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THE DISTRIBUTION OF RICH CLUSTERS OF GALAXIES*

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ABSTRACT

A catalogue is prepared of 2712 rich clusters of galaxies found on the National Geographic Society–Palomar Observatory Sky Survey. From the catalogue, 1682 clusters are selected which meet specific criteria for inclusion in a homogeneous statistical sample. An investigation of the sample leads to the following conclusions: (1) the distribution function of clusters according to richness, $N(n)$, increases rapidly as n decreases; (2) the data allow no significant decision that the spatial density of cluster centers varies with distance; (3) galactic obscuration of the order of a few tenths of a magnitude (photored) exists at high northern galactic latitudes around galactic longitude 300°; (4) there is a highly significant non-random surface distribution of clusters, both when clusters at all distances and when clusters at various distances are considered. An analysis of the distribution yields evidence that suggests the existence of second-order clusters, that is, clusters of clusters of galaxies. A statistical test reveals no incompatibilities between the observed distribution and one of complete second-order clustering of galaxies.

I. INTRODUCTION

Numerous attempts have been made to investigate the large-scale distribution of matter in the universe by analyzing counts of galaxies to various limiting magnitudes (Hubble 1936; Limber 1953, 1954; Neyman and Scott 1952; Neyman, Scott, and Shane 1953, 1954; Scott, Shane, and Swanson 1954). Although the approach has been interesting and undoubtedly fruitful, an obvious limitation is the uncertainty of galaxian distances. Of course, distances of galaxies are correlated with their apparent magnitudes; however, the uncertainty of the luminosity function of galaxies complicates and weakens the statistical treatment.

Clusters of galaxies, on the other hand, provide an independent approach to the problem of the over-all distribution of matter. Since there is a possibility of determining at least relative distances to individual clusters, their spatial distribution is directly obtainable. Results of work by Zwicky on the distribution of clusters over some regions of the sky have already been published (1938, 1942, 1952, 1953, 1956).

To obtain the distance to a cluster, some suitable characteristic of the luminosity function for a given cluster (for example, the magnitude of its nth brightest member) must be assumed known. At the present time, even the bright end of the luminosity function for galaxies in clusters is not accurately known, nor is it known how the function might depend upon the richness, distance, or compactness of a cluster. However, there is some observational evidence (Humason, Mayall, and Sandage 1956) that the dispersion among the absolute magnitudes of the third, fifth, and tenth brightest galaxies of rich clusters is not over 0.35 mag.

The principal statistical limitation of clusters of galaxies for distribution studies has been their small numbers. Prior to 1949, only a few dozen clusters were known. Twenty-five of these had been listed by Shapley (1933). In recent years, however, two independent photographic programs have indicated that clusters of galaxies are far more numerous than was formerly thought and that, indeed, they may be fundamental condensations of matter in the universe. These are the proper-motion survey made with

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the 20-inch Carnegie astrograph of the Lick Observatory and the National Geographic Society–Palomar Observatory Sky Survey.

On the Palomar survey, which is by far the more extensive in space of the two, tens of thousands of aggregates of galaxies can be identified. Nearly two thousand of these clusters are sufficiently rich to provide a homogeneous sample that is suitable for a provisional statistical investigation. Such an investigation is the purpose of the present program.

The study is in two parts. The first part consists of the compilation of a catalogue of 2712 rich clusters of galaxies discovered on the sky survey. The catalogue is intended as a finding list which is expected to be useful for the investigation of problems related to clusters.

In the second part, a homogeneous sample of 1682 clusters is selected from the catalogue for statistical study. The three problems considered are the uniformity of the distribution of clusters with depth in space, the isotropy of the distribution of clusters, and the evidence available for second-order clustering, that is, for the existence of clusters of clusters of galaxies.

II. A CATALOGUE OF RICH CLUSTERS OF GALAXIES

a) Observational Material

The observational material used for this study is the National Geographic Society–Palomar Observatory Sky Survey. The survey covers the sky from the north celestial pole down to declination -27° on 879 pairs of photographs taken with the 48-inch Schmidt telescope of the Palomar Observatory. Details of the sky survey have been given elsewhere (Wilson 1952; California Institute of Technology 1954). However, a few features are particularly pertinent to the present program and should be mentioned.

Each of the 14 × 14-inch photographic plates employed covers a field $6\overset{\circ}{.}6$ square; the image scale is thus 67.1 seconds of arc per millimeter. The smallest stellar images have a diameter of about 30 μ, about the limit of resolution of the Eastman 103*a* emulsions used. The non-vignetted field is $5\overset{\circ}{.}4$ in diameter. The computed loss in limiting magnitude because of vignetting at the extreme corners of a plate is less than 0.2 mag.

The fields for the sky survey were selected to allow for an overlap of at least $0\overset{\circ}{.}6$ along adjacent edges. Each field was photographed twice, once on an Eastman type O emulsion and once on a type E emulsion through a red Plexiglass filter. All exposures were made on photometrically clear nights in the absence of moonlight and when the seeing disk of a stellar image was not more than 3 seconds of arc in diameter.

The exposure times were chosen to reach the faintest stars that can be recorded by the instrument under average observing conditions. They ranged from 10 to 15 minutes for the blue exposures and from 40 to 60 minutes for the red. All plates were developed in standard formula D-19 developer for 5 minutes; the resulting contrasts are between 1.5 and 2.0. The original plates (which were used for the study of clusters) are of substantially lower contrast than the photographic reproductions, which have been distributed in the *Sky Atlas*, and are thus more satisfactory for the identification of faint galaxies.

The red and blue limiting magnitudes have been determined by the writer from six pairs of red and blue plates which contained Selected Area 57. The standards used were the photoelectric measures of stars in SA 57 by W. Baum, which were communicated to the writer prior to publication. The limiting photographic magnitude for the blue plates is 21.1, and the limiting photored magnitude for the red plates is 20.0. The red magnitudes are approximately on the same system as those of Kron and Smith (1951). Here by "limiting magnitude" is meant the faintest magnitude for which every star produces a recognizable image.

The intrinsic international color indexes of nearby elliptical and early-type spiral galaxies range between +0.8 and +0.9, while the later-type spirals are somewhat bluer (Baade 1951). Owing to the red shift of distant galaxies, the maxima of their spectral energy-curves are shifted to the red. The largest red shifts so far measured (Humason *et al.* 1956) are about $d\lambda/\lambda = 0.2$. A galaxy with an intrinsic effective wave length of λ 5000 would thus appear to have an effective wave length of λ 6000. Therefore, all but the nearest galaxies are more conspicuous on the red survey plates than on the blue. A cluster of galaxies with a red shift of $d\lambda/\lambda = 0.2$, although plainly visible on the red plate, is so inconspicuous on the blue plate as to be scarcely recognizable as a cluster.

Because of the advantages of the red plates for revealing distant clusters of galaxies, only the red survey photographs were used in the present study. The red plate-filter combination has a wave-length range of λ 6200 (filter cut off) to λ 6700, with an effective wave length near λ 6500.

b) Definition of a Cluster

A statistical investigation described in a recent series of papers by Neyman and Scott (1952), Neyman, Scott, and Shane (1953), Neyman, Scott, and Shane (1954), and Scott, Shane, and Swanson (1954) has indicated that clusters of galaxies may be fundamental units of matter. Indeed, the observed galaxian distribution on plates taken for the Lick survey was shown to be compatible with a statistical distribution model in which complete clustering of galaxies was assumed. It was further found that it was not possible to identify a particular cluster center to which each galaxy belonged. In a synthetic distribution obtained from the statistical model of complete clustering, galaxies in apparent clumps or associations were invariably found to be contributed from two or more different cluster centers. Thus, even though the distribution of galaxies on the 20-inch plates is compatible with the assumption that all galaxies are in clusters, it is not possible (at least on those plates) to identify the clusters to which individual galaxies belong.

The results of the Lick investigation imply that one must exercise considerable caution in deciding what a cluster is. It would appear that many apparent clusters are only projection effects, not physical associations of galaxies. Furthermore, the many clusters projected on each other on a photograph create the impression of a general field of galaxies, individual clusters often being "washed out" and indistinguishable from the field. Whereas no attempt has as yet been made to determine whether the distribution of galaxy images on the 48-inch plates is also compatible with the theory of complete clustering, the possibility must be considered that the same difficulties in the identification of clusters on the Palomar survey plates may be encountered as in the case of the Lick survey.

On the other hand, there are some well-known rich clusters of galaxies which are unquestionably real physical associations. Consider, for example, the famous clusters in Virgo and Coma Berenices, both of which have been well studied (Shapley 1934; Smith 1936; Zwicky 1942, 1951, 1952; Tuberg 1943; Baade and Spitzer 1951).

For the purpose of the present study, we shall consider the following picture of the distribution of galaxies: There is a general field of galaxies, the surface numerical density of which varies from point to point in the sky. Whether this field is composed of isolated individual galaxies, of clusters of galaxies overlapping in projection, or both, is considered immaterial. In any case, superposed upon the general field there are occasional very rich clusters of galaxies which stand out conspicuously and which we shall assume to be physical associations. There will generally be a few galaxies belonging to the general field which will be indistinguishable from the bona fide cluster members. However, their number will be relatively small if we consider only the very richest aggregates. In the present investigation, criteria have been set up which are intended to exclude those associations which have a non-negligible chance of being optical only or which are insufficiently rich to insure identification.

To be useful for statistical analysis, it is essential that those clusters that meet the adopted criteria be identified completely. As each sky survey plate was taken, it was carefully inspected, either by Dr. A. G. Wilson or by the writer (the principal observers for the sky survey). A card file was kept of interesting objects, including clusters of galaxies, noted on the photographs. Since nearly half of the survey fields had to be photographed more than once to obtain plates which met the standards set for the sky survey, duplicate inspections were made of a large part of the sky. As the data were collected for the catalogue of clusters, the acceptable red plate of each survey field was again carefully inspected by the writer. The list of clusters found on each plate was then compared with the earlier records of the original inspections of that plate and all duplicate plates of the same field. The criteria for the definition of a cluster of galaxies were so set that no more than about 2 per cent of the clusters identified on one of the original inspections, and which meet the criteria, were missed on the final inspection. The adopted criteria are described in the following paragraphs.

Richness criterion.—A cluster must contain at least fifty members that are not more than 2 mag. fainter than the third brightest member. The third rather than the first brightest member was chosen as the reference point, to reduce possible errors in the counts caused by confusion of the brightest members of clusters with field galaxies.

Compactness criterion.—A cluster must be sufficiently compact that its fifty or more members are within a given radial distance, r, of its center. The actual length of r is arbitrary so long as it is the same for all clusters. In determining whether a cluster meets this criterion, it was assumed that the red shifts of clusters are proportional to their distances. An estimate of the red shift was made by a technique described in Section I*e*. Then the counts of galaxies in the cluster were extended to a distance on the plate $4.6 \times 10^5/c d\lambda/\lambda$ mm from the center of the cluster (c in kilometers per second). For an assumed value of the Hubble constant of $H = 180$ km/sec $\times$ 10^6 pc (Humason *et al.* 1956), this corresponds to a distance in space of 8.3×10^5 pc. It should be pointed out that the counts are not particularly sensitive to the estimate of the red shift or to the linearity of the red-shift law. In practice, it was found that the circle on the plate to which the counts were made was always considerably larger than the main concentration of the cluster, and counting to a radius 30 per cent larger or smaller would not substantially affect the counts (after correction for the general field).

Distance criterion.—A cluster must be sufficiently distant that counts of its members do not extend over more than one plate or, at most, part of an adjacent plate. The Virgo cluster, for example, spreads over several survey fields and would be very difficult to catalogue in a manner comparable to the more distant clusters. The adopted lower limit of distance is the distance corresponding to a red shift of 6000 km/sec. The Coma cluster ($c d\lambda/\lambda = 6600$ km/sec) would thus be among the nearest clusters included in the catalogue.[1]

The upper limit on distance is set by the requirement that 2-mag. intervals beyond the third brightest member of a cluster be visible. Since it is not desirable to extend counts to within less than $\frac{1}{2}$ mag. of the plate limit (20.0), it was decided to set, as an upper limit on distance, clusters whose third brightest members average about magnitude 17.5. The corresponding red shift for such clusters is 60000 km/sec. The range in space included within these distance limits (corresponding to $H = 180$ km/sec $\times$ 10^6 pc) is 3.3×10^7–33×10^7 pc.

Galactic-latitude criterion.—In fields at moderately low galactic latitudes the density of stars is high enough that clusters may not be completely identified. As each plate was inspected, it was noted whether or not it was thought that visible clusters were being completely identified. Those areas of the sky in the neighborhood of the Milky Way, where the star fields are moderately dense, were excluded for the purpose of a statistical

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[1] It is No. 1656 in the catalogue (Table 6).

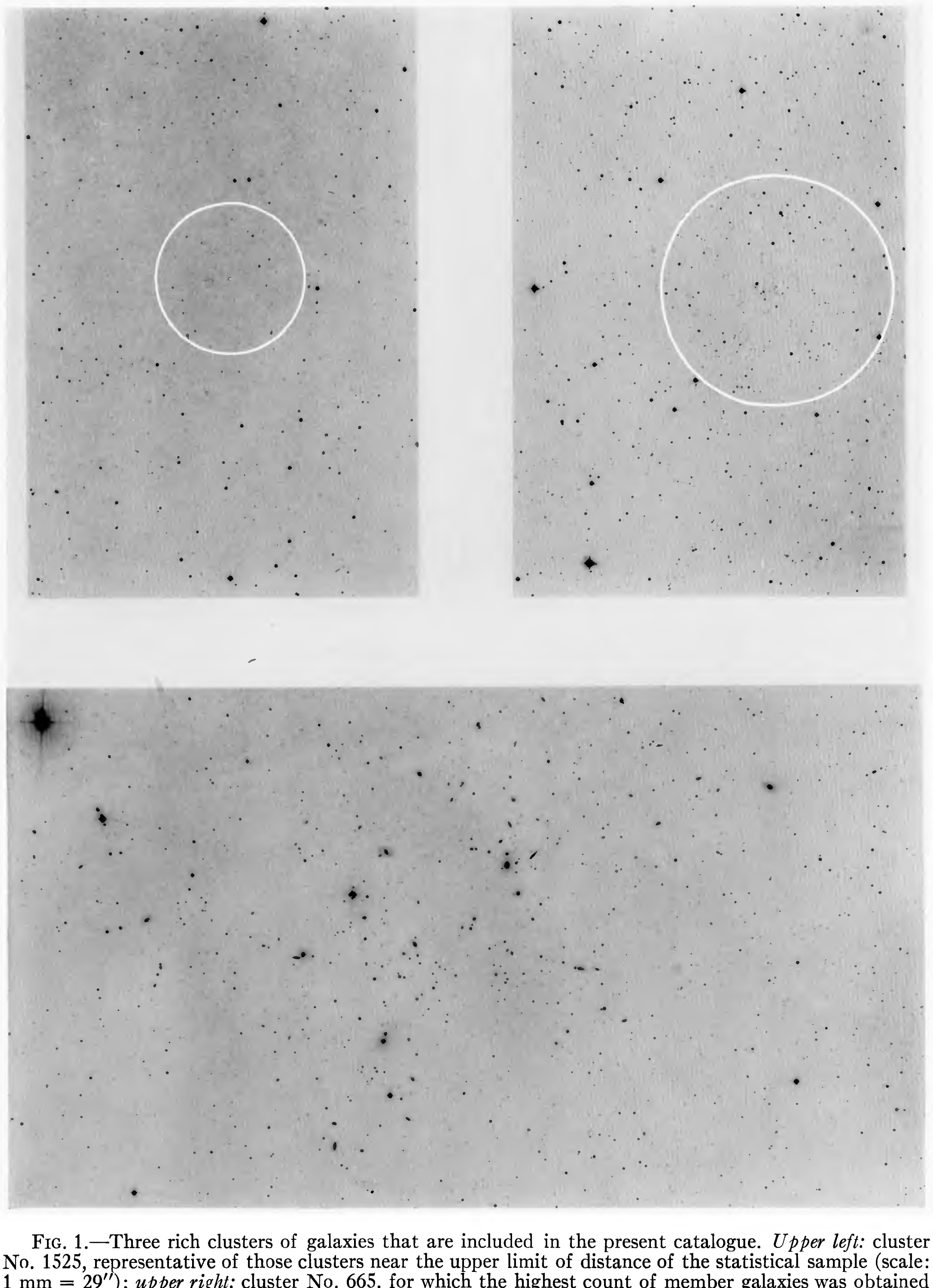

FIG. 1.—Three rich clusters of galaxies that are included in the present catalogue. *Upper left:* cluster No. 1525, representative of those clusters near the upper limit of distance of the statistical sample (scale: 1 mm = 29″); *upper right:* cluster No. 665, for which the highest count of member galaxies was obtained (scale: 1 mm = 32″); *bottom:* cluster No. 1367, a rich cluster near the lower limit of distance of the sample (scale: 1 mm = 50″). The first two clusters may not show well in the reproductions.

analysis. Interstellar obscuration, of course, also prevents complete identification of clusters. The magnitudes of partially obscured clusters and consequently their distances are overestimated. Distant clusters are reduced in brightness so as either to be invisible or to appear beyond the range of distances considered in the study. However, at the latitudes down to which the catalogue is actually extended, the effect of a moderately rich star field in camouflaging visible clusters is of importance comparable to the effect of interstellar obscuration in actually hiding clusters. How galactic absorption actually affects the results of the investigation will be discussed in Section III*d*.

The precise galactic latitudes at which the catalogue is considered incomplete vary with longitude and are based on the judgments made of the star densities at the times when the various plates were inspected. In Table 1 are tabulated the galactic latitudes above which (in the northern galactic hemisphere) or below which (in the southern galactic hemisphere) the identification of clusters is considered complete for the purposes of the statistical investigation of Section III.

TABLE 1

REGION OF COMPLETE IDENTIFICATION

North Galactic Hemisphere		South Galactic Hemisphere	
Longitude	Latitude	Longitude	Latitude
0°- 10°	+40°	0°- 80°	−35°
10 - 60	+35	80 -160	−30
60 -150	+25	160 -200	−25
150 -210	+30	200 -340	*
210 -360	+40	340 -360	−35

* Area of the celestial sphere not covered by the Palomar sky survey.

In the preparation of the catalogue, all survey fields, including those in the Milky Way, were inspected. All clusters which looked as if they might satisfy the completeness criteria were examined. Many clusters which, for one reason or another, did not fulfil the various requirements to be included in the statistical study were nevertheless included in the catalogue to enhance its value as a finding list. All such entries, which are not suitable for the statistical sample, are so noted in the catalogue. In particular, the catalogue contains many clusters which do not meet the richness or the galactic-latitude requirements.

Portions of 48-inch Schmidt plates showing three clusters are reproduced in Figure 1. Included are a comparatively nearby cluster, a typical cluster near the limit of the statistical sample, and the richest cluster catalogued.

c) Magnitude Estimates

Magnitudes of galaxies in clusters were estimated by comparing them with calibrated galaxy images on 4 × 5-inch sheets of cut film. The films are negative reproductions of arbitrary galaxy fields on survey plates. The film copies were made with a very low-density sky background and with the same scale as the originals. The procedure was to superpose the appropriate film on a survey plate and, by looking through both the film and the plate, to match up the image of the unknown galaxy on the plate with one of the calibrated images on the film. Six- to ten-power magnifying lenses were used for optical aid.

The galaxian images on the films were calibrated by the similar technique of superposing the films on survey plates containing images of galaxies of known magnitudes. A total of sixty galaxian images on three sheets of film were so calibrated. The images on the films thus served as "step scales" to compare images of galaxies of unknown with those of known magnitudes. The tacit assumption in this procedure is that all survey plates are identical with each other (as regards image quality) and with the plates from which the calibration was made. Fortunately, the acceptable survey plates were taken under fairly well-standardized conditions, and only in a very few cases does the quality of plates vary sufficiently to affect the magnitudes so determined by more than a few tenths. Quantitative estimates of the consistency of the magnitudes were later made and are described in Section II*g*.

Unfortunately, there were not available photored magnitudes of standard galaxies covering a sufficient magnitude range. Magnitudes of a number of galaxies, therefore, had to be determined before calibration of the images on the films was possible. For this purpose, forty-seven galaxies of various apparent magnitudes were chosen arbitrarily in the field near SA 57.

It was not important for this program whether or not the standard magnitudes had a zero-point error. There were two purposes for which magnitude estimates were required. First, an estimate of the magnitude of the tenth brightest member of each cluster was to be used as a distance criterion. The procedure assumes a certain constancy of the bright end of the luminosity function in clusters. No attempt was actually made to interpret distances directly from magnitudes. Rather, since the catalogue includes most of the clusters for which measured red shifts are available, it was possible to scale the magnitudes of the tenth brightest cluster members to approximate red shifts (see Sec. II*e*). Thus, if the pertinent part of the luminosity function of clusters is constant and if the magnitude determinations are self-consistent, there will exist a one-to-one relation between the magnitudes of the tenth brightest members of clusters and their red shifts (as well as their distances if a specific red shift–distance relation is assumed). The relation is independent of any zero-point error in the magnitude standards or even of any scale error.

The second purpose for which magnitudes were needed was to determine in each cluster a 2-mag. interval beyond the third brightest member for the purpose of making a count of the population of the cluster which is independent of its distance. For this purpose also a zero-point error is immaterial, although a scale error would obviously introduce a systematic bias in the counts between near and distant clusters.

The determination of galaxian magnitudes by photographic techniques is difficult and involved. The aperture effect introduced by the contribution of light from the outer unobserved parts of a galaxy is particularly troublesome (Humason *et al.* 1956). However, since the aperture effect appears largely as a shift in the zero point and since high precision was not required, the following photographic technique was deemed satisfactory and was employed to find magnitudes for the standard galaxies.

Four red plates of the field containing SA 57 and the forty-seven standard galaxies were taken with the 48-inch telescope. The plate-filter combinations, sky transparency, exposure times, and development were all matched to those of the red survey plates. One of the four plates was taken in focus, and the other three were, respectively, 0.75, 1.75, and 5.0 mm out of focus. The faintest galaxies appeared so nearly stellar on the Schmidt plates that they could be compared directly with standard stars in SA 57 on the in-focus plate. Magnitudes of all but the faintest galaxies were determined by comparing their extra-focal images with those of stars in SA 57.

The principal source of error in this technique is that the outer extremities of the galaxies will not be included in the extra-focal images. The effect is minimized if the extra-focal images are large compared with the angular extent of the galaxies. Measures for most of the galaxies could be made on two or three of the plates. Especially for the nearer and brighter galaxies, the measured magnitudes were systematically larger for smaller extra-focal image sizes. However, in the cases of most of the galaxies, magnitude determinations on at least two of the plates would be in fair agreement. The plan adopted was to average the two results obtained from the in-focus plate and the plate 0.75 mm out of focus for galaxies fainter than the sixteenth magnitude; from the plates 0.75 mm and 1.75 mm out of focus for galaxies between the fifteenth and sixteenth magnitudes; and from the plates 1.75 and 5.0 mm out of focus for galaxies brighter than 15.0 mag. The results are considered least reliable for galaxies brighter than about the fourteenth magnitude; the images of these galaxies are so large that the magnitudes obtained also are probably numerically too large.

The results are given in Table 2. The second and third columns, headed x and y, are the plate co-ordinates of the galaxian images, measured, respectively, horizontally and vertically in centimeters from the northeast corner of the exposed part of the plate. The field has the same center as sky survey plate No. 1393 (1855: $\alpha = 13^{\mathrm{h}}0^{\mathrm{m}}$, $\delta = +30°$). The center of SA 57 on this field is $x = 15.3$ and $y = 16.3$. The next four columns list the magnitudes which were used in the final averages as determined from the plates, respectively, 5.0, 1.75, and 0.75 mm out of focus and in focus. The last column gives the adopted magnitudes for the standard galaxies.

The standard error of the adopted magnitudes, computed from those cases where two values were averaged, is 0.21 mag. This describes the internal consistency of the results but not, of course, any systematic error of the magnitudes. Photoelectric magnitudes and colors for three of the measured galaxies, Nos. 1, 2, and 7, are given by Pettit (1954). While Pettit does not give photoelectric minus photored colors, these can be estimated by assuming the color equation,

$$(P - R) = 1.6\,(P - V)\,; \tag{1}$$

where P, V, and R are photographic, photovisual, and photored magnitudes, respectively. The red magnitudes so determined from Pettit's measures of the three galaxies in common average about 1.0 mag. brighter than the values given in Table 2. The result was expected for such bright galaxies because of the comparatively large aperture effect. It will be described in Section II*g* how the entire range of magnitudes was roughly checked against magnitudes measured by Sandage. The systematic error noted for bright galaxies is much smaller or absent for galaxies fainter than the fifteenth magnitude. Consequently, counts of galaxies in the nearest clusters may have been extended over a range of less than 2 mag. beyond the third brightest member. This source of error, which is discussed in Section II*g*, applies to very few clusters and does not affect the results of the investigation of Section III in a significant way. Other than at the bright end, the sequence of magnitude standards is considered satisfactory.

At the time that the calibration of the step-scale images on the films was made, it happened that four pairs of survey plates of this same field containing the 47 standard galaxies were available. These were plates which had not met the standards set for the sky survey and had thus been rejected for the final survey collection. In none of the four cases, however, was the cause for rejection one which affected the quality of images on the red plates. Therefore, the images of the standard galaxies on each of the four plates were used for the calibration. Furthermore, each of the sixty step-scale images on the films was calibrated by interpolation between three pairs of standard galaxies on each of the four survey plates. The final calibration of each step-scale image is thus the average of twelve independent estimates and is considered accurate (except for a zero-point error) to within 0.1 mag. Actual estimates of magnitudes made from the calibrated images may, of course, have considerably greater errors; indeed, the survey plates are not all homogeneous to within 0.1 mag.

TABLE 2

PHOTORED MAGNITUDES OF 47 STANDARD GALAXIES NEAR SELECTED AREA 57

No.	x (cm)	y (cm)	OUT OF FOCUS			IN FOCUS	ADOPTED
			5.0 mm	1.75 mm	0.75 mm		
1	25.2	23.8	12.0	12.4	....	....	12.2
2	25.8	23.8	12.8	12.7	....	....	12.8
3	19.5	17.6	12.8	12.7	....	....	12.8
4	20.8	22.7	13.0	12.8	....	....	12.9
5	28.4	26.2	13.1	13.2	....	....	13.2
6	25.0	22.5	13.5	13.2	....	....	13.4
7	24.2	24.7	13.5	13.5	....	....	13.5
8	23.0	23.6	13.7	13.6	....	....	13.6
9	23.6	24.3	13.5	13.7	....	....	13.6
10	13.8	18.7	13.5	13.7	....	....	13.6
11	27.6	22.2	13.9	13.7	....	....	13.8
12	25.7	18.6	13.6	13.9	....	....	13.8
13	17.2	20.7	13.7	13.9	....	....	13.8
14	18.3	16.8	13.8	14.3	....	....	14.0
15	24.5	18.1	14.0	14.1	....	....	14.0
16	27.9	24.2	14.0	14.7	....	....	14.4
17	27.9	24.4	14.4	14.9	....	....	14.6
18	24.6	23.3	....	14.9	15.0	....	15.0
19	12.7	14.4	....	14.7	15.3	....	15.0
20	26.7	23.1	....	15.1	15.4	....	15.2
21	28.0	24.8	....	15.1	15.6	....	15.4
22	12.1	13.9	....	15.2	15.5	....	15.4
23	9.5	12.6	....	15.4	15.3	....	15.4
24	10.0	14.6	....	....	15.5	....	15.5
25	14.9	18.0	....	....	15.5	....	15.5
26	25.7	23.8	....	15.4	15.6	....	15.5
27	12.8	20.2	....	15.4	15.7	....	15.6
28	25.7	17.6	....	15.8	16.0	....	15.9
29	8.9	16.0	....	....	16.1	....	16.1
30	22.4	17.1	....	....	16.7	16.1	16.4
31	27.2	22.8	....	....	16.7	16.0	16.4
32	18.4	15.0	....	....	16.7	....	16.7
33	13.6	19.2	....	....	16.6	16.9	16.8
34	7.9	19.6	....	....	16.9	16.8	16.8
35	14.8	25.7	....	....	16.9	16.9	16.9
36	15.2	23.6	....	....	17.3	16.9	17.1
37	25.5	17.6	....	....	17.6	17.8	17.7
38	14.4	22.5	....	....	17.5	18.0	17.8
39	13.6	15.7	....	....	17.2	18.3	17.8
40	14.6	26.8	....	....	17.7	18.4	18.0
41	17.5	24.5	....	....	18.0	18.0	18.0
42	12.0	16.2	....	....	17.8	18.1	18.0
43	18.2	22.9	....	....	17.9	18.4	18.2
44	18.7	26.9	....	....	18.0	18.6	18.3
45	17.6	25.4	....	....	....	18.4	18.4
46	18.0	23.1	....	....	....	18.6	18.6
47	14.8	26.4	....	....	....	18.6	18.6

d) *The Luminosity Function of Galaxies in Clusters*

In two respects the results of the investigation depend upon the bright end of the luminosity function of galaxies in clusters: (1) the magnitude of the tenth brightest member of a cluster is used as a distance criterion for the cluster; (2) the number of galaxies not more than 2 mag. fainter than the third brightest member of the cluster is used as a richness criterion for the cluster.

The validity of criterion 1 requires that the tenth brightest member of each rich cluster have the same absolute magnitude. The requirement will be fulfilled if there exists an intrinsic upper limit to the luminosities of galaxies and if the brightest galaxies in all the clusters considered reach this limit. The low dispersion observed by Humason, Mayall, and Sandage (1956) in the luminosities of the third, fifth, and tenth brightest members of clusters with measured red shifts is the only observational evidence that such an upper limit to luminosities of galaxies in clusters does exist. Unfortunately, the red-shift list does not include clusters as rich as the richest ones entered in the present catalogue. The validity of criterion 1, therefore, cannot be completely verified until more comprehensive data are available on the luminosity function of galaxies in clusters.

The validity of criterion 2 depends on the form of the bright end of the cluster luminosity function. If, for example, the numbers of galaxies of various magnitudes in each cluster increase linearly with increasing magnitude, clusters of all richnesses would have the same number of members in the magnitude interval counted. If, on the other hand, there exists an upper limit to luminosities of galaxies, differences in populations of different clusters can be expected to be reflected in the counts through the interval of the brightest 2 mag.

To check whether the counts of the brightest galaxies in clusters do indeed indicate the total richnesses of the clusters, five clusters were selected for which counts of members not more than 2 mag. fainter than their third brightest members range from 34 to 140. The bright ends of the apparent luminosity functions for these clusters were determined approximately with the step scale of calibrated galaxy images. The results are shown in Figure 2. The ordinates are the integrated luminosity functions, that is, the numbers of galaxies brighter than m; and the abscissae are the magnitudes, all adjusted to the same scale by subtracting the magnitude of the third brightest member for each cluster. The interval through which counts were made for the catalogue is that indicated by the vertical line.

It is seen in Figure 2 that the curves for richer clusters have steeper slopes both in and beyond the magnitude range to be counted. It can therefore be concluded that counts of galaxies in the 2-mag. intervals beyond the third brightest members do actually indicate differences between clusters of different richnesses. However, it cannot be assumed that there exists a proportionality between the counts in the adopted magnitude range and the true total population of the cluster. The relation between the bright end of the luminosity function and the total population of a cluster is not known at present.

The curves in Figure 2 have been arbitrarily shifted to the same magnitude for the third brightest cluster members. This in no way assures that the third brightest members of all the clusters have the same absolute magnitudes. Figure 2 indicates only that richer clusters will yield larger counts in their brighter magnitude intervals.

It should be noted from the figure that it is not possible that both the third brightest and the tenth brightest galaxies have exactly the same absolute magnitudes in different clusters. However, when the integrated luminosity functions are shifted so that they match for the third brightest cluster members, the points on the curves corresponding to the tenth brightest members lie within 0.4 mag. of each other. Thus these approximate data on the luminosity functions for five clusters do not invalidate the use of the tenth brightest members as distance indicators.

e) Relation between Magnitudes and Red Shifts

Although the magnitude of the tenth brightest member of a cluster is used here as a distance criterion, the results of the investigation do not depend in any critical way upon a knowledge of the actual distance to a cluster. It is sufficient that clusters can be ordered in distance with the assumption that an approximate one-to-one relation exists between the distance of a cluster and the magnitude of its tenth brightest member.

As it happens, however, it is possible to use a red-shift–magnitude relation, determined for the clusters for which Humason (Humason *et al.* 1956) has measured red shifts,

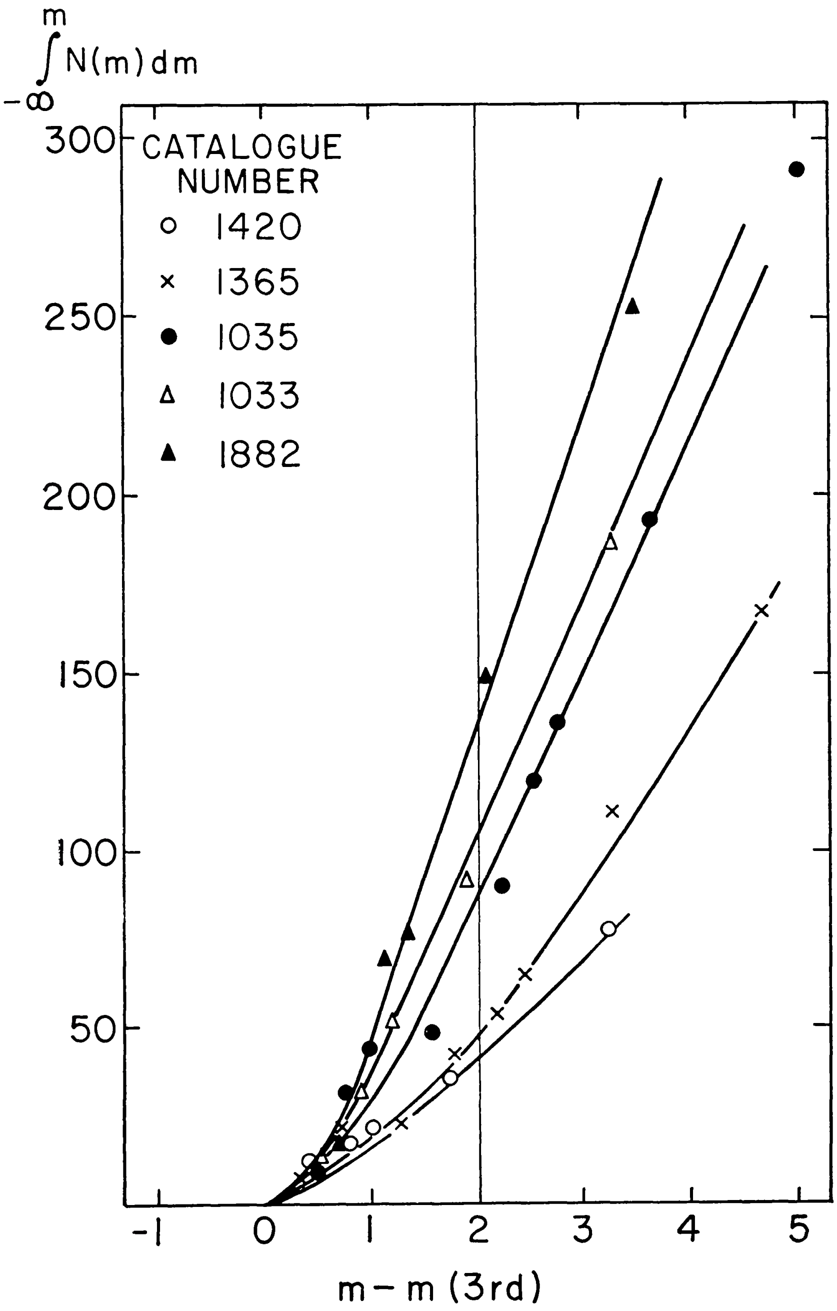

FIG. 2.—Integrated luminosity functions of five clusters in the catalogue. Abscissae are magnitudes compared to that of the third brightest galaxy of each cluster.

to estimate the red shifts of the catalogued clusters from the magnitudes of their tenth brightest members. When the Hubble constant is finally determined, or if one assumes the provisional value of the Hubble constant that was determined by Sandage, the red shifts can be translated into distances.

In the preparation of the catalogue it was necessary that relative distances be approximately known for clusters, so that counts of their memberships could be extended to the same radius in space. For this purpose, a provisional red-shift estimate was made for each cluster at the time the inspection of the plate for the cluster catalogue was made, and the counts of that cluster were extended to a distance on the plate $4.6 \times 10^5/cd\lambda/\lambda$ mm from the cluster center (Sec. II*b*). An accurate knowledge of the red shift for this purpose is not necessary.

Eighteen rich clusters with measured red shifts were available. On the Schmidt plates the tenth brightest members of these clusters were measured with the calibrated step scales. The velocity-magnitude relation for these data (given in Table 3) was plotted (Fig. 3) and was used to estimate red shifts for the other clusters. The two discrepant points at $\log cd\lambda/\lambda = 4.365$, $m = 16.6$, and $\log cd\lambda/\lambda = 4.410$, $m = 17.5$, are discussed in Section II*g*.

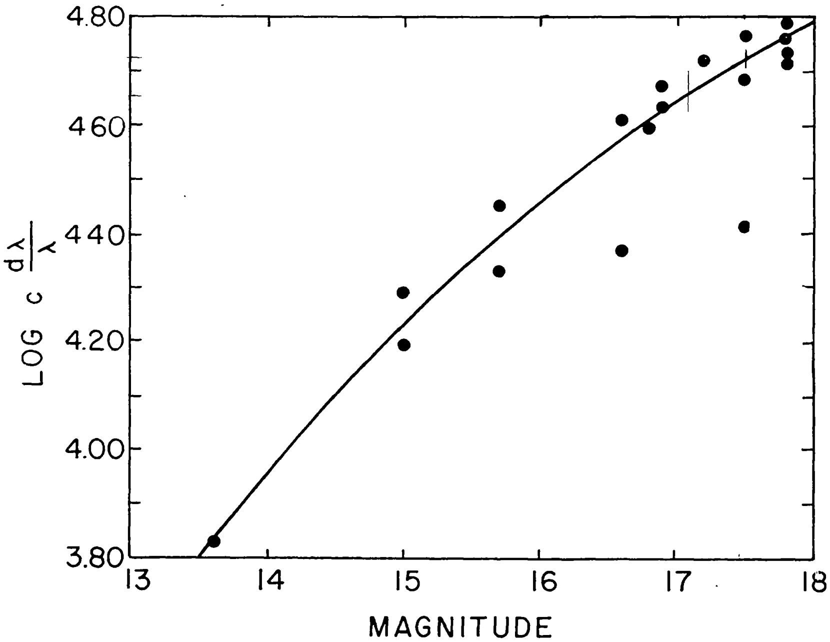

FIG. 3.—*Ordinates:* log $cd\lambda/\lambda$ for clusters of measured red shift included in the catalogue; *abscissae:* photored magnitudes of tenth brightest cluster members estimated with step scale of galaxian images prior to actual compilation of catalogue.

The curvature of the log $cd\lambda/\lambda$-magnitude relation of Figure 3 reflects the systematic errors in the magnitude scale determined by the photographic extra-focal technique (Sec. II*c*).

f) Inspection of Plates

The red plate for each sky survey field was inspected and searched for clusters of galaxies with a 3.5× magnifying lens. All rich clusters that were recognized and that appeared as possible candidates for inclusion in the statistical sample were noted. Next the records were consulted of earlier routine inspections of the same plate or of other plates of the same field made by either the writer or A. G. Wilson. All but 1 or 2 per cent of those clusters which finally met the criteria for the statistical sample and which were found on one of the earlier inspections were also found in the final cluster search.

After the identification of each cluster, its center was estimated by eye and noted with an ink dot on the cover glass of the plate. No attempt was made to locate a cluster center quantitatively; the centroid of the collection of galaxy images was determined solely by judgment.

The following pertinent information was noted for each cluster:

1. The right ascension and declination for the equinox 1855, entered to a tenth of a minute of time (for right ascension) and 1 minute of arc (for declination). The position was determined by locating the cluster center on the appropriate *BD* chart with a pencil mark and then measuring the position of the mark on the chart with a scale. (For the clusters south of $\delta = -23°$, the *CD* charts were used, and the equinox of the positions was 1875 rather than 1855). The writer's previous experience with this method of determining positions indicates that positions so obtained are usually accurate to within a minute of arc. A larger source of error arises in locating the center of the cluster. A check is available on the positions obtained and is discussed below.
2. The photored magnitude of the tenth brightest member, estimated with the step-scale technique described in Section II*c*.
3. The number of members in the cluster which are not more than 2 mag. fainter than the third brightest member. With the step scale, a galaxy was identified which was, as nearly as could be estimated, exactly 2 mag. fainter than the third brightest galaxy in the cluster. From the magnitude of the tenth brightest member, the red shift of the cluster was estimated (Fig. 3 and Sec. II*e*), and then the galaxies in the cluster were counted which were as bright as, or brighter than, the one identified as 2 mag. beyond the third brightest and which were within $4.6 \times 10^5/cd\lambda/\lambda$ mm from the cluster center on the plate. A sheet of transparent celluloid upon which concentric circles of various sizes were scratched was superposed over the cluster center to facilitate extending the counts over the proper area of the plate. In each case, galaxies in a region of the plate apparently "free" of clusters were counted in a comparable area down to the same limiting magnitude. The "field" count was then subtracted from the direct count over the cluster to obtain the corrected "true" population of the cluster. The corrections for the "field" galaxies ranged up to about 30 per cent of the total uncorrected counts, the larger corrections occurring for the more distant clusters in which the counts were extended to fainter magnitudes.
4. A judgment as to whether or not interstellar absorption is apparent on the plate and whether the star density in that field is so dense that complete identification of visible clusters is in question. These judgments were later used to determine the limits of galactic latitude at which the sample is considered complete.

The number of clusters identified and catalogued on each plate ranged from none to over thirty and averaged around five or six for fields far from the Milky Way.

g) Accuracy

In the course of the inspection, nearly three thousand clusters were catalogued. However, since adjacent plates overlap on all edges, a number of clusters occurring in the overlap regions of the plates were catalogued separately during the inspection on two different plates. These duplications are of great value in determining the internal consistency of the measuring and counting techniques.

The cluster data were first sorted so that duplications could be located and removed. One hundred and twenty pairs of duplicate data for clusters were found, including one case where a cluster occurring near the corner of a field was measured on three different plates. The number of duplicates is smaller than might at first be expected from the relative areas of the overlapping and non-overlapping parts of the plates; many clusters whose centers lie in the plate overlaps were measured only once because large fractions of their memberships lie outside the overlapping region. The lip of the plateholder prevented exposure of a $\frac{1}{4}$-inch strip along the edge of each 14 × 14-inch plate. A cluster whose center is within 0.35 inch of the edge of the exposed portion of a plate would not, in most cases, be counted on that plate. Thus the actual usable portion of a plate is about 12.8 inches square. The eight hundred and seventy-nine 12.8 × 12.8-inch fields cover about 32100 square degrees. On the other hand, the actual area of the sky surveyed is 30206 square degrees. Thus, about 1900 square degrees, or 6 per cent of the sky, is duplicated. Out of the 2712 clusters catalogued, one would expect about 160 duplications. Of the 1682 clusters which meet the requirements for the statistical sample, there should be about 100 duplicates. Actually, 90 of the 120 duplicated clusters are in the statistical sample.

For each pair of overlap duplicates, the corresponding determinations of positions, magnitudes, and counts were averaged and the results entered as revised data for each cluster. The values obtained in the two inspections of each cluster were then used to estimate the accuracy of the positions, magnitudes, and counts of the general catalogue clusters. The error estimates made are probably upper limits, for the largest measuring and counting uncertainties occur for clusters near the edges of plates.

Accuracy of positions.—The writer has found from experience that the position of an object can be located on the *BD* charts to an accuracy of about 1 minute of arc. In the case of a cluster of galaxies, however, a considerable uncertainty arises in locating the center of a cluster, and positions of a cluster determined on two different plates can be expected to differ from each other appreciably, owing to varying judgments of the location of the centroid of the cluster on the two plates. The effect is particularly important near the edge of a plate where part of a cluster may be out of the field. For the 120 "overlap" clusters, the standard deviation of the individual positions from the mean positions was computed to be 1.9 minutes of arc. Thus a position determined from the *BD* charts with the technique described will, in general, be within a few minutes of arc of the center of the cluster and always somewhere within the main concentration of the cluster. The greatest deviations occur for the comparatively nearby clusters which occupy a larger area in the sky, but for these clusters the positions are less critical.

Accuracy of magnitudes.—The internal consistency of magnitude estimates can also be checked from the overlap duplicates. Again, the error estimates obtained are upper limits. Not only were the plates of the two adjacent fields often taken years apart under varying observing conditions and with different emulsion shipments, but the quality of photographic images is generally poorest near the edges of a plate. For the hundred and twenty pairs of magnitude estimates in overlap clusters, the standard deviation of an individual estimate from the mean was computed to be 0.19 mag.

Accuracy of counts.—Counts of galaxies in clusters in the overlap regions are subject to the same uncertainties as are the magnitude estimates, in addition to the handicap that some of the members of an overlap cluster may lie off the field of the plate. For the hundred and twenty pairs of counts of overlap clusters, the standard deviation of an individual count from the mean is 16.9 per cent.

Before the plate inspection began, those clusters for which measured red shifts were available were separately inspected (see Sec. II*e*). Later, during the routine inspection, these clusters were treated on the same basis as all the new clusters. Thus positions, magnitudes, and counts were obtained for the calibration clusters, along with all other catalogue clusters. The magnitude estimates obtained the second time could then be compared with those made before the main cataloguing began. Thus another check is available on the magnitude estimates, as well as on the red-shift–magnitude relation described in Section II*e*.

Sandage (Humason *et al.* 1956) has also measured the magnitudes of the tenth brightest members of the calibration clusters. Sandage gives photographic and photovisual magnitudes which are not directly comparable to photored magnitudes. However, approximate photored magnitudes can be obtained from Sandage's values with the color equation given in Section II*c* (eq. [1]). The use of a linear color equation may not be accurate for galaxies, especially ones of large red shift, owing to the unknown ultraviolet radiation. Nevertheless, photored magnitudes so obtained are sufficiently good for a rough check between magnitudes estimated here with a step-scale technique and those measured by Sandage on plates taken with a jiggle-camera at the 200-inch telescope.

Table 3 gives for each of the calibration clusters the original magnitude estimate (Abell Est. 1), the final magnitude estimate (Abell Est. 2), and the approximate photored magnitudes obtained from Sandage's measures with equation (1). The catalogue number, the Mount Wilson–Palomar designation, log ($cd\lambda/\lambda$), and the richness designation (see Sec. II*h*) are also given. Figure 4 is a plot of log ($cd\lambda/\lambda$) versus magnitude from the final (Abell Est. 2) data. The corresponding curve in Figure 3 is shown as a dashed line in Figure 4. Magnitudes derived from the measures of Sandage are shown as open circles.

TABLE 3

PHOTORED MAGNITUDES OF THE TENTH BRIGHTEST CLUSTER MEMBERS

Catalog No.	Sandage-Humason Designation	log $c\ (d\lambda/\lambda)$	Richness	Abell Est. 1	Abell Est. 2	Sandage (From Eq. [1])
1656........	1257+2812	3.816	2	13.6	13.5	13.0
151.......	0106−1536	4.196	1	15.0	15.0	15.6
1020.......	1024+1039	4.290	1	15.0	16.0	....
2065.......	1520+2754	4.333	2	15.7	15.6	....
568.......	0705+3506	4.365	0	16.6	15.4	....
465.......	0348+0613	4.410	1	17.5	17.7	....
2048.......	1513+0433	4.450	1	15.7	16.0	....
1930.......	1431+3146	4.594	1	16.8	17.0	17.1
1132.......	1055+5702	4.608	1	16.6	17.0	17.1
1413.......	2253+2341	4.632	3	16.9	17.1	....
2100.......	1534+3749	4.662	3	16.9	17.0	....
31.......	0025+2223	4.680	2	17.5	17.7	17.0
234.......	0138+1840	4.714	1	17.8	17.9	17.5
1689.......	1309−0105	4.720	4	17.2	17.6	....
1677.......	1304+3110	4.740	2	17.8	17.7	....
801.......	0925+2044	4.761	2	17.8	17.7	17.3
1643.......	1253+4422	4.764	1	17.5	17.7	....
732.......	0855+0321	4.785	1	17.8	17.7	17.6

Comparison of the second and third to last columns of Table 3 indicates that the magnitude estimates are fairly consistent with one another except for the two clusters, catalogue Nos. 1020 and 568. In each case, one of the estimates was apparently a poor one, and the other one satisfactory, to judge from the scatter of the respective points in Figures 3 and 4.

Comparison of the last three columns of Table 3 indicates that, whereas the magnitude estimates made with the step-scale scatter about those derived from measures by Sandage (or perhaps are systematically slightly fainter), there is no gross inconsistency and, for magnitudes fainter than about 15.0, no significant systematic difference. Perfect agreement is not to be expected for reasons given above. The approximate agreement with the Sandage magnitudes and the fairly good internal consistency of the step-scale estimates furnish confidence that magnitudes obtained for the catalogue are satisfactory for the purpose for which they are used.

Investigation of the scatter about the smooth curve in Figure 3 indicates the standard error in red shift obtained from the red-shift–magnitude relation to be 26 per cent. The standard error would be much lower except for one point (catalogue cluster No. 465). Magnitude estimates for this cluster are consistently too high for the observed red shift. However, Humason (Humason *et al.* 1956) has measured only one galaxy in the cluster, and he states that its cluster membership is in doubt. The smooth curves in Figures 3 and 4 were therefore drawn without regard to that one point.

The effect of a scale error among the bright magnitudes (13.0–15.0) must finally be considered. As was discussed in Section II*c*, magnitudes determined by Pettit indicate a zero-point error at magnitude 13.0 of about 1 mag. Although it is not definitely established that the zero-point error is less for fainter magnitudes, it seems very likely that it could be so in view of the general agreement with the Sandage magnitudes. If a zero-point error decreasing with increasing magnitude is present, it is equivalent to a scale error and will result in the counts of nearby clusters being extended over too small a magnitude range. There is a possibility, therefore, that some nearby clusters sufficiently rich to meet the requirements for inclusion in a statistical sample may be omitted. However, the number of clusters whose tenth brightest members are brighter than 15.0 is very small compared with the more distant ones; increasing their number by a factor of 2 would not affect in any substantial way the results of Section III of this paper.

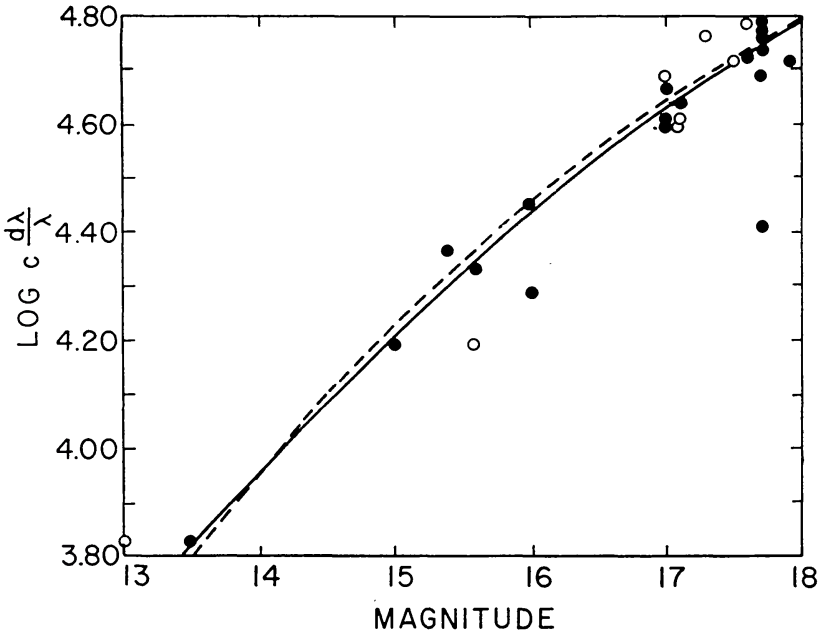

FIG. 4.—*Ordinates:* log $cd\lambda/\lambda$ for clusters of measured red shift included in the catalogue; *abscissae:* photored magnitudes of tenth brightest cluster members. The black dots are magnitude estimates made with the step scale of galaxian images during the compilation of the catalogue. The open circles are magnitudes derived from those of Sandage with equation (1). The dotted line is the solid curve in Fig. 3.

h) *Reduction of Data*

To facilitate the reduction and processing of the material, the data for each cluster were entered on an IBM punch card. The calculations and miscellaneous processing involved in the reduction work were carried out by the writer with the IBM Model 604 Digital Calculating Punch and IBM card-sorting and duplicating equipment of the Department of Engineering of the California Institute of Technology, with the exception of the computation of galactic co-ordinates, which was done with the Datatron Digital Computer Model 204 of the ElectroData Corporation of Pasadena.

Equinox of positions.—The positions for the clusters were for the equinox 1855, except for the clusters south of $\delta = -23°$, which were for the equinox 1875, the equinox of the *Cordoba Durchmusterung*. To reduce all the positions to the same equinox, positions for the southern clusters were precessed from 1875 back to 1855.

Extinction.—The magnitudes of the tenth brightest members of all clusters were corrected for the effect of atmospheric extinction. It is important that extinction be taken into account because the south galactic pole lies near the southern limit of the sky survey, while the north galactic pole passes nearly through the Palomar zenith. The adopted procedure was to reduce all magnitudes to their value at the Palomar zenith, but not outside the atmosphere. The extinction, in magnitudes, is given by

$$\Delta m = -2.5 \log T(\lambda, z) = k \sec z \,, \tag{2}$$

where $T(\lambda, z)$ is the transmission of the atmosphere at wave length λ and zenith distance z, and k is a constant. The atmospheric transmission at the Palomar zenith was assumed to be the same as that at the Mount Wilson zenith, for which (Pettit 1940)

$$T(\lambda = 6500 \text{ A}, 0°) = 0.925 \,. \tag{3}$$

It follows that

$$\Delta m = 0.085 \sec z \,. \tag{4}$$

Because practically all red survey plates, especially those taken far south, were centered within an hour of the meridian, it was assumed that the hour angle for all exposures was ±30 minutes. This simplification introduces little error, for the magnitudes were to be corrected only to the nearest tenth, and the corrections were as great as -0.1 mag. only for clusters north of $+84°$ or south of $-18°$ declination.

Galactic co-ordinates.—Galactic co-ordinates were computed for each cluster referred to the galactic pole (1900) $\alpha = 12^{\mathrm{h}}44^{\mathrm{m}}.0$, $\delta = +27°30'$ or (1855) $\alpha = 12^{\mathrm{h}}41^{\mathrm{m}}.8$, $\delta = +27°45'$ (van Tulder 1942).

Galactic obscuration.—Corrections to magnitudes for the effect of general galactic obscuration were made, following Hubble (1936), on the assumption of a uniform plane-parallel distribution of the absorbing material. In particular, it was assumed that the absorption relative to that at the galactic poles, in magnitudes, is a linear function of the cosecant of the galactic latitude, that is,

$$\Delta m(b) = \text{Constant}\,(|\csc b| - 1) \,. \tag{5}$$

Hubble, from an analysis of galaxy counts, had derived the photographic absorption, $\Delta P(b)$, to be

$$\Delta P(b) = 0.25\,|\csc b| \,. \tag{6}$$

From the selective absorption data of Whitford (1948), it is found that

$$\Delta P(b) = 2.20\,[P(b) - R(b)]_{\mathrm{ex}} \,, \qquad \Delta R(b) = 1.20\,[P(b) - R(b)]_{\mathrm{ex}} \,, \tag{7}$$

where $\Delta R(b)$ is the photored absorption, $[P(b) - R(b)]_{\mathrm{ex}}$ is the photographic minus photored color excess, and where λ 4050 and λ 6440 are assumed for the blue and red effective wave lengths, respectively. From equations (5), (6), and (7), we get

$$\Delta R(b) = 0.136\,(|\csc b| - 1) \,. \tag{8}$$

All magnitudes were corrected to the galactic pole by subtracting $\Delta R(b)$ as calculated from equation (8).

Precession constants.—Ten-year precession rates were computed for all the cluster positions from the standard formulae (e.g., Smart 1949) for the equinox of 1900.

Richness classifications.—The counts of the membership of the clusters, intended as richness criteria, are approximate only. It was desirable, therefore, to group the clusters into categories according to their richness in such a manner that a negligible number of clusters would be misclassified by more than one group interval. The standard error of an individual count was estimated (Sec. II*g*) at about 17 per cent. It was decided to extend a group interval about three and a half times this standard error, or about 60 per cent, beyond the lower limit of the group. Then, if the counting errors are normally distributed, even a value at the upper or lower limit of a group interval would have only one chance in five thousand of being in error far enough to belong in a group more than one interval removed.

The richness groups are defined in Table 4. "Counts" refer to the number of galaxies counted in a cluster that are not more than 2 mag. fainter than the third brightest member. The group intervals are not exactly 60 per cent of their lower limits but are rounded off, for convenience in classifying, to even numbers.

TABLE 4

RICHNESS-GROUP INTERVALS

Richness Group	Counts	Richness Group	Counts	Richness Group	Counts
0..........	30–49	2..........	80–129	4..........	200–299
1..........	50–79	3..........	130–199	5..........	300 or over

TABLE 5

DISTANCE-GROUP INTERVALS

Distance Group	Magnitude Range	Distance Group	Magnitude Range	Distance Group	Magnitude Range
1..........	13.3–14.0	4..........	15.7–16.4	6..........	17.3–18.0
2..........	14.1–14.8	5..........	16.5–17.2	7..........	Over 18.0
3..........	14.9–15.6				

Distance classification.—As in the richness classification, the clusters were grouped into distance classifications according to the magnitudes of their tenth brightest members. The standard statistical error in magnitude estimates was estimated (Sec. II*g*) at 0.19 mag. Analogous to the case for richness classification, the magnitude interval in a distance group was chosen to be approximately 3.5 times the standard error in magnitude estimate, or about 0.7 mag. Table 5 defines the magnitude intervals corresponding to various distance groups. Magnitudes refer to tenth brightest cluster members.

i) Explanation of Catalogue

Table 6 contains the completed catalogue of 2712 rich clusters of galaxies. The clusters are listed in order of right ascension. Table 6 was printed directly from the IBM cards with an IBM Model 407 Accounting Machine. Plus signs are not available on IBM tabulators; hence in Table 6 a positive quantity is indicated by the absence of a minus sign.

The first column contains the catalogue number for each cluster, running consecutively from 1 to 2712. An asterisk (*) following the number indicates that the cluster does not meet the requirements for inclusion in the statistical sample. These non-sample clusters are included in Table 6 to enhance the value of the catalogue as a finding list.

TABLE 6

A CATALOGUE OF RICH CLUSTERS OF GALAXIES

No.	R. A. (1855)	Decl.	Precession R. A. (1900)	Precession Decl.	l	b	Mag.	Dist.	Rich.
1	00 00.1	15 43	0.512	3.34	75.6	-45.4	17.1	5	1
2	00 01.0	-20 27	0.512	3.34	35.9	-78.2	17.3	6	1
3	00 01.8	03 14	0.512	3.34	71.1	-57.6	17.0	5	1
4	00 01.9	05 59	0.512	3.34	72.6	-54.9	17.8	6	1
5*	00 02.8	32 18	0.514	3.34	80.6	-29.2	17.1	5	1
6	00 03.0	16 54	0.513	3.34	77.0	-44.4	17.5	6	2
7	00 04.2	31 37	0.515	3.34	80.8	-30.0	17.1	5	1
8	00 04.7	-12 00	0.511	3.34	59.3	-72.0	17.2	5	1
9	00 04.9	08 40	0.513	3.34	74.9	-52.5	18.0	6	1
10	00 05.4	-06 48	0.511	3.34	65.9	-67.3	17.2	5	2
11	00 05.4	-17 15	0.511	3.34	49.5	-76.6	17.2	5	2
12	00 05.9	-08 25	0.511	3.34	64.6	-68.9	17.2	5	2
13	00 06.3	-20 19	0.510	3.34	40.6	-79.0	16.6	5	2
14*	00 07.9	-24 42	0.508	3.34	20.0	-81.8	15.2	3	0
15*	00 07.9	-26 50	0.508	3.34	5.0	-82.4	17.4	6	0
16	00 09.3	05 57	0.513	3.34	75.7	-55.4	17.0	5	2
17	00 09.5	08 00	0.513	3.34	76.5	-53.4	17.6	6	1
18*	00 09.6	-03 36	0.511	3.34	70.9	-64.7	17.1	5	0
19	00 11.5	-07 00	0.511	3.34	69.5	-68.0	17.8	6	2
20	00 12.3	-23 26	0.507	3.34	31.3	-82.1	17.1	5	1
21*	00 13.0	27 50	0.519	3.34	82.3	-34.0	16.2	4	1
22	00 13.4	-26 31	0.506	3.34	9.4	-83.6	17.5	6	3
23*	00 14.3	-01 42	0.512	3.33	74.6	-63.1	17.0	5	0
24	00 15.0	22 30	0.518	3.33	82.0	-39.3	17.5	6	2
25	00 15.6	-00 58	0.512	3.33	75.7	-62.5	17.8	6	1
26*	00 15.7	36 03	0.523	3.33	84.1	-25.9	17.4	6	2
27*	00 17.5	-21 31	0.505	3.33	47.2	-81.7	16.5	5	0
28	00 17.7	07 20	0.514	3.33	79.7	-54.4	17.6	6	2
29*	00 19.3	37 46	0.527	3.33	85.1	-24.3	17.5	6	0
30	00 19.4	-13 00	0.508	3.33	69.3	-74.4	17.8	6	2
31	00 19.6	21 50	0.520	3.33	83.3	-40.1	17.7	6	2
32	00 19.6	-09 55	0.509	3.33	72.6	-71.4	18.0	6	1
33	00 19.8	-20 19	0.505	3.33	54.8	-81.0	17.9	6	1
34	00 19.9	-09 37	0.509	3.33	73.1	-71.1	18.0	6	2
35	00 20.1	-22 29	0.504	3.33	45.8	-82.8	17.1	5	1
36	00 20.3	-13 36	0.507	3.33	69.4	-75.0	17.6	6	2
37	00 20.6	-11 20	0.508	3.33	72.1	-72.8	18.0	6	1
38	00 20.9	13 08	0.517	3.33	82.3	-48.8	17.6	6	1
39	00 21.0	-12 12	0.508	3.33	71.6	-73.7	18.0	6	1
40	00 21.1	15 36	0.518	3.33	82.8	-46.4	17.5	6	1
41	00 21.3	07 03	0.515	3.33	81.1	-54.9	17.6	6	3
42	00 21.3	-24 27	0.503	3.33	34.5	-84.3	17.1	5	3
43*	00 21.4	16 47	0.518	3.33	83.1	-45.2	15.9	4	0
44	00 22.1	11 14	0.516	3.33	82.3	-50.7	17.0	5	1
45	00 22.5	-13 06	0.507	3.33	71.9	-74.7	17.8	6	2
46	00 22.9	-13 41	0.507	3.32	71.7	-75.3	17.6	6	1
47	00 23.3	-24 58	0.502	3.32	32.8	-85.0	17.5	6	1
48	00 23.7	11 45	0.517	3.32	83.1	-50.3	17.6	6	1
49	00 24.1	-12 14	0.507	3.32	74.2	-73.9	18.0	6	1
50	00 24.1	-23 02	0.502	3.32	48.8	-83.8	17.4	6	2
51*	00 24.3	-24 28	0.501	3.32	38.9	-84.9	17.4	6	0
52	00 24.5	-13 00	0.507	3.32	73.8	-74.7	18.0	6	1
53*	00 25.3	-08 22	0.508	3.32	77.9	-70.2	17.2	5	0
54*	00 26.1	25 57	0.524	3.32	85.6	-36.2	17.7	6	0
55*	00 26.5	05 32	0.515	3.32	83.1	-56.5	17.2	5	0
56	00 26.5	-08 36	0.508	3.32	78.6	-70.5	18.0	6	1
57	00 26.6	-09 43	0.508	3.32	78.0	-71.6	17.6	6	2
58	00 26.7	-07 34	0.509	3.32	79.3	-69.5	17.2	5	1
59	00 26.8	29 29	0.527	3.32	86.1	-32.7	17.5	6	1
60	00 27.3	29 14	0.527	3.32	86.2	-32.9	17.9	6	2
61	00 27.6	-24 00	0.500	3.32	48.8	-85.1	17.7	6	1
62	00 27.7	19 36	0.522	3.32	85.5	-42.5	17.1	5	1
63*	00 27.9	48 54	0.543	3.32	87.7	-13.3	16.1	4	0
64	00 28.9	18 07	0.521	3.31	85.7	-44.0	17.5	6	1
65	00 29.3	18 17	0.521	3.31	85.9	-43.9	17.5	6	2
66*	00 29.3	-05 59	0.509	3.31	81.7	-68.0	17.8	6	0
67	00 29.4	18 28	0.522	3.31	85.9	-43.7	17.5	6	2
68	00 29.5	08 21	0.516	3.31	84.9	-53.8	18.0	6	1
69	00 30.0	17 33	0.521	3.31	86.0	-44.6	17.1	5	2
70	00 30.0	-08 14	0.508	3.31	81.3	-70.3	17.5	6	1
71*	00 30.1	28 48	0.528	3.31	86.9	-33.4	15.6	3	0
72*	00 30.6	44 56	0.542	3.31	87.9	-17.3	16.3	4	0
73	00 30.8	08 38	0.517	3.31	85.4	-53.5	18.0	6	1
74*	00 31.7	-23 07	0.499	3.31	63.2	-84.8	15.9	4	0
75*	00 32.2	20 28	0.524	3.31	87.0	-41.7	16.5	5	0
76*	00 32.3	05 59	0.515	3.31	85.7	-56.2	15.0	3	0
77	00 32.9	28 44	0.529	3.31	87.7	-33.5	16.5	5	1
78	00 32.9	25 57	0.527	3.31	87.5	-36.3	17.9	6	1
79	00 33.0	17 21	0.522	3.31	87.0	-44.9	17.1	5	1
80	00 33.2	-25 29	0.497	3.31	49.1	-87.0	17.1	5	1

			Precession						
No.	R.A. (1855)	Decl.	R.A. (1900)	Decl.	l	b	Mag.	Dist.	Rich.
81*	00 33.4	21 29	0.525	3.31	87.4	-40.7	17.7	6	0
82	00 33.7	24 37	0.527	3.31	87.7	-37.6	17.1	5	2
83*	00 33.9	13 15	0.520	3.30	87.1	-49.0	17.8	6	0
84	00 34.2	20 37	0.525	3.30	87.6	-41.6	16.8	5	1
85	00 34.3	-10 09	0.506	3.30	83.9	-72.3	15.7	4	1
86*	00 35.3	-22 36	0.498	3.30	73.6	-84.6	15.9	4	0
87	00 35.7	-10 36	0.506	3.30	84.9	-72.8	16.6	5	1
88	00 35.7	-26 51	0.495	3.30	33.3	-88.4	15.6	3	1
89*	00 35.8	-10 14	0.506	3.30	85.1	-72.4	16.6	5	0
90	00 35.9	01 23	0.513	3.30	87.0	-60.8	17.2	5	2
91	00 35.9	-11 26	0.505	3.30	84.9	-73.6	17.6	6	1
92*	00 36.1	19 52	0.525	3.30	88.2	-42.4	17.9	6	0
93*	00 36.5	-19 16	0.500	3.30	81.6	-81.4	16.9	5	0
94*	00 37.9	-03 08	0.510	3.30	87.7	-65.4	17.2	5	0
95	00 38.4	-01 40	0.511	3.29	88.1	-63.9	17.2	5	1
96*	00 38.5	38 43	0.542	3.29	89.3	-23.5	17.4	6	1
97	00 38.7	-23 58	0.495	3.29	79.4	-86.2	17.1	5	2
98	00 38.8	19 42	0.525	3.29	89.0	-42.5	16.9	5	3
99*	00 39.6	-18 27	0.499	3.29	86.8	-80.7	17.1	5	0
100*	00 39.9	-03 19	0.510	3.29	88.9	-65.6	17.7	6	0
101	00 40.1	-01 43	0.511	3.29	89.0	-64.0	17.2	5	2
102*	00 41.2	00 35	0.512	3.29	89.7	-61.7	15.4	3	0
103	00 41.9	-06 39	0.507	3.28	90.0	-68.9	17.2	5	2
104	00 42.1	23 44	0.530	3.28	90.1	-38.5	15.9	4	1
105	00 42.2	-05 32	0.508	3.28	90.2	-67.8	17.2	5	1
106*	00 43.1	-12 29	0.503	3.28	91.2	-74.7	17.2	5	0
107	00 43.1	-20 03	0.497	3.28	92.2	-82.3	17.1	5	1
108	00 43.7	-07 21	0.507	3.28	91.3	-69.6	17.2	5	2
109	00 44.8	21 26	0.529	3.28	90.9	-40.8	17.7	6	1
110*	00 45.3	05 20	0.516	3.28	91.6	-56.9	17.2	5	0
111	00 45.5	-05 49	0.508	3.28	92.4	-68.0	17.2	5	3
112	00 46.2	-01 36	0.511	3.27	92.5	-63.8	17.2	5	1
113	00 46.2	-05 25	0.508	3.27	92.9	-67.6	17.5	6	2
114*	00 46.5	-22 29	0.494	3.27	101.7	-84.6	15.9	4	0
115	00 48.2	25 33	0.534	3.27	91.8	-36.7	17.3	6	3
116*	00 48.4	-00 08	0.512	3.27	93.6	-62.3	15.7	4	0
117*	00 48.7	-10 49	0.503	3.27	95.8	-73.0	16.0	4	0
118	00 48.7	-27 12	0.488	3.27	160.6	-88.4	16.5	5	1
119	00 49.0	-02 03	0.511	3.26	94.2	-64.2	15.0	3	1
120	00 49.9	-17 12	0.497	3.26	100.5	-79.3	17.2	5	1

			Precession						
No.	R.A. (1855)	Decl.	R.A. (1900)	Decl.	l	b	Mag.	Dist.	Rich.
121	00 50.2	-07 48	0.505	3.26	96.1	-69.9	16.0	4	1
122	00 50.4	-27 04	0.487	3.26	160.8	-88.0	17.1	5	1
123	00 51.2	-15 11	0.499	3.26	100.3	-77.2	17.2	5	1
124*	00 51.3	41 36	0.556	3.26	91.9	-20.6	17.5	6	2
125	00 52.5	13 30	0.524	3.25	93.9	-48.7	17.2	5	1
126	00 52.6	-15 00	0.498	3.25	101.7	-77.0	16.6	5	1
127	00 52.9	-24 15	0.489	3.25	126.1	-85.7	17.7	6	1
128*	00 53.3	-13 45	0.500	3.25	101.4	-75.7	17.0	5	0
129	00 53.7	-10 45	0.502	3.25	99.9	-72.8	17.8	6	2
130	00 54.1	-00 56	0.511	3.25	96.8	-63.0	17.2	5	1
131	00 55.0	-15 34	0.497	3.25	104.8	-77.4	17.2	5	1
132*	00 55.2	26 15	0.538	3.24	93.7	-35.9	17.7	6	0
133*	00 55.6	-22 35	0.490	3.24	121.9	-84.0	15.9	4	0
134*	00 55.7	-03 19	0.509	3.24	98.3	-65.3	16.0	4	0
135	00 56.2	-23 22	0.489	3.24	127.4	-84.5	17.7	6	2
136	00 56.3	24 18	0.537	3.24	94.2	-37.8	17.5	6	2
137	00 56.7	24 58	0.537	3.24	94.2	-37.2	17.5	6	2
138*	00 57.1	42 20	0.562	3.24	93.0	-19.8	17.5	6	3
139*	00 57.3	35 37	0.551	3.24	93.5	-26.5	17.5	6	2
140	00 57.5	-24 45	0.487	3.24	140.4	-85.4	17.5	6	3
141	00 58.6	-25 23	0.485	3.23	148.8	-85.6	17.7	6	3
142	00 58.7	00 11	0.512	3.23	98.9	-61.8	18.0	6	2
143	00 58.9	25 28	0.539	3.23	94.8	-36.6	17.5	6	1
144	00 59.3	-21 39	0.490	3.23	124.0	-82.7	17.9	6	1
145	00 59.4	-03 14	0.509	3.23	100.5	-65.1	17.6	6	2
146	01 00.3	-12 02	0.500	3.23	106.3	-73.7	17.6	6	1
147*	01 00.7	01 24	0.513	3.22	99.6	-60.5	15.0	3	0
148	01 00.8	-13 58	0.498	3.22	108.7	-75.5	17.2	5	1
149*	01 01.1	42 50	0.566	3.22	93.7	-19.3	17.5	6	2
150	01 01.6	12 24	0.525	3.22	97.5	-49.6	16.6	5	1
151	01 01.7	-16 12	0.495	3.22	112.7	-77.6	15.0	3	1
152*	01 02.2	13 13	0.526	3.22	97.5	-48.7	17.2	5	0
153	01 02.2	04 28	0.517	3.22	99.5	-57.4	17.6	6	2
154	01 03.3	16 54	0.531	3.21	97.3	-45.0	15.6	3	1
155	01 03.3	-25 36	0.483	3.21	157.1	-84.7	17.5	6	1
156*	01 03.7	32 41	0.551	3.21	95.3	-29.3	16.9	5	1
157	01 03.9	-15 11	0.495	3.21	113.3	-76.4	16.9	5	1
158*	01 04.1	16 07	0.530	3.21	97.7	-45.8	15.9	4	0
159	01 04.8	-15 53	0.494	3.21	115.3	-77.0	17.2	5	1
160*	01 05.2	14 45	0.529	3.21	98.3	-47.1	15.7	4	0

No.	R.A. (1855)	Decl.	Precession R.A. (1900)	Precession Decl.	l	b	Mag.	Dist.	Rich.
161*	01 06.7	36 39	0.560	3.20	95.5	-25.3	16.4	4	0
162	01 06.7	02 07	0.514	3.20	102.3	-59.5	16.6	5	1
163	01 06.8	23 58	0.541	3.20	97.2	-37.9	17.5	6	2
164	01 07.0	-04 32	0.507	3.20	105.6	-66.0	17.6	6	1
165*	01 07.3	31 50	0.552	3.20	96.3	-30.1	17.5	6	0
166	01 07.4	-17 03	0.492	3.20	120.2	-77.8	16.3	4	1
167	01 07.6	23 43	0.541	3.20	97.5	-38.2	17.5	6	1
168	01 07.7	-00 32	0.511	3.20	103.9	-62.1	15.4	3	2
169*	01 08.2	40 21	0.568	3.19	95.4	-21.6	16.7	5	1
170*	01 08.5	12 20	0.526	3.19	100.1	-49.4	16.6	5	0
171*	01 09.1	15 30	0.530	3.19	99.5	-46.2	15.9	4	0
172	01 09.5	02 29	0.515	3.19	103.5	-59.0	16.9	5	1
173*	01 10.5	38 14	0.565	3.18	96.1	-23.7	17.4	6	1
174*	01 11.7	35 03	0.560	3.18	96.9	-26.8	15.8	4	0
175	01 11.9	14 07	0.529	3.18	100.8	-47.5	17.0	5	2
176	01 12.3	-08 55	0.501	3.18	112.4	-69.8	17.6	6	1
177	01 13.0	-21 48	0.484	3.17	141.7	-80.8	17.5	6	1
178	01 14.0	19 20	0.537	3.17	100.3	-42.3	17.1	5	1
179*	01 14.0	18 44	0.536	3.17	100.4	-42.9	15.3	3	0
180*	01 14.4	02 16	0.515	3.17	106.0	-59.0	17.0	5	0
181	01 14.5	-00 27	0.512	3.17	107.4	-61.6	17.2	5	1
182*	01 14.9	-07 41	0.502	3.16	112.8	-68.5	17.6	6	0
183*	01 14.9	-22 40	0.482	3.16	147.6	-81.0	16.5	5	0
184	01 15.0	12 18	0.528	3.16	102.5	-49.1	17.8	6	1
185	01 15.4	-22 14	0.483	3.16	145.9	-80.6	17.1	5	1
186	01 15.5	-11 11	0.498	3.16	117.1	-71.6	17.2	5	1
187	01 15.5	-19 59	0.486	3.16	136.5	-79.1	17.5	6	2
188	01 15.6	-13 32	0.495	3.16	120.7	-73.7	17.2	5	1
189	01 16.2	00 54	0.513	3.16	107.5	-60.2	15.7	4	1
190*	01 16.5	-10 37	0.498	3.16	117.1	-71.0	17.2	5	0
191	01 16.6	20 10	0.539	3.16	100.9	-41.3	17.5	6	2
192	01 16.8	03 44	0.517	3.16	106.4	-57.4	17.6	6	2
193	01 17.5	07 57	0.522	3.15	104.9	-53.3	16.0	4	1
194*	01 18.2	-02 16	0.509	3.15	110.4	-63.1	13.9	1	0
195*	01 19.1	18 26	0.537	3.14	102.1	-42.9	15.3	3	0
196	01 19.3	22 28	0.543	3.14	101.2	-39.0	17.5	6	1
197	01 19.7	-18 52	0.486	3.14	136.4	-77.6	17.1	5	1
198	01 20.0	-17 12	0.488	3.14	131.8	-76.3	17.8	6	2
199*	01 20.1	-18 33	0.486	3.14	135.7	-77.3	17.5	6	0
200	01 20.2	14 28	0.532	3.14	103.6	-46.8	17.1	5	1
201*	01 20.3	15 47	0.534	3.14	103.3	-45.5	17.1	5	0
202	01 20.3	06 32	0.521	3.14	106.6	-54.5	17.8	6	2
203	01 20.8	01 08	0.514	3.14	109.6	-59.6	17.0	5	1
204	01 21.3	-07 33	0.502	3.13	116.7	-67.7	17.5	6	1
205	01 21.5	05 28	0.519	3.13	107.6	-55.4	17.6	6	1
206*	01 21.6	-26 21	0.474	3.13	173.3	-81.0	17.5	6	0
207*	01 21.8	-03 15	0.508	3.13	113.0	-63.7	17.2	5	0
208*	01 24.1	-00 12	0.512	3.12	112.0	-60.6	16.6	5	0
209	01 24.8	-14 20	0.492	3.12	128.9	-73.3	17.8	6	3
210*	01 25.4	-26 44	0.471	3.11	176.5	-80.3	17.5	6	0
211	01 25.5	-04 46	0.505	3.11	116.3	-64.8	17.2	5	2
212*	01 26.8	03 45	0.517	3.10	110.8	-56.7	17.2	5	0
213	01 27.5	19 53	0.542	3.10	104.3	-41.1	17.7	6	1
214	01 27.5	-26 51	0.470	3.10	177.6	-79.8	17.5	6	1
215	01 28.5	-24 12	0.474	3.09	164.0	-78.9	17.5	6	1
216	01 29.4	-07 10	0.501	3.09	120.9	-66.5	17.2	5	1
217	01 29.4	-08 48	0.499	3.09	122.9	-68.0	17.0	5	1
218	01 29.4	-11 30	0.495	3.09	126.8	-70.3	17.8	6	1
219	01 29.7	08 25	0.525	3.09	109.5	-52.0	17.2	5	1
220	01 29.7	07 12	0.523	3.09	110.1	-53.2	17.5	6	1
221	01 30.3	17 24	0.539	3.09	106.0	-43.3	17.7	6	1
222	01 30.3	-13 44	0.491	3.09	131.3	-72.0	17.6	6	3
223	01 30.8	-13 32	0.491	3.08	131.2	-71.8	17.6	6	3
224	01 31.0	-07 42	0.500	3.08	122.4	-66.8	17.0	5	1
225	01 31.1	18 09	0.540	3.08	106.0	-42.6	15.9	4	1
226	01 31.8	-11 00	0.495	3.08	127.5	-69.6	17.6	6	1
227	01 32.0	17 27	0.539	3.08	106.5	-43.2	17.7	6	1
228*	01 32.0	-10 48	0.496	3.08	127.2	-69.4	17.6	6	0
229	01 32.1	-04 23	0.505	3.07	119.4	-63.7	16.6	5	1
230	01 32.3	-12 07	0.493	3.07	129.6	-70.4	17.6	6	2
231*	01 32.6	23 47	0.551	3.07	104.6	-37.0	17.9	6	0
232	01 32.9	-11 07	0.495	3.07	128.3	-69.5	17.6	6	1
233	01 33.0	-02 35	0.508	3.07	118.1	-62.0	17.2	5	1
234	01 33.1	18 11	0.541	3.07	106.6	-42.4	17.9	6	1
235	01 33.2	-18 10	0.483	3.07	143.7	-74.8	17.5	6	1
236	01 33.3	-12 36	0.492	3.07	131.0	-70.7	17.2	5	1
237*	01 33.5	-00 28	0.511	3.07	116.6	-60.0	16.6	5	0
238	01 34.0	-23 47	0.473	3.06	164.3	-77.6	17.5	6	1
239	01 34.2	-12 31	0.492	3.06	131.4	-70.5	17.6	6	2
240*	01 34.3	06 54	0.523	3.06	112.1	-53.1	15.6	3	0

			Precession						
No.	R. A. (1855)	Decl.	R. A. (1900)	Decl.	l	b	Mag.	Dist.	Rich.
241	01 34.6	-16 59	0.485	3.06	141.3	-73.7	17.6	6	1
242	01 34.9	-15 03	0.488	3.06	136.9	-72.3	18.0	6	1
243*	01 35.3	-10 58	0.495	3.06	129.4	-69.0	16.6	5	0
244	01 36.3	17 46	0.541	3.05	107.7	-42.6	17.6	6	1
245*	01 36.5	05 40	0.521	3.05	113.6	-54.1	16.4	4	0
246	01 37.2	05 05	0.520	3.05	114.3	-54.6	16.4	4	1
247	01 37.4	16 55	0.540	3.04	108.4	-43.4	16.9	5	1
248	01 37.5	-03 00	0.507	3.04	120.7	-61.9	17.6	6	1
249	01 38.8	19 20	0.545	3.04	107.9	-40.9	17.7	6	1
250	01 39.1	18 58	0.544	3.03	108.1	-41.3	17.7	6	1
251*	01 39.2	-08 02	0.499	3.03	127.2	-66.1	17.2	5	0
252	01 39.3	-03 26	0.506	3.03	122.0	-62.1	17.8	6	1
253	01 39.9	19 56	0.546	3.03	108.0	-40.3	17.9	6	1
254	01 39.9	-04 01	0.505	3.03	122.8	-62.5	17.6	6	2
255	01 40.0	-02 43	0.508	3.03	121.6	-61.4	17.2	5	1
256	01 40.3	-04 35	0.504	3.03	123.6	-63.0	17.0	5	1
257	01 41.2	13 16	0.534	3.02	111.3	-46.5	16.9	5	1
258*	01 42.0	22 45	0.552	3.02	107.6	-37.4	17.7	6	0
259*	01 43.1	-12 43	0.490	3.01	136.7	-69.2	17.2	5	0
260*	01 43.5	32 27	0.574	3.01	104.7	-28.0	15.8	4	1
261	01 44.1	-02 58	0.507	3.00	123.7	-61.1	17.2	5	1
262*	01 44.4	35 26	0.582	3.00	104.0	-25.1	13.3	1	0
263*	01 44.8	36 51	0.586	3.00	103.7	-23.7	17.8	6	1
264	01 45.1	-26 30	0.463	3.00	178.6	-75.9	17.7	6	1
265	01 45.2	-07 45	0.499	3.00	129.8	-65.0	17.6	6	2
266*	01 45.3	-04 52	0.504	2.99	126.3	-62.6	17.2	5	0
267*	01 45.4	00 20	0.513	2.99	121.2	-58.0	16.6	5	0
268*	01 46.0	-01 51	0.509	2.99	123.4	-59.9	16.6	5	0
269	01 46.2	-05 03	0.503	2.99	126.9	-62.6	17.2	5	1
270	01 46.5	-03 33	0.506	2.99	125.4	-61.3	17.6	6	1
271*	01 46.6	01 03	0.514	2.99	121.1	-57.3	16.6	5	0
272*	01 46.9	33 14	0.578	2.98	105.3	-27.1	16.8	5	1
273	01 47.4	-24 16	0.467	2.98	170.4	-74.9	17.7	6	1
274	01 47.5	-07 00	0.500	2.98	129.9	-64.1	16.3	4	3
275	01 48.0	13 57	0.537	2.98	113.1	-45.3	17.1	5	1
276*	01 48.4	40 39	0.599	2.97	103.4	-19.9	16.3	4	0
277	01 48.6	-08 06	0.498	2.97	131.9	-64.8	15.6	3	1
278*	01 48.9	31 31	0.574	2.97	106.3	-28.6	15.6	3	0
279	01 48.9	00 21	0.513	2.97	122.6	-57.6	17.2	5	1
280*	01 49.2	-02 30	0.508	2.97	125.5	-60.1	17.4	6	0
281*	01 49.8	-06 34	0.500	2.96	130.4	-63.4	17.0	5	0
282*	01 49.8	-10 50	0.492	2.96	136.7	-66.7	17.8	6	0
283	01 50.1	-22 46	0.469	2.96	165.9	-73.8	17.1	5	1
284	01 50.5	-01 21	0.510	2.96	124.9	-58.9	17.5	6	1
285	01 50.6	-04 27	0.504	2.96	128.2	-61.5	17.2	5	1
286	01 51.1	-02 29	0.508	2.96	126.3	-59.8	17.2	5	2
287*	01 53.2	-08 34	0.496	2.94	134.7	-64.5	17.2	5	0
288	01 53.8	17 44	0.546	2.94	113.1	-41.3	17.5	6	1
289	01 54.0	-25 20	0.462	2.94	175.6	-73.7	17.5	6	1
290*	01 54.1	20 20	0.551	2.94	111.9	-38.8	16.5	5	0
291*	01 54.3	-02 53	0.507	2.93	128.0	-59.7	17.8	6	0
292*	01 54.5	18 24	0.547	2.93	112.9	-40.6	16.5	5	0
293	01 54.5	03 05	0.518	2.93	122.5	-54.5	17.3	6	2
294	01 54.6	04 43	0.521	2.93	121.2	-53.1	17.6	6	1
295	01 55.1	-01 47	0.509	2.93	127.2	-58.7	16.6	5	1
296	01 55.1	-03 50	0.505	2.93	129.4	-60.4	17.6	6	1
297	01 55.4	-26 17	0.459	2.93	179.1	-73.6	17.5	6	2
298	01 55.6	-10 03	0.493	2.92	138.0	-65.2	17.2	5	1
299	01 57.3	-00 22	0.511	2.91	126.6	-57.2	17.6	6	1
300	01 57.4	17 10	0.546	2.91	114.4	-41.5	17.7	6	1
301	01 58.0	-02 48	0.507	2.91	129.5	-59.1	18.0	6	1
302	01 58.8	-25 28	0.459	2.90	176.9	-72.7	17.9	6	1
303	01 58.9	-04 01	0.504	2.90	131.2	-60.0	16.6	5	1
304*	01 59.0	03 48	0.519	2.90	123.5	-53.4	17.6	6	0
305	01 59.5	-15 37	0.481	2.90	150.0	-68.3	17.8	6	1
306	02 00.1	-12 30	0.487	2.89	144.1	-66.2	17.8	6	1
307	02 00.3	09 47	0.531	2.89	119.6	-47.9	17.5	6	1
308*	02 00.7	-04 03	0.504	2.89	131.9	-59.8	17.2	5	0
309	02 00.8	02 19	0.517	2.89	125.5	-54.4	17.8	6	1
310	02 00.9	04 47	0.521	2.89	123.4	-52.3	17.6	6	1
311*	02 01.2	19 02	0.551	2.88	114.6	-39.4	16.5	5	0
312	02 02.1	04 11	0.520	2.88	124.4	-52.7	17.5	6	1
313	02 02.6	02 13	0.516	2.87	126.2	-54.3	17.6	6	1
314	02 02.6	-13 36	0.485	2.87	147.2	-66.5	17.6	6	2
315	02 02.7	-01 42	0.509	2.87	130.1	-57.6	17.5	6	2
316*	02 02.9	-14 11	0.483	2.87	148.4	-66.8	17.2	5	0
317	02 03.0	-09 14	0.494	2.87	139.8	-63.4	17.6	6	1
318	02 04.6	25 46	0.568	2.86	112.3	-32.9	16.9	5	1
319	02 04.8	-12 47	0.486	2.86	146.5	-65.5	17.6	6	1
320	02 04.9	24 43	0.565	2.86	112.8	-33.8	17.7	6	1

No.	R. A. (1855)	Decl.	Precession R. A. (1900)	Precession Decl.	l	b	Mag.	Dist.	Rich.
321	02 04.9	-00 17	0.512	2.86	129.5	-56.1	17.6	6	1
322*	02 05.9	06 50	0.526	2.85	123.6	-49.9	17.6	6	0
323	02 06.3	-03 33	0.505	2.85	133.5	-58.5	17.5	6	1
324	02 06.4	-02 13	0.508	2.85	132.1	-57.4	17.5	6	1
325	02 06.4	-25 58	0.455	2.85	179.5	-71.1	17.9	6	1
326*	02 06.5	-07 48	0.496	2.85	139.1	-61.7	17.0	5	0
327*	02 06.5	-26 48	0.453	2.85	182.0	-71.2	17.9	6	0
328*	02 06.7	-07 33	0.497	2.84	138.8	-61.5	17.3	6	0
329	02 07.4	-05 13	0.501	2.84	136.0	-59.6	17.2	5	1
330*	02 07.6	09 40	0.532	2.84	122.1	-47.2	17.2	5	0
331	02 07.8	10 42	0.534	2.84	121.4	-46.3	17.1	5	1
332	02 08.5	-14 17	0.482	2.83	150.7	-65.8	17.6	6	1
333	02 08.7	16 11	0.546	2.83	118.2	-41.3	17.6	6	2
334	02 09.0	-04 53	0.502	2.83	136.2	-59.1	17.5	6	1
335	02 09.1	-12 50	0.485	2.82	148.2	-64.7	17.6	6	1
336*	02 09.3	-02 48	0.506	2.82	133.8	-57.5	17.2	5	0
337	02 09.9	16 51	0.548	2.82	118.2	-40.6	17.6	6	1
338	02 10.5	-11 57	0.487	2.81	147.1	-63.9	17.6	6	1
339	02 10.6	-09 47	0.491	2.81	143.6	-62.4	17.8	6	1
340*	02 11.4	-13 21	0.483	2.81	149.9	-64.6	17.6	6	0
341*	02 12.1	-17 29	0.474	2.80	158.5	-66.8	17.8	6	0
342	02 12.3	02 04	0.517	2.80	129.8	-53.1	17.7	6	1
343*	02 12.4	-22 32	0.462	2.80	170.8	-68.9	17.7	6	0
344	02 13.6	20 42	0.558	2.79	117.1	-36.7	17.4	6	2
345	02 13.6	12 56	0.540	2.79	121.7	-43.6	17.5	6	1
346	02 14.2	25 44	0.571	2.78	114.7	-32.1	16.9	5	1
347*	02 16.8	41 13	0.622	2.76	108.5	-17.6	13.3	1	0
348	02 16.8	-09 16	0.492	2.76	145.0	-61.0	18.0	6	1
349*	02 17.5	36 11	0.604	2.76	110.7	-22.2	17.3	6	1
350	02 18.0	-10 29	0.489	2.75	147.3	-61.6	17.5	6	1
351*	02 18.2	-09 23	0.491	2.75	145.7	-60.8	16.9	5	0
352	02 20.8	-02 50	0.506	2.73	137.8	-55.7	17.6	6	1
353	02 20.8	-22 43	0.458	2.73	172.9	-67.1	17.7	6	1
354	02 21.1	00 47	0.514	2.73	134.0	-52.8	17.6	6	1
355*	02 21.2	-12 35	0.483	2.73	151.8	-62.3	18.0	6	0
356	02 21.5	03 50	0.521	2.72	131.2	-50.3	17.8	6	2
357*	02 21.6	12 36	0.541	2.72	124.2	-43.0	16.8	5	0
358*	02 23.2	-13 51	0.480	2.71	154.7	-62.6	15.6	3	0
359	02 23.4	02 11	0.517	2.71	133.4	-51.4	18.0	6	2
360	02 23.7	06 21	0.527	2.71	129.7	-48.0	17.8	6	2
361*	02 24.0	02 15	0.517	2.70	133.5	-51.2	17.6	6	0
362	02 24.4	-05 31	0.499	2.70	142.3	-57.0	17.7	6	1
363	02 25.0	08 49	0.533	2.69	128.0	-45.7	17.1	5	2
364	02 27.4	08 03	0.531	2.67	129.4	-46.0	17.1	5	2
365*	02 28.3	-02 04	0.507	2.67	139.4	-53.8	17.4	6	0
366	02 28.5	-06 05	0.498	2.66	144.4	-56.7	17.6	6	1
367	02 29.9	-20 02	0.463	2.65	168.5	-64.2	16.5	5	1
368*	02 31.0	-27 08	0.442	2.64	185.0	-65.8	17.5	6	0
369	02 32.4	-04 10	0.502	2.63	143.1	-54.7	17.8	6	1
370*	02 32.5	-02 13	0.507	2.63	140.9	-53.2	17.8	6	0
371	02 34.1	-11 51	0.483	2.61	154.4	-59.3	17.0	5	1
372*	02 34.4	41 14	0.634	2.61	111.7	-16.3	15.7	4	0
373*	02 34.9	27 23	0.584	2.61	118.6	-28.5	17.7	6	1
374	02 35.9	03 38	0.521	2.60	135.7	-48.3	17.8	6	2
375*	02 36.3	28 27	0.588	2.59	118.3	-27.5	17.8	6	0
376*	02 36.8	36 15	0.615	2.59	114.5	-20.5	15.4	3	0
377*	02 37.5	27 12	0.584	2.58	119.3	-28.4	17.7	6	1
378	02 37.7	-03 43	0.503	2.58	144.2	-53.4	17.6	6	1
379	02 38.0	02 48	0.519	2.58	137.1	-48.6	17.6	6	1
380	02 38.0	-26 53	0.440	2.58	184.9	-64.2	16.9	5	1
381	02 38.6	-01 16	0.509	2.57	141.6	-51.5	17.6	6	2
382	02 39.5	03 42	0.521	2.56	136.7	-47.7	17.2	5	1
383	02 40.8	-04 07	0.502	2.55	145.5	-53.1	17.6	6	2
384	02 40.9	-02 54	0.505	2.55	144.1	-52.3	18.0	6	1
385*	02 41.1	-22 26	0.453	2.55	175.6	-62.5	17.9	6	0
386*	02 43.3	-17 46	0.466	2.53	166.9	-60.4	17.2	5	0
387*	02 43.9	27 31	0.588	2.52	120.5	-27.5	17.6	6	0
388	02 44.3	-04 22	0.501	2.52	146.8	-52.6	17.6	6	2
389	02 44.9	-25 31	0.442	2.51	182.5	-62.5	15.9	4	2
390*	02 45.9	-15 34	0.471	2.50	163.5	-58.8	18.0	6	0
391	02 46.2	-03 06	0.504	2.50	145.8	-51.4	17.6	6	1
392*	02 46.7	04 21	0.523	2.50	138.1	-46.0	17.4	6	0
393	02 46.8	03 20	0.521	2.49	139.1	-46.7	17.1	5	1
394	02 47.0	-15 15	0.472	2.49	163.2	-58.4	17.8	6	1
395	02 47.5	-10 59	0.483	2.49	156.6	-56.1	17.6	6	2
396*	02 48.2	41 01	0.642	2.48	114.2	-15.3	16.6	5	0
397*	02 48.9	15 22	0.553	2.47	129.5	-37.0	15.1	3	0
398	02 49.4	-16 17	0.468	2.47	165.5	-58.4	17.8	6	1
399	02 50.0	12 26	0.545	2.46	132.0	-39.2	15.6	3	1
400	02 50.0	05 27	0.526	2.46	137.9	-44.6	13.9	1	1

			Precession						
No.	R. A. (1855)	Decl.	R. A. (1900)	Decl.	l	b	Mag.	Dist.	Rich.
401	02 51.0	13 00	0.547	2.45	131.8	-38.6	15.6	3	2
402*	02 51.1	-22 43	0.449	2.45	177.5	-60.4	17.9	6	0
403	02 51.7	02 55	0.520	2.45	140.8	-46.2	17.5	6	2
404*	02 51.8	40 50	0.643	2.45	114.9	-15.1	16.8	5	0
405*	02 51.8	37 11	0.627	2.45	116.8	-18.3	17.5	6	1
406*	02 52.2	-20 12	0.456	2.44	173.0	-59.4	17.7	6	0
407*	02 52.7	35 16	0.620	2.44	118.0	-19.8	14.7	2	0
408*	02 53.8	31 51	0.607	2.43	120.1	-22.6	17.4	6	1
409	02 55.8	01 19	0.516	2.41	143.5	-46.6	17.8	6	1
410	02 56.3	03 14	0.521	2.40	141.7	-45.2	16.9	5	1
411	02 57.1	00 27	0.513	2.39	144.7	-47.0	17.6	6	1
412*	02 58.9	-00 45	0.510	2.37	146.5	-47.5	17.5	6	0
413	02 59.1	01 42	0.517	2.37	143.9	-45.8	17.5	6	1
414*	02 59.2	-15 02	0.470	2.37	165.4	-55.7	17.5	6	0
415	02 59.9	-12 37	0.477	2.36	161.9	-54.4	16.3	4	1
416	03 00.5	-17 18	0.463	2.36	169.3	-56.4	17.7	6	1
417*	03 00.7	-15 08	0.470	2.36	165.9	-55.5	17.8	6	0
418	03 01.4	-14 18	0.472	2.35	164.7	-54.9	17.8	6	1
419*	03 02.1	-24 13	0.441	2.34	181.7	-58.4	15.7	4	0
420	03 02.4	-12 05	0.478	2.34	161.6	-53.6	16.8	5	1
421	03 02.8	09 16	0.538	2.33	137.7	-39.7	17.1	5	1
422	03 03.3	-11 36	0.479	2.33	161.1	-53.2	17.6	6	1
423	03 04.4	-12 40	0.476	2.32	162.9	-53.5	16.6	5	2
424	03 04.9	-03 12	0.503	2.31	150.7	-48.0	17.5	6	1
425	03 09.0	-12 17	0.477	2.27	163.3	-52.3	17.8	6	1
426*	03 09.1	40 59	0.654	2.27	117.7	-13.3	12.5	0	2
427*	03 09.2	33 55	0.622	2.27	121.8	-19.1	17.7	6	1
428*	03 09.4	-19 39	0.453	2.26	174.6	-55.4	16.5	5	0
429*	03 10.5	36 17	0.633	2.25	120.6	-17.0	17.7	6	2
430*	03 14.8	-15 52	0.465	2.20	169.6	-52.7	17.7	6	0
431	03 14.9	-17 05	0.461	2.20	171.4	-53.2	17.4	6	1
432	03 16.9	-06 20	0.494	2.18	157.1	-47.5	17.8	6	2
433	03 17.4	-07 19	0.490	2.18	158.4	-47.9	17.8	6	1
434	03 18.0	-09 59	0.482	2.17	161.9	-49.3	17.6	6	1
435	03 18.8	-06 09	0.494	2.16	157.2	-47.0	17.8	6	1
436*	03 18.9	08 39	0.538	2.16	142.0	-37.4	17.1	5	0
437*	03 19.5	-03 15	0.502	2.15	154.0	-45.1	16.5	5	0
438	03 21.6	-10 21	0.481	2.13	163.1	-48.7	17.2	5	1
439*	03 21.9	24 18	0.590	2.13	130.4	-25.2	17.0	5	0
440	03 22.3	-11 07	0.478	2.12	164.2	-48.9	17.2	5	1
441	03 23.4	-07 28	0.489	2.11	159.8	-46.8	17.6	6	1
442	03 23.5	-13 25	0.471	2.11	167.5	-49.8	17.6	6	1
443	03 24.4	-06 45	0.492	2.10	159.1	-46.2	17.9	6	1
444*	03 27.8	02 49	0.521	2.06	149.4	-39.7	17.5	6	0
445	03 29.2	-03 22	0.502	2.04	156.2	-43.3	17.5	6	1
446*	03 29.9	-02 55	0.503	2.04	155.8	-42.9	17.5	6	0
447	03 30.8	-05 36	0.495	2.02	159.0	-44.2	17.7	6	2
448	03 31.8	-11 36	0.476	2.01	166.6	-47.1	17.6	6	2
449*	03 32.3	74 44	1.164	2.01	100.7	16.1	16.2	4	1
450*	03 33.1	23 02	0.588	2.00	133.4	-24.5	16.4	4	0
451*	03 34.8	-02 54	0.503	1.98	156.8	-41.9	17.5	6	0
452*	03 38.3	01 14	0.516	1.94	153.1	-38.7	17.9	6	0
453	03 38.3	-20 30	0.444	1.94	179.7	-49.3	17.9	6	2
454	03 38.4	-13 27	0.469	1.94	170.0	-46.5	17.5	6	1
455	03 38.8	07 25	0.536	1.93	147.3	-34.6	17.9	6	1
456	03 39.0	-21 12	0.442	1.93	180.8	-49.4	17.5	6	1
457	03 39.2	-20 36	0.444	1.93	180.0	-49.1	17.9	6	1
458	03 39.6	-24 45	0.428	1.92	186.2	-50.2	17.2	5	2
459	03 39.7	-20 46	0.443	1.92	180.3	-49.1	17.7	6	1
460	03 39.9	-14 09	0.466	1.92	171.2	-46.5	17.5	6	1
461*	03 40.1	26 42	0.604	1.92	132.1	-20.7	17.6	6	2
462	03 41.7	-18 07	0.452	1.90	176.8	-47.7	17.5	6	2
463*	03 42.8	-22 02	0.438	1.88	182.4	-48.8	17.9	6	0
464	03 42.9	-18 16	0.451	1.88	177.1	-47.5	17.7	6	2
465	03 43.2	05 52	0.531	1.88	149.6	-34.8	17.7	6	1
466*	03 43.6	24 48	0.597	1.87	134.1	-21.6	17.5	6	1
467*	03 44.0	-22 43	0.435	1.87	183.6	-48.7	17.5	6	0
468*	03 44.3	20 59	0.583	1.86	137.1	-24.3	17.4	6	0
469	03 45.7	-22 37	0.435	1.85	183.6	-48.3	17.9	6	2
470*	03 48.0	-05 07	0.495	1.82	161.6	-40.4	16.9	5	0
471	03 52.8	-14 04	0.465	1.76	173.0	-43.7	17.6	6	1
472	03 57.1	-17 30	0.452	1.71	177.9	-44.1	17.5	6	2
473*	03 57.9	-17 52	0.450	1.70	178.5	-44.0	17.7	6	0
474	04 01.3	-17 05	0.453	1.65	177.9	-43.0	17.1	5	1
475	04 02.0	-09 47	0.479	1.65	169.2	-39.7	17.9	6	1
476	04 04.5	-11 36	0.472	1.61	171.7	-40.0	17.6	6	1
477	04 04.8	-02 15	0.504	1.61	161.5	-35.3	17.5	6	1
478*	04 05.4	10 07	0.547	1.60	149.8	-27.9	17.4	6	2
479*	04 07.1	-03 48	0.499	1.58	163.4	-35.6	17.5	6	0
480*	04 07.6	00 38	0.514	1.57	159.0	-33.1	17.6	6	0

			Precession						
No.	R. A. (1855)	Decl.	R. A. (1900)	Decl.	l	b	Mag.	Dist.	Rich.
481*	04 08.6	-10 19	0.476	1.56	170.8	-38.5	17.9	6	0
482	04 09.2	-02 30	0.504	1.55	162.4	-34.5	17.5	6	1
483	04 09.2	-11 54	0.471	1.55	172.7	-39.1	17.9	6	1
484	04 09.3	-08 02	0.484	1.55	168.3	-37.3	16.9	5	1
485*	04 10.0	04 27	0.527	1.54	155.8	-30.4	17.7	6	0
486	04 15.3	-05 17	0.494	1.47	166.3	-34.7	17.5	6	1
487	04 16.7	-24 36	0.421	1.46	189.1	-42.1	17.0	5	1
488	04 17.5	-05 37	0.492	1.44	167.0	-34.3	17.6	6	1
489*	04 19.2	-04 56	0.495	1.42	166.5	-33.6	17.7	6	0
490*	04 20.6	-21 03	0.435	1.40	185.0	-40.1	17.0	5	0
491	04 22.3	-05 22	0.493	1.38	167.4	-33.2	17.7	6	1
492*	04 22.5	75 50	1.316	1.38	102.3	19.1	17.7	6	1
493*	04 23.3	73 30	1.198	1.37	104.2	17.7	17.0	5	2
494	04 23.8	-08 04	0.483	1.36	170.5	-34.2	17.3	6	2
495*	04 24.0	-26 41	0.410	1.36	192.4	-41.0	17.0	5	0
496	04 26.9	-13 34	0.463	1.32	176.9	-35.9	15.3	3	1
497*	04 28.9	10 21	0.549	1.29	153.5	-23.2	17.0	5	0
498*	04 29.2	20 55	0.590	1.29	144.7	-16.6	16.7	5	1
499*	04 30.9	-20 43	0.434	1.27	185.6	-37.8	17.8	6	0
500	04 32.7	-22 24	0.427	1.24	187.8	-37.9	15.8	4	1
501*	04 34.2	08 07	0.541	1.22	156.3	-23.4	17.4	6	1
502*	04 34.8	69 32	1.068	1.21	108.0	15.9	16.8	5	0
503	04 35.0	-17 29	0.447	1.21	182.3	-35.7	17.7	6	1
504*	04 35.4	06 32	0.536	1.21	157.9	-24.1	17.4	6	1
505*	04 35.6	79 46	1.663	1.20	99.4	22.1	15.2	3	0
506	04 36.4	-10 00	0.476	1.19	174.2	-32.3	17.5	6	2
507	04 36.8	-18 46	0.441	1.19	184.0	-35.8	17.4	6	1
508	04 38.4	01 45	0.518	1.16	162.8	-26.1	17.4	6	2
509	04 40.2	02 02	0.519	1.14	162.8	-25.5	17.4	6	1
510	04 40.5	-21 17	0.431	1.14	187.2	-35.8	17.6	6	1
511*	04 40.7	-25 41	0.411	1.13	192.5	-37.2	17.0	5	0
512	04 41.1	-18 33	0.442	1.13	184.2	-34.7	17.0	5	1
513*	04 41.3	-09 59	0.475	1.13	174.8	-31.2	17.5	6	0
514	04 41.4	-20 42	0.433	1.12	186.7	-35.4	15.2	3	1
515*	04 41.8	05 55	0.534	1.12	159.5	-23.1	16.8	5	1
516	04 43.2	-09 05	0.479	1.10	174.2	-30.4	17.5	6	1
517	04 43.6	-09 30	0.477	1.09	174.6	-30.5	17.6	6	2
518	04 44.5	-10 58	0.471	1.08	176.3	-30.9	17.5	6	2
519*	04 46.3	00 27	0.514	1.06	165.2	-25.1	17.0	5	0
520*	04 46.7	02 43	0.522	1.05	163.1	-23.8	17.4	6	3

			Precession						
No.	R. A. (1855)	Decl.	R. A. (1900)	Decl.	l	b	Mag.	Dist.	Rich.
521	04 47.3	-10 30	0.473	1.04	176.2	-30.1	17.6	6	1
522	04 50.0	-06 23	0.488	1.00	172.3	-27.6	17.0	5	1
523*	04 51.1	08 33	0.544	0.99	158.5	-19.7	16.7	5	2
524	04 51.5	-19 57	0.435	0.98	186.8	-33.0	16.7	5	1
525*	04 51.7	07 56	0.542	0.98	159.1	-19.9	17.2	5	0
526*	04 52.1	05 14	0.531	0.98	161.6	-21.3	16.4	4	1
527*	04 52.2	73 30	1.231	0.97	105.5	19.3	15.7	4	0
528*	04 52.4	-09 14	0.478	0.97	175.5	-28.4	17.5	6	0
529*	04 52.9	05 58	0.534	0.96	161.0	-20.7	17.0	5	2
530*	04 53.2	-01 05	0.508	0.96	167.6	-24.4	18.2	7	2
531	04 54.1	-03 46	0.498	0.95	170.3	-25.5	17.0	5	1
532*	04 55.1	11 45	0.557	0.93	156.2	-17.1	17.5	6	0
533*	04 55.4	-22 50	0.422	0.93	190.4	-33.1	15.8	4	0
534*	04 57.4	73 20	1.228	0.90	105.9	19.5	17.0	5	1
535*	05 00.2	-02 47	0.502	0.86	170.2	-23.7	17.4	6	1
536	05 00.9	-09 26	0.476	0.85	176.7	-26.6	17.0	5	2
537*	05 06.3	73 44	1.254	0.78	105.8	20.3	17.5	6	2
538	05 08.7	-15 52	0.450	0.74	184.2	-27.6	17.4	6	1
539*	05 08.8	06 18	0.536	0.74	163.0	-17.2	14.4	2	1
540	05 19.6	-25 50	0.406	0.59	195.8	-28.8	17.6	6	1
541*	05 20.0	64 18	0.968	0.58	115.1	16.6	17.5	6	2
542*	05 23.9	63 56	0.962	0.52	115.6	16.8	17.5	6	1
543	05 24.5	-22 32	0.421	0.52	192.7	-26.7	16.9	5	1
544	05 25.1	-26 04	0.404	0.51	196.5	-27.8	17.5	6	2
545*	05 25.6	-11 39	0.467	0.50	181.8	-22.1	17.0	5	4
546*	05 27.7	66 23	1.016	0.47	113.6	18.3	17.3	6	1
547*	05 30.8	-14 31	0.455	0.42	185.2	-22.2	17.0	5	2
548*	05 41.2	-25 41	0.406	0.27	197.5	-24.2	13.7	1	1
549*	05 42.1	65 40	1.003	0.26	115.0	19.3	17.3	6	0
550*	05 46.5	-21 07	0.426	0.20	193.4	-21.4	16.7	5	2
551*	05 48.5	-17 47	0.441	0.17	190.3	-19.7	17.5	6	1
552*	05 48.7	76 19	1.425	0.16	104.6	23.8	17.8	6	1
553*	06 01.5	48 38	0.765	-0.02	132.2	14.3	15.3	3	0
554*	06 03.5	67 29	1.049	-0.05	114.0	21.9	17.0	5	0
555*	06 10.8	-17 13	0.443	-0.16	192.0	-14.6	17.4	6	1
556*	06 13.5	67 07	1.039	-0.20	114.7	22.7	16.7	5	0
557*	06 14.4	69 18	1.100	-0.21	112.5	23.5	17.0	5	0
558	06 20.5	73 42	1.270	-0.30	108.0	25.1	17.0	5	2
559*	06 24.0	69 49	1.115	-0.35	112.2	24.4	15.8	4	0
560*	06 27.7	68 00	1.059	-0.40	114.2	24.3	17.6	6	1

No.	R. A. (1855)	Decl.	Precession R. A. (1900)	Precession Decl.	l	b	Mag.	Dist.	Rich.
561*	06 28.1	69 09	1.092	-0.41	113.0	24.6	17.0	5	0
562	06 36.1	69 26	1.098	-0.52	112.9	25.4	17.0	5	1
563	06 42.2	69 12	1.088	-0.61	113.2	25.8	17.0	5	2
564*	06 44.7	70 00	1.112	-0.65	112.4	26.2	16.2	4	1
565	06 50.5	71 58	1.180	-0.73	110.3	26.9	16.5	5	1
566*	06 50.8	63 30	0.948	-0.73	119.6	25.6	16.4	4	2
567*	06 52.1	33 02	0.653	-0.75	151.0	16.7	16.9	5	1
568*	06 58.0	35 16	0.664	-0.84	149.3	18.7	15.4	3	0
569*	06 58.2	48 51	0.759	-0.84	135.5	23.1	13.8	1	0
570	07 01.5	70 35	1.121	-0.89	112.0	27.7	18.0	6	2
571	07 02.0	72 08	1.178	-0.89	110.2	27.8	17.6	6	2
572*	07 02.4	54 55	0.817	-0.90	129.3	25.3	17.0	5	0
573	07 02.5	67 47	1.037	-0.90	115.1	27.5	17.6	6	1
574	07 03.6	71 13	1.142	-0.92	111.3	27.9	17.4	6	2
575*	07 06.7	79 28	1.659	-0.96	101.9	28.4	17.0	5	0
576*	07 09.5	56 00	0.827	-1.00	128.3	26.5	14.4	2	1
577	07 10.0	79 13	1.627	-1.00	102.2	28.5	17.5	6	2
578*	07 10.4	67 16	1.019	-1.01	115.8	28.2	17.0	5	0
579*	07 11.6	37 01	0.672	-1.03	148.5	21.8	17.6	6	2
580*	07 15.8	41 42	0.700	-1.08	144.0	24.0	16.8	5	1
581*	07 17.6	11 23	0.554	-1.11	173.9	13.1	17.3	6	1
582*	07 18.0	42 16	0.703	-1.12	143.5	24.6	16.4	4	0
583	07 18.6	43 20	0.710	-1.12	142.4	25.0	17.6	6	2
584*	07 19.6	26 59	0.619	-1.14	159.2	19.9	17.3	6	1
585*	07 20.9	41 09	0.694	-1.15	144.8	24.8	17.0	5	0
586*	07 23.0	31 56	0.642	-1.18	154.5	22.4	17.4	6	3
587*	07 23.1	39 45	0.685	-1.19	146.4	24.8	16.6	5	1
588	07 23.3	70 16	1.092	-1.19	112.4	29.5	17.1	5	1
589	07 27.9	63 49	0.932	-1.25	119.9	29.7	17.1	5	1
590*	07 27.9	35 36	0.660	-1.25	151.1	24.5	17.8	6	1
591	07 31.8	44 18	0.712	-1.30	142.0	27.5	16.8	5	1
592*	07 34.7	09 43	0.547	-1.34	177.3	16.1	15.0	3	1
593	07 35.0	73 11	1.187	-1.35	109.0	30.3	17.4	6	3
594*	07 36.8	11 25	0.553	-1.37	176.0	17.4	17.5	6	1
595*	07 37.7	52 26	0.776	-1.38	133.1	30.0	15.6	3	0
596	07 40.0	73 00	1.172	-1.41	109.2	30.7	17.2	5	2
597*	07 42.5	35 44	0.656	-1.44	151.9	27.4	17.0	5	1
598*	07 42.5	18 02	0.577	-1.44	170.2	21.4	17.4	6	1
599	07 42.6	69 14	1.041	-1.45	113.6	31.2	17.2	5	1
600*	07 43.1	64 08	0.926	-1.45	119.5	31.4	16.5	5	0

No.	R. A. (1855)	Decl.	Precession R. A. (1900)	Precession Decl.	l	b	Mag.	Dist.	Rich.
601*	07 44.0	34 42	0.651	-1.46	153.1	27.4	17.6	6	1
602*	07 44.3	29 44	0.626	-1.47	158.5	26.0	15.8	4	0
603*	07 46.5	34 08	0.647	-1.50	153.9	27.7	16.8	5	1
604*	07 46.6	61 45	0.882	-1.50	122.3	31.8	17.1	5	0
605*	07 47.4	27 47	0.617	-1.51	160.8	26.0	16.7	5	0
606*	07 47.6	36 20	0.658	-1.51	151.6	28.5	17.7	6	1
607*	07 47.7	39 43	0.677	-1.51	147.8	29.4	16.9	5	0
608	07 49.0	64 10	0.921	-1.53	119.5	32.0	17.1	5	1
609	07 49.2	63 56	0.917	-1.53	119.8	32.1	17.1	5	1
610*	07 50.4	27 31	0.615	-1.55	161.3	26.5	16.4	4	0
611*	07 51.5	36 29	0.658	-1.56	151.6	29.3	17.9	6	1
612*	07 51.6	35 13	0.651	-1.56	153.1	29.0	16.5	5	1
613	07 52.3	45 33	0.712	-1.57	141.4	31.3	17.5	6	1
614*	07 52.7	18 22	0.577	-1.58	170.9	23.7	17.0	5	0
615*	07 53.6	32 08	0.635	-1.59	156.6	28.6	17.7	6	1
616	07 53.9	47 13	0.723	-1.59	139.5	31.8	17.1	5	1
617	07 54.2	77 44	1.412	-1.60	103.6	30.9	17.7	6	2
618	07 54.7	67 58	0.995	-1.60	115.0	32.4	17.3	6	1
619*	07 55.3	-01 49	0.506	-1.61	190.4	15.3	16.8	5	1
620	07 55.4	46 06	0.715	-1.61	140.8	31.9	17.4	6	2
621	07 56.1	70 27	1.060	-1.62	112.0	32.2	17.3	6	2
622	07 56.9	48 26	0.731	-1.63	138.1	32.5	17.4	6	1
623*	07 58.3	-00 33	0.510	-1.65	189.7	16.6	16.9	5	1
624	07 58.4	77 18	1.371	-1.65	104.1	31.2	17.8	6	1
625	08 00.0	82 49	2.042	-1.67	97.8	29.9	16.7	5	2
626	08 00.0	49 38	0.739	-1.67	136.8	33.1	17.1	5	1
627	08 00.0	35 09	0.648	-1.67	153.6	30.7	17.4	6	1
628*	08 00.7	35 39	0.650	-1.68	153.1	30.9	15.9	4	0
629	08 01.2	66 52	0.962	-1.69	116.2	33.1	17.1	5	1
630*	08 01.3	40 45	0.678	-1.69	147.3	32.1	16.9	5	0
631*	08 01.8	36 24	0.653	-1.69	152.3	31.3	17.1	5	0
632*	08 02.0	05 21	0.530	-1.70	184.7	20.2	17.2	5	1
633	08 02.4	64 11	0.908	-1.70	119.4	33.5	17.1	5	2
634*	08 02.7	58 29	0.824	-1.70	126.2	33.8	14.9	3	0
635*	08 02.9	17 09	0.571	-1.71	173.2	25.5	17.0	5	0
636*	08 04.5	73 12	1.144	-1.73	108.7	32.4	16.8	5	0
637*	08 04.5	48 49	0.730	-1.73	137.8	33.8	17.5	6	0
638*	08 05.0	13 52	0.559	-1.73	176.7	24.6	17.0	5	0
639	08 05.8	68 22	0.991	-1.74	114.3	33.4	17.7	6	3
640	08 06.0	30 01	0.622	-1.75	159.8	30.5	17.5	6	1

No.	R. A. (1855)	Decl.	Precession		l	b	Mag.	Dist.	Rich.
			R. A. (1900)	Decl.					
641*	08 06.9	23 16	0.594	-1.76	167.2	28.6	17.5	6	0
642	08 07.0	30 26	0.623	-1.76	159.4	30.9	17.7	6	2
643*	08 08.6	52 57	0.762	-1.78	132.9	34.7	17.1	5	0
644*	08 10.4	-07 09	0.489	-1.80	197.2	15.8	16.2	4	0
645	08 11.0	57 02	0.801	-1.81	127.9	35.0	17.7	6	1
646*	08 11.8	47 34	0.716	-1.82	139.5	34.9	16.8	5	0
647*	08 12.6	08 00	0.538	-1.83	183.4	23.8	17.8	6	1
648	08 13.1	33 00	0.633	-1.83	156.9	32.8	17.7	6	1
649*	08 13.7	49 20	0.728	-1.84	137.3	35.3	17.3	6	0
650*	08 14.1	19 02	0.576	-1.85	172.4	28.7	17.5	6	0
651*	08 14.1	16 34	0.567	-1.85	175.0	27.7	17.6	6	0
652*	08 14.3	56 30	0.792	-1.85	128.5	35.5	17.5	6	0
653*	08 14.3	01 41	0.517	-1.85	189.7	21.2	17.0	5	1
654	08 14.6	39 23	0.664	-1.85	149.4	34.4	17.1	5	1
655	08 15.0	47 36	0.715	-1.86	139.5	35.4	17.1	5	3
656	08 15.1	48 45	0.723	-1.86	138.1	35.5	17.5	6	1
657*	08 15.1	16 25	0.566	-1.86	175.2	27.9	17.4	6	2
658*	08 15.6	16 09	0.566	-1.86	175.6	27.9	17.0	5	1
659*	08 15.7	19 53	0.579	-1.86	171.7	29.3	16.8	5	1
660	08 15.9	37 19	0.653	-1.87	151.9	34.3	17.7	6	1
661	08 16.3	53 37	0.762	-1.87	132.1	35.8	17.4	6	1
662*	08 17.0	08 58	0.541	-1.88	183.0	25.2	17.4	6	0
663*	08 17.2	35 18	0.642	-1.88	154.4	34.1	17.7	6	0
664*	08 17.2	04 55	0.528	-1.88	187.0	23.4	17.4	6	2
665	08 17.4	66 22	0.932	-1.89	116.5	34.8	17.5	6	5
666*	08 17.7	38 48	0.660	-1.89	150.2	34.9	17.9	6	0
667*	08 18.0	45 12	0.697	-1.89	142.5	35.8	17.5	6	0
668	08 18.4	35 15	0.641	-1.90	154.5	34.4	17.5	6	1
669	08 18.8	56 48	0.792	-1.90	128.1	36.1	17.9	6	1
670	08 19.1	67 22	0.951	-1.91	115.3	34.8	17.5	6	2
671*	08 19.5	30 54	0.621	-1.91	159.7	33.6	14.9	3	0
672*	08 19.8	32 58	0.630	-1.91	157.3	34.1	17.4	6	0
673*	08 20.2	15 39	0.563	-1.92	176.6	28.7	17.1	5	0
674*	08 21.9	18 55	0.574	-1.94	173.3	30.3	17.7	6	0
675*	08 22.1	38 54	0.658	-1.94	150.3	35.7	17.7	6	0
676*	08 22.2	37 39	0.652	-1.94	151.8	35.6	17.7	6	0
677	08 23.0	36 16	0.645	-1.95	153.5	35.5	17.9	6	1
678	08 23.7	51 13	0.736	-1.96	135.1	37.0	17.1	5	1
679*	08 24.8	36 28	0.645	-1.97	153.4	35.9	17.9	6	0
680	08 26.0	37 22	0.649	-1.99	152.3	36.3	17.7	6	1

No.	R. A. (1855)	Decl.	Precession		l	b	Mag.	Dist.	Rich.
			R. A. (1900)	Decl.					
681*	08 26.3	44 21	0.687	-1.99	143.7	37.2	17.1	5	0
682*	08 27.3	52 21	0.743	-2.00	133.6	37.5	17.1	5	0
683*	08 27.6	31 44	0.622	-2.01	159.2	35.5	17.1	5	0
684	08 27.7	73 19	1.106	-2.01	108.1	34.0	17.1	5	2
685*	08 27.7	44 45	0.688	-2.01	143.2	37.4	17.1	5	0
686	08 28.8	78 14	1.363	-2.02	102.5	32.5	17.7	6	2
687	08 29.3	42 39	0.675	-2.03	145.9	37.6	17.7	6	1
688	08 29.4	16 22	0.564	-2.03	176.8	31.0	17.5	6	1
689*	08 29.4	15 30	0.561	-2.03	177.8	30.7	17.1	5	0
690	08 30.4	29 21	0.611	-2.04	162.2	35.5	16.9	5	1
691*	08 31.4	42 33	0.673	-2.05	146.0	37.9	17.1	5	0
692*	08 32.2	27 15	0.602	-2.06	164.8	35.3	16.2	4	0
693*	08 32.2	01 35	0.517	-2.06	192.2	25.0	17.4	6	0
694*	08 32.3	32 34	0.624	-2.06	158.5	36.6	17.5	6	0
695	08 32.4	32 48	0.625	-2.06	158.2	36.7	17.1	5	1
696	08 33.4	16 41	0.564	-2.07	176.9	32.0	17.4	6	1
697	08 33.6	36 52	0.643	-2.08	153.2	37.7	17.9	6	1
698	08 33.8	42 04	0.669	-2.08	146.7	38.3	17.9	6	1
699	08 35.9	28 19	0.605	-2.10	163.8	36.4	16.5	5	1
700*	08 36.7	37 29	0.644	-2.11	152.6	38.4	18.3	7	0
701*	08 38.3	38 40	0.649	-2.13	151.1	38.8	17.7	6	0
702	08 38.4	25 31	0.594	-2.13	167.4	36.1	17.1	5	1
703*	08 38.5	05 40	0.529	-2.13	189.1	28.4	17.8	6	1
704*	08 38.8	79 51	1.469	-2.13	100.5	32.3	17.5	6	0
705*	08 38.8	30 32	0.613	-2.13	161.4	37.5	17.1	5	0
706	08 39.5	29 16	0.608	-2.14	162.9	37.4	17.5	6	1
707*	08 39.7	80 27	1.527	-2.14	99.8	32.1	17.5	6	0
708	08 39.7	38 04	0.646	-2.14	151.9	39.0	17.9	6	1
709*	08 42.2	13 17	0.552	-2.17	181.6	32.6	17.5	6	0
710*	08 42.9	37 07	0.640	-2.18	153.3	39.6	17.9	6	0
711*	08 42.9	00 51	0.515	-2.18	194.4	26.9	17.3	6	1
712	08 43.5	26 11	0.595	-2.19	167.0	37.4	17.7	6	1
713*	08 44.4	18 46	0.569	-2.20	175.8	35.2	16.8	5	0
714	08 45.2	42 28	0.665	-2.20	146.4	40.5	16.8	5	1
715	08 45.6	35 57	0.633	-2.21	154.9	39.9	17.9	6	1
716*	08 45.8	49 01	0.704	-2.21	137.7	40.6	17.1	5	0
717*	08 46.0	83 26	1.961	-2.21	96.6	31.0	16.7	5	0
718*	08 46.9	79 47	1.434	-2.22	100.4	32.7	17.1	5	0
719	08 47.0	78 34	1.333	-2.22	101.7	33.2	17.6	6	2
720	08 47.0	16 11	0.560	-2.22	179.0	34.8	17.7	6	1

No.	R. A. (1855)	Decl.	Precession R. A. (1900)	Precession Decl.	l	b	Mag.	Dist.	Rich.
721*	08 47.8	61 51	0.821	-2.23	121.1	39.0	17.7	6	0
722*	08 48.5	31 19	0.613	-2.24	160.9	39.7	16.9	5	0
723	08 48.6	82 03	1.694	-2.24	98.0	31.7	17.1	5	1
724	08 49.0	39 08	0.646	-2.25	150.8	41.0	16.7	5	1
725*	08 49.2	63 10	0.837	-2.25	119.5	38.8	17.4	6	0
726*	08 49.5	31 41	0.614	-2.25	160.5	40.0	16.7	5	0
727	08 49.8	39 59	0.650	-2.26	149.7	41.2	16.7	5	1
728*	08 49.8	10 32	0.542	-2.26	185.5	33.1	17.5	6	0
729	08 49.9	58 49	0.783	-2.26	124.9	39.9	17.1	5	1
730	08 50.0	51 54	0.721	-2.26	133.9	41.0	17.5	6	1
731*	08 50.1	-03 08	0.503	-2.26	199.2	26.3	17.6	6	0
732	08 50.3	03 44	0.523	-2.26	192.6	30.0	17.7	6	1
733	08 50.5	56 11	0.757	-2.26	128.3	40.5	17.7	6	1
734	08 52.5	16 50	0.561	-2.28	178.9	36.3	17.7	6	1
735*	08 52.7	62 20	0.822	-2.29	120.4	39.4	17.5	6	0
736	08 52.7	52 47	0.726	-2.29	132.6	41.3	17.5	6	2
737*	08 53.1	80 30	1.481	-2.29	99.5	32.6	16.9	5	0
738	08 54.0	78 37	1.314	-2.30	101.4	33.5	17.5	6	2
739	08 54.6	47 49	0.690	-2.31	139.2	42.1	17.5	6	1
740*	08 56.1	42 54	0.661	-2.32	145.9	42.5	17.1	5	0
741	08 57.3	37 53	0.636	-2.33	152.7	42.5	17.8	6	1
742	08 58.8	60 53	0.796	-2.35	121.9	40.5	17.7	6	1
743	08 58.9	10 52	0.542	-2.35	186.4	35.3	17.5	6	1
744*	08 59.2	17 15	0.561	-2.35	179.2	38.0	16.6	5	0
745*	08 59.2	05 22	0.527	-2.35	192.3	32.7	17.4	6	0
746	08 59.3	52 08	0.715	-2.36	133.3	42.4	17.7	6	1
747	08 59.4	61 43	0.805	-2.36	120.8	40.3	17.5	6	1
748	09 00.1	76 22	1.161	-2.36	103.7	34.8	17.4	6	2
749*	09 00.9	07 34	0.539	-2.37	190.2	34.2	17.7	6	0
750	09 01.2	11 37	0.544	-2.37	185.9	36.1	17.1	5	3
751*	09 01.4	84 02	2.009	-2.38	95.7	31.0	17.8	6	0
752	09 01.4	36 02	0.626	-2.38	155.3	43.1	17.8	6	1
753*	09 01.4	-06 19	0.495	-2.38	203.9	26.9	17.3	6	0
754*	09 01.8	-09 04	0.487	-2.38	206.5	25.3	15.2	3	2
755*	09 02.5	49 34	0.695	-2.39	136.7	43.2	17.1	5	0
756	09 02.5	49 05	0.692	-2.39	137.4	43.3	17.5	6	1
757*	09 02.9	48 19	0.687	-2.39	138.4	43.4	15.6	3	0
758	09 03.1	43 09	0.658	-2.39	145.5	43.8	17.9	6	1
759*	09 03.4	42 30	0.654	-2.40	146.4	43.8	17.5	6	0
760*	09 03.4	-04 53	0.499	-2.40	203.0	28.1	17.6	6	1
761*	09 03.7	-10 00	0.485	-2.40	207.6	25.2	17.0	5	1
762*	09 03.8	74 54	1.086	-2.40	105.1	35.7	16.2	4	0
763	09 04.4	16 36	0.558	-2.41	180.5	38.8	16.5	5	1
764	09 05.3	64 26	0.833	-2.42	117.2	40.1	17.4	6	2
765	09 05.7	74 26	1.063	-2.42	105.6	36.0	16.9	5	2
766*	09 05.8	-04 08	0.501	-2.42	202.7	29.0	17.1	5	0
767	09 06.4	83 02	1.764	-2.43	96.6	31.7	17.1	5	1
768	09 06.7	80 00	1.378	-2.43	99.7	33.3	17.7	6	1
769	09 06.7	03 55	0.523	-2.43	194.9	33.6	16.5	5	1
770*	09 06.8	61 02	0.788	-2.43	121.4	41.4	17.7	6	0
771	09 07.2	61 47	0.796	-2.44	120.4	41.2	17.7	6	1
772	09 07.5	37 14	0.628	-2.44	153.8	44.4	17.7	6	1
773	09 07.8	52 19	0.709	-2.44	132.8	43.7	17.5	6	2
774*	09 08.0	06 08	0.528	-2.44	192.8	35.0	16.9	5	0
775	09 08.7	06 29	0.529	-2.45	192.5	35.3	17.4	6	1
776	09 08.8	00 12	0.513	-2.45	199.0	32.1	17.9	6	1
777	09 10.6	78 52	1.274	-2.47	100.7	34.1	17.5	6	4
778*	09 10.8	-07 43	0.492	-2.47	206.8	27.9	17.8	6	1
779*	09 11.0	34 23	0.615	-2.47	157.9	44.9	13.8	1	0
780*	09 11.5	-11 40	0.481	-2.48	210.4	25.6	16.6	5	0
781	09 11.7	31 03	0.602	-2.48	162.5	44.5	17.6	6	2
782	09 11.8	52 35	0.707	-2.48	132.3	44.2	17.6	6	2
783	09 11.9	61 51	0.791	-2.48	120.1	41.7	17.7	6	1
784	09 12.0	55 35	0.729	-2.48	128.2	43.5	17.5	6	1
785*	09 13.2	60 06	0.770	-2.49	122.2	42.4	17.6	6	0
786*	09 13.6	75 26	1.081	-2.50	104.2	36.0	15.9	4	0
787	09 13.6	75 02	1.065	-2.50	104.6	36.2	15.9	4	2
788	09 14.0	72 56	0.993	-2.50	106.9	37.2	17.0	5	1
789*	09 14.1	61 39	0.785	-2.50	120.2	42.0	17.5	6	0
790*	09 14.2	-13 02	0.478	-2.50	212.0	25.3	17.3	6	1
791	09 14.4	13 03	0.546	-2.51	186.0	39.6	17.5	6	1
792	09 15.6	43 26	0.651	-2.52	145.0	46.0	17.5	6	1
793	09 15.7	50 56	0.692	-2.52	134.4	45.1	17.1	5	1
794	09 16.0	09 17	0.536	-2.52	190.5	38.3	17.5	6	1
795	09 16.1	14 48	0.551	-2.52	184.1	40.7	17.5	6	3
796	09 16.9	61 02	0.775	-2.53	120.8	42.5	17.4	6	1
797	09 18.5	18 18	0.560	-2.55	180.1	42.6	16.5	5	1
798	09 19.3	81 36	1.485	-2.55	97.7	32.9	17.9	6	1
799*	09 19.5	59 23	0.754	-2.55	122.8	43.4	17.7	6	0
800	09 19.5	38 26	0.626	-2.55	152.2	46.9	17.7	6	2

No.	R. A. (1855)	Decl.	Precession R. A. (1900)	Precession Decl.	l	b	Mag.	Dist.	Rich.
801	09 19.8	21 12	0.568	-2.56	176.5	43.9	17.7	6	2
802	09 21.1	67 41	0.859	-2.57	112.5	40.2	17.3	6	1
803*	09 21.3	12 46	0.544	-2.57	187.3	41.0	17.5	6	0
804	09 21.4	63 12	0.793	-2.57	117.8	42.2	17.4	6	1
805*	09 21.4	04 45	0.524	-2.57	196.4	37.2	17.5	6	0
806*	09 21.7	56 40	0.728	-2.58	126.2	44.5	17.5	6	0
807	09 21.8	-05 49	0.498	-2.58	206.9	31.2	17.9	6	1
808*	09 22.4	08 20	0.533	-2.58	192.6	39.2	17.4	6	0
809*	09 22.6	77 57	1.173	-2.58	101.2	35.1	16.9	5	0
810*	09 23.4	-01 32	0.508	-2.59	203.1	34.1	17.4	6	0
811	09 23.5	78 11	1.183	-2.59	101.0	35.0	17.4	6	1
812*	09 23.6	38 32	0.624	-2.59	152.1	47.7	17.8	6	0
813*	09 23.6	-13 56	0.477	-2.59	214.4	26.4	17.5	6	1
814	09 23.8	76 35	1.100	-2.59	102.6	35.9	17.1	5	2
815	09 23.8	29 42	0.592	-2.59	165.1	46.9	17.7	6	1
816*	09 24.0	-12 46	0.480	-2.60	213.5	27.3	17.4	6	1
817	09 24.1	18 00	0.557	-2.60	181.2	43.7	17.1	5	1
818*	09 24.5	74 38	1.021	-2.60	104.6	37.0	16.5	5	0
819*	09 24.5	10 18	0.537	-2.60	190.6	40.6	16.5	5	0
820	09 26.5	-02 17	0.507	-2.62	204.4	34.3	17.5	6	1
821*	09 26.7	-04 03	0.502	-2.62	206.2	33.3	17.7	6	0
822*	09 26.7	-12 47	0.481	-2.62	214.0	27.8	17.5	6	1
823*	09 26.8	-25 13	0.447	-2.62	223.9	19.2	17.3	6	1
824*	09 27.0	24 34	0.575	-2.62	172.6	46.5	17.5	6	0
825*	09 27.1	66 05	0.823	-2.62	114.0	41.5	18.2	7	1
826*	09 27.2	54 10	0.703	-2.63	129.3	46.0	17.7	6	0
827	09 27.3	-02 19	0.506	-2.63	204.6	34.4	17.5	6	1
828*	09 27.7	12 51	0.543	-2.63	188.1	42.5	17.7	6	0
829*	09 27.8	62 48	0.779	-2.63	117.9	43.0	17.1	5	0
830	09 27.8	08 10	0.532	-2.63	193.6	40.3	17.7	6	1
831*	09 27.9	-02 24	0.506	-2.63	204.8	34.5	17.5	6	0
832*	09 28.0	16 31	0.553	-2.63	183.6	44.0	17.1	5	0
833*	09 28.4	11 31	0.540	-2.64	189.8	42.0	16.7	5	0
834*	09 28.7	67 20	0.839	-2.64	112.4	41.0	16.3	4	0
835	09 29.5	13 31	0.545	-2.65	187.5	43.1	17.7	6	1
836	09 29.7	79 06	1.217	-2.65	99.8	34.7	17.3	6	1
837	09 29.7	09 11	0.534	-2.65	192.8	41.2	17.5	6	1
838*	09 29.8	-04 22	0.502	-2.65	207.0	33.7	15.3	3	0
839*	09 30.3	80 33	1.325	-2.65	98.4	33.8	17.9	6	0
840*	09 30.6	79 22	1.232	-2.66	99.6	34.6	17.3	6	0
841*	09 31.3	-03 33	0.504	-2.66	206.5	34.5	16.5	5	0
842*	09 31.5	-20 17	0.462	-2.66	221.0	23.5	16.7	5	0
843	09 31.6	57 14	0.721	-2.67	124.8	45.6	17.5	6	1
844	09 32.6	-00 18	0.511	-2.67	203.6	36.7	17.6	6	1
845	09 32.7	65 04	0.799	-2.67	114.8	42.5	17.4	6	2
846	09 32.9	23 09	0.569	-2.68	175.2	47.4	17.0	5	1
847	09 32.9	03 07	0.519	-2.68	200.1	38.7	17.5	6	2
848*	09 33.1	75 32	1.028	-2.68	103.3	37.0	16.9	5	0
849*	09 33.2	22 01	0.566	-2.68	176.8	47.1	17.2	5	0
850	09 33.2	13 14	0.543	-2.68	188.4	43.8	17.5	6	2
851*	09 33.4	47 40	0.658	-2.68	138.2	48.6	18.4	7	1
852	09 33.5	30 05	0.589	-2.68	165.1	49.0	17.8	6	1
853*	09 34.3	16 03	0.550	-2.69	185.0	45.2	17.5	6	0
854	09 34.3	09 36	0.534	-2.69	193.0	42.4	17.7	6	1
855*	09 34.3	-08 38	0.492	-2.69	211.8	31.9	17.4	6	1
856*	09 35.2	57 13	0.716	-2.70	124.6	46.1	17.1	5	0
857*	09 35.4	-21 58	0.459	-2.70	223.0	22.9	16.9	5	2
858*	09 35.8	06 33	0.527	-2.70	196.8	41.2	16.6	5	0
859	09 35.9	09 31	0.534	-2.70	193.4	42.7	17.1	5	1
860	09 36.1	02 46	0.518	-2.70	201.0	39.2	17.4	6	1
861*	09 36.1	00 43	0.514	-2.70	203.2	38.0	17.4	6	0
862	09 36.7	10 14	0.535	-2.71	192.6	43.2	17.7	6	1
863*	09 36.9	-11 58	0.485	-2.71	215.2	30.2	17.7	6	0
864	09 37.1	71 53	0.909	-2.71	106.8	39.3	17.4	6	1
865*	09 37.5	44 10	0.638	-2.72	143.3	49.9	16.6	5	0
866*	09 37.6	58 49	0.726	-2.72	122.3	45.8	17.5	6	0
867*	09 37.7	01 13	0.515	-2.72	202.9	38.6	17.5	6	0
868*	09 38.3	-07 59	0.494	-2.72	212.0	33.1	17.6	6	3
869*	09 38.7	03 02	0.519	-2.73	201.2	39.9	17.4	6	0
870	09 39.0	10 17	0.535	-2.73	193.0	43.7	17.7	6	1
871	09 39.7	66 28	0.806	-2.73	112.7	42.4	17.1	5	1
872	09 40.0	77 57	1.110	-2.74	100.6	35.8	17.6	6	1
873	09 40.0	71 59	0.905	-2.74	106.6	39.4	17.4	6	3
874	09 40.3	58 43	0.722	-2.74	122.2	46.1	17.7	6	1
875*	09 41.0	71 37	0.894	-2.75	106.9	39.7	17.4	6	0
876	09 41.5	29 58	0.585	-2.75	165.6	50.7	17.6	6	1
877	09 41.6	76 04	1.022	-2.75	102.3	37.0	17.7	6	1
878	09 42.1	06 27	0.526	-2.75	198.0	42.5	16.8	5	1
879	09 42.3	29 33	0.583	-2.76	166.3	50.8	17.2	5	1
880	09 42.4	-03 30	0.504	-2.76	208.6	36.7	17.4	6	1

			Precession						
No.	R.A. (1855)	Decl.	R.A. (1900)	Decl.	l	b	Mag.	Dist.	Rich.
881*	09 43.2	72 24	0.907	-2.76	106.0	39.4	17.7	6	0
882*	09 43.6	08 56	0.532	-2.77	195.4	44.1	17.1	5	0
883	09 43.7	06 11	0.526	-2.77	198.6	42.6	16.8	5	1
884*	09 43.9	05 25	0.524	-2.77	199.5	42.3	17.1	5	0
885	09 44.0	63 10	0.758	-2.77	116.3	44.5	17.7	6	1
886	09 44.1	58 35	0.716	-2.77	122.1	46.6	17.5	6	1
887*	09 44.7	41 02	0.620	-2.78	148.0	51.6	17.6	6	0
888	09 44.8	77 38	1.077	-2.78	100.7	36.2	17.7	6	1
889	09 45.3	23 28	0.566	-2.78	175.9	50.2	17.6	6	1
890*	09 45.7	-04 10	0.503	-2.78	209.9	36.9	17.2	5	0
891	09 45.9	29 06	0.580	-2.79	167.2	51.5	17.6	6	1
892*	09 46.1	01 15	0.515	-2.79	204.5	40.3	17.1	5	0
893	09 47.0	36 40	0.603	-2.79	155.0	52.3	17.8	6	1
894*	09 47.2	36 51	0.603	-2.80	154.7	52.3	17.8	6	0
895	09 47.3	50 11	0.658	-2.80	133.6	50.2	18.0	6	1
896*	09 47.5	41 42	0.620	-2.80	146.8	52.0	17.0	5	0
897*	09 47.9	28 53	0.579	-2.80	167.7	51.9	17.6	6	0
898	09 48.3	49 57	0.656	-2.80	133.9	50.4	18.0	6	1
899	09 48.4	55 58	0.691	-2.81	125.2	48.3	17.2	5	1
900*	09 48.5	19 17	0.554	-2.81	182.4	49.6	17.5	6	0
901*	09 49.0	-09 16	0.492	-2.81	215.3	34.2	17.7	6	1
902*	09 49.3	-09 30	0.492	-2.81	215.5	34.1	17.7	6	0
903*	09 49.7	20 19	0.556	-2.82	181.1	50.2	17.2	5	0
904	09 49.8	60 47	0.726	-2.82	118.8	46.2	17.4	6	1
905*	09 50.4	57 42	0.701	-2.82	122.7	47.8	17.8	6	0
906*	09 50.5	66 05	0.781	-2.82	112.3	43.5	17.4	6	0
907*	09 51.2	-10 22	0.490	-2.83	216.7	33.8	17.5	6	1
908*	09 51.5	23 07	0.563	-2.83	177.0	51.5	18.4	7	1
909	09 51.6	75 32	0.971	-2.83	102.4	37.9	17.7	6	2
910	09 51.6	67 52	0.803	-2.83	110.3	42.6	17.5	6	4
911*	09 53.4	-14 42	0.482	-2.84	220.8	31.1	17.5	6	0
912*	09 53.7	00 36	0.513	-2.85	206.7	41.5	15.9	4	0
913	09 54.5	21 11	0.557	-2.85	180.3	51.5	18.0	6	1
914	09 56.2	71 57	0.863	-2.87	105.6	40.4	17.7	6	2
915	09 56.4	51 38	0.657	-2.87	130.7	51.0	17.2	5	1
916*	09 57.0	-18 41	0.474	-2.87	224.6	28.8	17.3	6	0
917	09 57.3	63 13	0.737	-2.87	115.1	45.7	17.4	6	1
918	09 57.5	74 27	0.920	-2.87	103.1	38.9	17.1	5	1
919	09 57.5	00 00	0.512	-2.87	208.1	41.8	17.1	5	1
920	09 57.6	55 59	0.680	-2.88	124.4	49.4	17.2	5	1

			Precession						
No.	R.A. (1855)	Decl.	R.A. (1900)	Decl.	l	b	Mag.	Dist.	Rich.
921*	09 57.9	08 08	0.528	-2.88	198.9	46.7	16.7	5	0
922	09 58.3	71 44	0.854	-2.88	105.7	40.7	17.9	6	2
923	09 58.3	26 37	0.569	-2.88	172.1	53.8	17.2	5	1
924	09 58.5	36 22	0.595	-2.88	155.4	54.6	17.2	5	1
925	09 58.6	27 50	0.572	-2.88	170.0	54.1	17.7	6	1
926	09 58.7	22 24	0.558	-2.88	178.9	52.8	17.8	6	1
927	09 58.9	51 02	0.651	-2.89	131.3	51.6	17.4	6	1
928	09 59.1	12 13	0.536	-2.89	193.9	49.0	17.2	5	1
929*	09 59.2	38 43	0.602	-2.89	151.3	54.6	17.6	6	0
930*	09 59.6	-04 56	0.502	-2.89	213.5	39.0	16.5	5	1
931*	09 59.8	-12 43	0.487	-2.89	220.5	33.6	17.4	6	0
932	10 00.1	20 18	0.553	-2.89	182.4	52.5	17.5	6	1
933*	10 00.2	01 14	0.514	-2.89	207.4	43.1	15.9	4	0
934	10 00.7	17 58	0.548	-2.90	186.0	51.8	17.0	5	1
935*	10 00.9	56 42	0.680	-2.90	123.1	49.5	17.2	5	0
936*	10 00.9	30 16	0.577	-2.90	166.0	54.9	17.2	5	0
937	10 01.1	14 41	0.541	-2.90	190.9	50.5	17.2	5	1
938*	10 01.5	19 07	0.550	-2.90	184.4	52.4	16.6	5	0
939*	10 01.6	-10 37	0.492	-2.91	219.1	35.5	17.7	6	0
940*	10 02.1	-15 56	0.481	-2.91	223.5	31.7	17.5	6	0
941	10 02.2	04 24	0.520	-2.91	204.3	45.5	17.1	5	1
942*	10 03.5	20 00	0.551	-2.92	183.3	53.2	17.0	5	0
943	10 03.8	34 20	0.586	-2.92	158.9	55.7	17.2	5	2
944	10 03.8	-01 20	0.510	-2.92	210.8	42.2	17.1	5	1
945*	10 04.3	69 49	0.805	-2.92	107.2	42.3	17.2	5	0
946*	10 04.4	24 34	0.561	-2.92	176.0	54.7	17.6	6	0
947	10 04.7	63 48	0.730	-2.93	113.8	46.1	16.8	5	1
948*	10 04.8	73 02	0.864	-2.93	104.0	40.2	17.1	5	0
949*	10 04.8	07 08	0.525	-2.93	201.5	47.5	16.8	5	0
950	10 05.4	50 33	0.642	-2.93	131.5	52.7	17.6	6	1
951	10 05.4	35 27	0.588	-2.93	156.9	56.1	17.6	6	1
952	10 05.8	20 30	0.552	-2.93	182.8	53.8	16.9	5	1
953*	10 06.1	-15 14	0.483	-2.94	223.8	32.8	17.9	6	1
954*	10 06.2	00 36	0.513	-2.94	209.3	43.9	16.5	5	0
955*	10 06.2	-23 44	0.466	-2.94	230.1	26.3	17.4	6	1
956	10 06.4	47 54	0.629	-2.94	135.5	53.9	17.2	5	1
957	10 06.5	-00 12	0.512	-2.94	210.3	43.5	15.9	4	1
958	10 07.5	41 44	0.606	-2.95	145.7	55.7	18.0	6	1
959	10 07.6	60 17	0.696	-2.95	117.7	48.4	17.8	6	1
960	10 08.0	66 57	0.758	-2.95	109.9	44.4	17.2	5	2

					Precession						
No.	R. A. (1855)		Decl.		R. A. (1900)	Decl.	l	b	Mag.	Dist.	Rich.
961	10	08.1	34	21	0.583	-2.95	158.9	56.6	17.2	5	2
962*	10	08.5	64	12	0.727	-2.95	112.9	46.2	17.1	5	0
963	10	08.5	39	45	0.598	-2.95	149.1	56.3	17.2	5	3
964	10	08.5	25	32	0.562	-2.95	174.7	55.8	17.2	5	1
965	10	09.5	50	37	0.638	-2.96	130.9	53.3	17.5	6	1
966*	10	09.5	-24	40	0.465	-2.96	231.4	26.0	17.4	6	1
967*	10	09.6	44	10	0.612	-2.96	141.4	55.5	17.0	5	0
968	10	10.1	69	00	0.780	-2.96	107.6	43.2	17.5	6	2
969	10	10.3	31	06	0.574	-2.97	164.8	57.0	17.6	6	1
970*	10	10.4	-09	59	0.494	-2.97	220.5	37.4	16.5	5	1
971	10	11.1	41	42	0.603	-2.97	145.5	56.4	16.6	5	1
972	10	11.3	40	17	0.598	-2.97	148.0	56.7	17.2	5	1
973	10	11.8	08	48	0.528	-2.98	200.9	49.9	17.6	6	2
974	10	11.9	14	47	0.539	-2.98	192.6	52.9	17.4	6	1
975	10	12.2	65	22	0.732	-2.98	111.3	45.7	16.8	5	2
976*	10	12.4	-13	12	0.488	-2.98	223.6	35.4	17.7	6	1
977	10	12.5	33	58	0.580	-2.98	159.6	57.5	17.2	5	1
978	10	13.2	-05	48	0.502	-2.98	217.4	40.9	15.6	3	1
979*	10	13.2	-07	10	0.500	-2.98	218.6	39.9	15.3	3	0
980	10	13.3	50	51	0.635	-2.99	130.1	53.8	17.5	6	1
981	10	13.5	68	51	0.770	-2.99	107.5	43.6	17.9	6	2
982	10	13.5	35	22	0.583	-2.99	156.9	57.7	17.6	6	1
983	10	13.6	60	33	0.689	-2.99	116.7	48.8	17.7	6	2
984*	10	13.6	12	56	0.535	-2.99	195.6	52.4	17.8	6	0
985	10	13.7	52	47	0.643	-2.99	127.2	53.0	17.0	5	1
986	10	13.8	14	52	0.538	-2.99	192.8	53.4	17.7	6	1
987	10	14.1	07	08	0.525	-2.99	203.5	49.4	17.2	5	1
988*	10	14.3	33	03	0.576	-2.99	161.3	57.9	18.0	6	0
989*	10	14.4	09	56	0.529	-2.99	199.9	51.1	17.2	5	0
990	10	14.5	49	54	0.629	-2.99	131.5	54.3	17.4	6	1
991	10	14.5	19	37	0.547	-2.99	185.5	55.5	17.2	5	1
992	10	14.6	21	14	0.550	-2.99	182.8	56.0	17.8	6	1
993*	10	14.6	-04	14	0.505	-2.99	216.2	42.2	14.9	3	0
994	10	14.9	20	04	0.548	-3.00	184.8	55.7	17.5	6	1
995	10	15.1	38	01	0.589	-3.00	151.9	57.8	17.2	5	1
996	10	15.1	15	53	0.540	-3.00	191.5	54.1	17.6	6	1
997	10	15.4	38	15	0.589	-3.00	151.5	57.8	17.2	5	1
998	10	15.5	68	42	0.764	-3.00	107.5	43.8	17.5	6	2
999*	10	15.6	13	35	0.536	-3.00	195.1	53.2	15.6	3	0
1000	10	15.8	50	55	0.633	-3.00	129.8	54.1	17.6	6	1

					Precession						
No.	R. A. (1855)		Decl.		R. A. (1900)	Decl.	l	b	Mag.	Dist.	Rich.
1001	10	15.9	-05	53	0.502	-3.00	218.1	41.3	17.7	6	1
1002	10	16.0	50	36	0.631	-3.00	130.2	54.3	17.6	6	1
1003*	10	16.1	48	32	0.622	-3.00	133.5	55.1	16.6	5	0
1004	10	16.4	51	48	0.636	-3.01	128.3	53.8	17.2	5	1
1005	10	16.6	68	58	0.764	-3.01	107.1	43.7	17.5	6	2
1006	10	17.0	67	47	0.749	-3.01	108.3	44.5	17.7	6	1
1007	10	17.1	33	40	0.576	-3.01	160.1	58.5	17.5	6	1
1008*	10	17.4	-04	38	0.504	-3.01	217.2	42.5	17.7	6	0
1009	10	17.6	-05	04	0.504	-3.01	217.7	42.2	17.7	6	1
1010	10	17.7	39	48	0.592	-3.01	148.5	58.0	17.2	5	1
1011*	10	17.7	13	00	0.534	-3.01	196.3	53.3	17.8	6	0
1012*	10	17.9	32	01	0.572	-3.01	163.3	58.7	17.8	6	0
1013	10	18.6	-05	30	0.503	-3.02	218.4	42.1	17.7	6	2
1014	10	18.7	66	11	0.728	-3.02	109.8	45.7	17.1	5	2
1015	10	19.4	35	17	0.579	-3.02	157.0	58.9	17.5	6	1
1016*	10	19.4	11	43	0.532	-3.02	198.5	53.0	15.4	3	0
1017*	10	19.8	65	52	0.723	-3.03	110.0	46.0	17.9	6	0
1018	10	20.1	18	18	0.543	-3.03	188.5	56.2	17.6	6	1
1019	10	20.2	31	33	0.570	-3.03	164.2	59.1	17.8	6	1
1020	10	20.2	11	09	0.531	-3.03	199.5	52.9	16.0	4	1
1021	10	20.3	38	24	0.586	-3.03	150.9	58.7	16.6	5	1
1022*	10	20.7	10	25	0.529	-3.03	200.6	52.6	17.2	5	0
1023*	10	20.7	-06	02	0.502	-3.03	219.4	42.0	17.1	5	0
1024	10	20.8	04	30	0.519	-3.03	208.3	49.2	17.0	5	1
1025	10	21.6	63	36	0.699	-3.04	112.3	47.7	16.9	5	2
1026	10	21.6	40	50	0.592	-3.04	146.3	58.5	17.2	5	1
1027	10	21.8	54	09	0.640	-3.04	124.2	53.3	17.2	5	1
1028	10	22.1	41	53	0.595	-3.04	144.3	58.3	17.0	5	1
1029	10	22.2	78	05	0.949	-3.04	98.5	37.3	17.1	5	2
1030*	10	22.4	31	45	0.569	-3.04	163.8	59.6	17.8	6	0
1031*	10	22.6	39	29	0.588	-3.04	148.7	59.0	17.2	5	0
1032*	10	22.8	04	46	0.520	-3.05	208.4	49.8	15.7	4	0
1033	10	23.2	35	50	0.578	-3.05	155.8	59.6	17.2	5	2
1034	10	23.4	19	28	0.544	-3.05	187.1	57.3	17.5	6	1
1035	10	23.6	40	58	0.591	-3.05	145.8	58.8	15.4	3	2
1036*	10	23.9	32	37	0.570	-3.05	162.1	59.9	17.8	6	0
1037*	10	25.1	69	32	0.752	-3.06	105.8	43.8	17.7	6	0
1038	10	25.5	03	00	0.517	-3.06	211.2	49.2	17.6	6	1
1039*	10	25.5	-04	03	0.506	-3.06	218.7	44.3	17.5	6	0
1040*	10	25.7	46	14	0.605	-3.06	136.1	57.5	17.2	5	0

			Precession						
No.	R.A. (1855)	Decl.	R.A. (1900)	Decl.	l	b	Mag.	Dist.	Rich.
1041	10 25.7	-08 09	0.499	-3.06	222.5	41.3	17.1	5	1
1042	10 26.5	12 33	0.532	-3.07	198.8	55.0	17.2	5	1
1043	10 26.6	17 02	0.539	-3.07	191.8	57.1	17.2	5	1
1044	10 26.6	06 25	0.522	-3.07	207.3	51.5	17.6	6	1
1045	10 26.8	31 27	0.566	-3.07	164.5	60.5	17.2	5	1
1046	10 27.1	68 43	0.737	-3.07	106.4	44.5	17.5	6	2
1047	10 27.3	05 10	0.520	-3.07	209.1	50.9	17.2	5	1
1048*	10 27.4	44 42	0.599	-3.07	138.6	58.4	17.2	5	0
1049	10 28.2	68 30	0.733	-3.08	106.5	44.7	17.7	6	2
1050	10 28.2	45 34	0.600	-3.08	137.0	58.2	17.2	5	2
1051	10 28.3	46 58	0.605	-3.08	134.5	57.6	17.5	6	1
1052	10 28.3	28 49	0.560	-3.08	169.9	60.7	17.8	6	1
1053	10 28.6	31 31	0.565	-3.08	164.4	60.9	17.2	5	1
1054	10 28.8	43 23	0.594	-3.08	140.8	59.1	17.2	5	1
1055*	10 29.0	37 55	0.579	-3.08	151.3	60.5	17.2	5	0
1056	10 29.4	42 34	0.591	-3.08	142.3	59.4	17.0	5	1
1057	10 29.5	13 10	0.532	-3.08	198.6	55.9	17.2	5	1
1058*	10 29.6	35 08	0.572	-3.08	156.9	61.0	17.2	5	0
1059	10 29.9	-05 14	0.504	-3.09	220.9	44.2	17.7	6	1
1060*	10 30.0	-26 47	0.469	-3.09	237.0	26.9	12.7	0	1
1061	10 30.5	67 58	0.721	-3.09	106.8	45.3	17.7	6	2
1062	10 30.9	16 38	0.537	-3.09	193.3	57.8	17.2	5	1
1063	10 31.0	19 25	0.542	-3.09	188.4	59.0	17.2	5	1
1064	10 31.3	02 02	0.515	-3.09	213.8	49.6	17.1	5	1
1065*	10 31.7	57 39	0.644	-3.10	118.2	52.4	17.2	5	0
1066	10 31.9	05 56	0.521	-3.10	209.3	52.3	16.6	5	1
1067	10 32.2	41 00	0.584	-3.10	144.9	60.4	16.6	5	1
1068	10 32.4	40 43	0.584	-3.10	145.5	60.5	17.0	5	1
1069*	10 32.6	-07 52	0.501	-3.10	224.0	42.6	15.1	3	0
1070	10 33.9	78 54	0.928	-3.11	97.3	37.0	17.5	6	2
1071*	10 34.1	43 51	0.590	-3.11	139.3	59.8	17.2	5	0
1072*	10 34.2	58 10	0.643	-3.11	117.2	52.4	17.2	5	0
1073	10 34.2	37 24	0.574	-3.11	152.0	61.6	17.2	5	2
1074	10 34.6	47 24	0.600	-3.11	132.9	58.4	17.3	6	1
1075	10 35.3	-08 59	0.499	-3.12	225.6	42.2	17.1	5	1
1076	10 35.8	58 56	0.645	-3.12	116.0	52.0	17.2	5	1
1077	10 36.0	47 16	0.598	-3.12	132.9	58.7	17.5	6	2
1078	10 36.1	01 24	0.514	-3.12	215.8	50.0	17.0	5	1
1079*	10 36.1	-06 38	0.503	-3.12	223.8	44.1	17.1	5	0
1080*	10 36.5	01 51	0.515	-3.12	215.4	50.4	17.0	5	0
1081	10 36.6	36 20	0.570	-3.12	154.0	62.3	17.2	5	2
1082*	10 36.6	33 08	0.564	-3.12	160.9	62.6	17.6	6	0
1083*	10 36.9	60 25	0.651	-3.12	114.1	51.1	17.6	6	0
1084	10 37.3	-06 20	0.503	-3.13	223.9	44.6	17.4	6	1
1085*	10 37.5	21 02	0.542	-3.13	186.5	61.0	16.6	5	0
1086*	10 37.5	-15 45	0.490	-3.13	231.5	37.1	17.5	6	1
1087*	10 37.7	44 40	0.589	-3.13	137.3	60.1	17.8	6	0
1088*	10 37.7	-18 44	0.486	-3.13	233.6	34.7	17.0	5	0
1089*	10 38.6	19 24	0.539	-3.13	189.8	60.6	17.7	6	0
1090*	10 38.7	-17 35	0.488	-3.13	233.1	35.7	17.1	5	0
1091*	10 38.8	-16 15	0.490	-3.13	232.2	36.9	17.7	6	0
1092	10 38.9	02 07	0.515	-3.13	215.7	51.0	17.6	6	1
1093	10 39.3	09 50	0.525	-3.14	205.9	56.1	17.8	6	1
1094	10 39.6	28 17	0.553	-3.14	171.6	63.1	18.0	6	2
1095	10 39.7	15 59	0.534	-3.14	196.2	59.4	17.6	6	2
1096	10 40.2	28 49	0.554	-3.14	170.4	63.3	17.8	6	1
1097*	10 40.4	32 14	0.560	-3.14	162.8	63.4	16.0	4	0
1098*	10 40.6	-03 11	0.508	-3.14	221.8	47.5	16.9	5	0
1099	10 40.7	35 44	0.566	-3.14	155.1	63.2	17.0	5	1
1100*	10 41.0	23 00	0.544	-3.14	183.0	62.4	15.7	4	0
1101	10 41.2	45 08	0.587	-3.15	135.9	60.4	17.8	6	2
1102	10 41.3	07 57	0.523	-3.15	209.1	55.3	17.5	6	1
1103*	10 41.5	14 13	0.531	-3.15	199.6	59.0	17.6	6	0
1104*	10 41.5	-16 23	0.490	-3.15	232.9	37.1	17.4	6	0
1105	10 41.6	10 13	0.525	-3.15	205.9	56.8	16.8	5	1
1106*	10 41.9	44 46	0.586	-3.15	136.5	60.7	17.8	6	0
1107	10 42.0	04 25	0.518	-3.15	213.9	53.2	17.0	5	1
1108*	10 42.1	17 00	0.535	-3.15	194.9	60.4	17.2	5	0
1109	10 42.3	18 32	0.537	-3.15	192.1	61.1	17.2	5	1
1110	10 43.2	43 10	0.581	-3.16	139.3	61.6	17.8	6	1
1111	10 43.3	-01 48	0.510	-3.16	221.2	49.0	17.8	6	2
1112*	10 43.4	56 20	0.622	-3.16	118.1	54.5	17.5	6	0
1113	10 43.4	09 25	0.524	-3.16	207.6	56.6	17.6	6	1
1114	10 43.6	20 56	0.540	-3.16	187.7	62.3	17.1	5	1
1115	10 43.9	09 49	0.525	-3.16	207.1	57.0	17.6	6	1
1116*	10 44.5	13 00	0.529	-3.16	202.4	58.9	17.2	5	0
1117	10 44.8	40 31	0.573	-3.16	144.4	62.8	17.2	5	1
1118*	10 45.0	38 20	0.569	-3.16	149.0	63.5	17.6	6	0
1119	10 45.1	11 29	0.527	-3.16	205.0	58.2	17.5	6	1
1120	10 45.2	31 35	0.556	-3.16	164.2	64.5	18.0	6	2

			Precession						
No.	R.A. (1855)	Decl.	R.A. (1900)	Decl.	l	b	Mag.	Dist.	Rich.
1121	10 45.2	09 48	0.524	-3.16	207.5	57.2	17.7	6	2
1122*	10 45.3	38 41	0.569	-3.17	148.2	63.4	17.7	6	0
1123	10 45.4	76 18	0.804	-3.17	98.6	39.5	16.9	5	2
1124	10 45.7	72 32	0.737	-3.17	101.4	42.6	17.3	6	2
1125	10 46.2	11 01	0.526	-3.17	206.0	58.2	17.6	6	1
1126	10 46.2	17 38	0.534	-3.17	194.7	61.6	16.0	4	1
1127	10 46.5	15 27	0.531	-3.17	198.7	60.6	17.8	6	1
1128*	10 46.6	09 48	0.524	-3.17	207.9	57.5	17.0	5	0
1129*	10 46.9	12 36	0.528	-3.17	203.7	59.2	17.8	6	0
1130*	10 47.5	-09 54	0.500	-3.18	229.7	43.3	17.1	5	0
1131	10 48.0	11 46	0.526	-3.18	205.3	58.9	17.2	5	1
1132	10 49.5	57 34	0.618	-3.18	115.6	54.3	17.0	5	1
1133	10 49.6	50 38	0.594	-3.18	125.2	58.8	17.4	6	1
1134	10 49.7	-01 22	0.511	-3.19	222.6	50.3	17.6	6	2
1135	10 49.9	41 50	0.572	-3.19	140.9	63.2	16.9	5	1
1136	10 49.9	09 25	0.523	-3.19	209.4	57.9	17.6	6	1
1137	10 50.0	10 24	0.524	-3.19	208.0	58.5	17.2	5	1
1138	10 50.6	33 46	0.556	-3.19	158.9	65.4	17.5	6	1
1139*	10 50.6	02 17	0.515	-3.19	218.9	53.2	15.0	3	0
1140*	10 50.7	34 43	0.558	-3.19	156.6	65.3	17.8	6	0
1141	10 51.9	13 01	0.527	-3.19	204.3	60.4	17.2	5	2
1142*	10 53.3	11 20	0.525	-3.20	207.5	59.7	15.4	3	0
1143	10 53.4	51 08	0.591	-3.20	123.7	59.0	17.2	5	1
1144*	10 53.6	59 33	0.620	-3.20	112.6	53.2	17.2	5	0
1145*	10 53.9	17 31	0.532	-3.20	196.6	63.2	15.7	4	0
1146*	10 54.3	-21 57	0.487	-3.20	239.6	33.9	17.0	5	4
1147	10 54.7	12 47	0.526	-3.21	205.5	60.9	17.6	6	1
1148	10 55.0	-00 17	0.512	-3.21	223.1	52.0	17.6	6	1
1149*	10 55.5	08 25	0.521	-3.21	212.5	58.3	16.0	4	0
1150*	10 56.0	74 29	0.733	-3.21	99.1	41.3	16.5	5	0
1151*	10 56.3	36 44	0.558	-3.21	151.3	66.0	17.5	6	0
1152	10 56.4	13 20	0.527	-3.21	205.1	61.5	17.6	6	1
1153	10 56.4	02 07	0.514	-3.21	220.9	54.1	17.5	6	2
1154	10 56.5	50 37	0.586	-3.21	123.9	59.7	17.8	6	1
1155*	10 56.5	35 59	0.556	-3.21	153.1	66.3	16.6	5	0
1156	10 56.6	48 12	0.580	-3.21	127.8	61.2	17.8	6	1
1157	10 56.9	14 25	0.528	-3.22	203.3	62.2	17.2	5	1
1158*	10 57.0	23 01	0.538	-3.22	185.4	65.9	17.6	6	0
1159	10 57.9	13 20	0.526	-3.22	205.5	61.8	17.2	5	1
1160*	10 58.0	-18 11	0.492	-3.22	238.3	37.6	17.4	6	1
1161*	10 58.4	-21 20	0.489	-3.22	240.3	34.9	17.3	6	2
1162	10 58.8	04 44	0.517	-3.22	218.5	56.4	17.6	6	1
1163*	10 58.8	-20 46	0.490	-3.22	240.1	35.5	17.0	5	1
1164	10 59.0	02 51	0.515	-3.22	220.9	55.0	17.7	6	1
1165*	10 59.2	-23 57	0.486	-3.22	242.0	32.7	17.5	6	1
1166	10 59.7	69 32	0.667	-3.23	102.5	45.7	17.1	5	1
1167	10 59.8	49 40	0.580	-3.23	124.7	60.7	17.3	6	1
1168	10 59.8	16 42	0.529	-3.23	199.8	64.0	16.8	5	1
1169	10 59.9	44 44	0.569	-3.23	133.3	63.5	16.6	5	1
1170	11 00.0	08 48	0.521	-3.23	213.4	59.4	17.6	6	2
1171*	11 00.0	03 44	0.516	-3.23	220.2	55.9	16.2	4	0
1172*	11 00.7	-06 23	0.506	-3.23	230.6	48.0	17.2	5	0
1173	11 01.1	42 22	0.564	-3.23	137.8	64.9	16.8	5	1
1174	11 01.2	44 04	0.567	-3.23	134.3	64.1	17.0	5	2
1175	11 01.3	33 58	0.550	-3.23	157.6	67.6	17.8	6	1
1176*	11 01.5	07 25	0.519	-3.23	215.9	58.8	17.7	6	0
1177*	11 01.7	22 29	0.535	-3.23	187.5	66.8	15.7	4	0
1178	11 01.9	35 23	0.552	-3.23	153.9	67.5	17.8	6	2
1179*	11 02.1	24 45	0.538	-3.24	181.9	67.5	16.6	5	0
1180	11 02.2	63 45	0.625	-3.24	107.1	50.6	17.8	6	1
1181*	11 02.3	-19 00	0.493	-3.24	239.9	37.4	17.6	6	1
1182	11 02.4	32 34	0.547	-3.24	161.2	68.0	17.5	6	2
1183	11 02.6	12 48	0.525	-3.24	207.8	62.4	17.2	5	1
1184*	11 02.8	51 05	0.580	-3.24	121.9	60.1	17.8	6	0
1185	11 03.0	29 28	0.543	-3.24	169.6	68.3	14.3	2	1
1186	11 03.6	76 11	0.733	-3.24	97.5	40.1	16.5	5	2
1187	11 03.6	40 22	0.558	-3.24	141.7	66.2	15.6	3	1
1188	11 03.6	22 19	0.534	-3.24	188.3	67.1	17.5	6	2
1189*	11 03.6	01 55	0.514	-3.24	223.5	55.1	17.0	5	0
1190	11 03.7	41 38	0.560	-3.24	138.8	65.7	16.6	5	2
1191	11 03.7	01 33	0.514	-3.24	223.9	54.8	17.5	6	2
1192*	11 03.9	60 03	0.606	-3.24	110.4	53.7	17.6	6	0
1193	11 04.2	43 14	0.563	-3.24	135.4	65.0	17.2	5	1
1194	11 04.3	31 30	0.545	-3.24	164.0	68.5	17.5	6	1
1195	11 04.4	-04 09	0.508	-3.24	229.8	50.4	17.6	6	1
1196	11 04.6	54 40	0.587	-3.24	116.5	57.8	17.8	6	1
1197*	11 04.7	37 16	0.553	-3.24	148.8	67.5	17.2	5	0
1198	11 04.9	31 10	0.544	-3.25	164.9	68.7	17.5	6	2
1199	11 05.0	20 52	0.532	-3.25	192.0	66.9	17.6	6	1
1200	11 05.0	-02 23	0.510	-3.25	228.4	51.9	17.0	5	1

			Precession						
No.	R. A. (1855)	Decl.	R. A. (1900)	Decl.	l	b	Mag.	Dist.	Rich.
1201	11 05.4	14 13	0.525	-3.25	206.2	63.8	17.0	5	2
1202	11 05.5	48 18	0.571	-3.25	125.7	62.3	17.0	5	1
1203	11 05.9	41 05	0.557	-3.25	139.6	66.3	16.6	5	1
1204	11 05.9	18 23	0.529	-3.25	197.9	66.1	17.8	6	1
1205	11 05.9	03 18	0.515	-3.25	222.7	56.5	16.9	5	1
1206	11 06.2	-04 50	0.508	-3.25	231.0	50.1	17.6	6	1
1207	11 06.6	68 29	0.642	-3.25	102.5	46.9	17.1	5	1
1208	11 06.6	05 09	0.517	-3.25	220.6	58.0	17.6	6	2
1209	11 06.9	13 41	0.525	-3.25	207.7	63.8	17.2	5	1
1210	11 07.3	17 33	0.528	-3.25	200.1	66.0	17.3	6	1
1211	11 07.5	-11 26	0.502	-3.25	236.6	44.6	17.5	6	2
1212*	11 08.7	58 15	0.592	-3.26	111.5	55.5	17.2	5	0
1213	11 08.7	30 04	0.541	-3.26	167.9	69.5	14.5	2	1
1214	11 09.6	-04 49	0.508	-3.26	232.1	50.6	17.5	6	1
1215	11 10.2	04 27	0.516	-3.26	222.8	58.1	16.7	5	2
1216	11 10.4	-03 41	0.509	-3.26	231.4	51.6	16.0	4	1
1217*	11 10.4	-24 26	0.490	-3.26	245.0	33.4	17.4	6	1
1218*	11 10.6	52 31	0.574	-3.26	118.1	60.0	16.0	4	0
1219	11 10.8	17 30	0.527	-3.26	201.2	66.7	17.5	6	1
1220	11 11.0	38 18	0.549	-3.26	145.1	68.3	17.3	6	1
1221	11 11.2	63 29	0.606	-3.27	106.0	51.4	17.6	6	1
1222	11 12.4	47 58	0.563	-3.27	124.6	63.4	16.6	5	1
1223*	11 12.7	46 43	0.560	-3.27	126.7	64.2	17.2	5	0
1224	11 13.0	37 14	0.546	-3.27	147.4	69.1	17.8	6	1
1225*	11 13.1	54 34	0.576	-3.27	114.9	58.7	15.4	3	0
1226*	11 13.2	34 31	0.543	-3.27	154.8	69.9	17.2	5	0
1227	11 13.5	48 50	0.563	-3.27	122.9	62.9	16.6	5	2
1228	11 13.7	35 08	0.543	-3.27	153.0	69.9	13.8	1	1
1229	11 14.0	46 57	0.560	-3.27	126.0	64.2	17.8	6	1
1230	11 14.0	23 08	0.531	-3.27	188.2	69.7	17.2	5	1
1231*	11 14.2	50 31	0.566	-3.27	120.1	61.8	17.0	5	0
1232	11 14.5	18 42	0.527	-3.28	199.6	68.1	17.4	6	1
1233*	11 14.6	-18 09	0.498	-3.28	242.8	39.5	17.6	6	1
1234	11 14.8	22 12	0.530	-3.28	190.9	69.6	17.3	6	2
1235	11 15.3	20 26	0.528	-3.28	195.6	69.0	17.0	5	2
1236*	11 15.3	01 16	0.513	-3.28	228.3	56.4	17.2	5	0
1237	11 15.5	43 39	0.553	-3.28	131.8	66.5	17.3	6	1
1238	11 15.5	01 54	0.513	-3.28	227.7	56.9	16.0	4	1
1239*	11 15.6	60 57	0.589	-3.28	107.6	53.8	17.5	6	0
1240	11 15.6	43 55	0.553	-3.28	131.2	66.3	17.2	5	2

			Precession						
No.	R. A. (1855)	Decl.	R. A. (1900)	Decl.	l	b	Mag.	Dist.	Rich.
1241	11 15.6	28 01	0.535	-3.28	174.1	71.0	17.6	6	1
1242	11 15.6	17 46	0.526	-3.28	202.1	67.8	17.2	5	1
1243	11 16.1	19 00	0.527	-3.28	199.4	68.5	17.3	6	1
1244*	11 16.2	46 13	0.556	-3.28	126.7	65.0	17.6	6	0
1245*	11 16.2	33 06	0.540	-3.28	158.5	70.8	17.2	5	0
1246	11 16.2	22 14	0.529	-3.28	191.1	69.9	17.6	6	3
1247	11 16.4	20 49	0.528	-3.28	194.9	69.4	17.2	5	1
1248*	11 16.4	-03 25	0.510	-3.28	233.2	52.7	17.0	5	0
1249	11 16.6	68 50	0.620	-3.28	101.1	47.1	17.2	5	1
1250	11 17.0	42 27	0.550	-3.28	133.9	67.4	17.3	6	1
1251	11 17.1	18 18	0.526	-3.28	201.4	68.4	17.5	6	1
1252	11 17.1	-08 00	0.506	-3.28	237.1	48.8	17.2	5	1
1253*	11 17.3	43 18	0.551	-3.28	132.1	66.9	17.3	6	0
1254	11 17.9	71 53	0.636	-3.28	99.0	44.4	15.3	3	1
1255	11 18.1	76 17	0.678	-3.29	96.4	40.4	16.7	5	1
1256	11 18.1	-15 31	0.501	-3.29	242.3	42.2	17.7	6	1
1257*	11 18.3	36 08	0.541	-3.29	149.4	70.5	15.0	3	0
1258	11 18.4	26 14	0.532	-3.29	179.9	71.4	17.2	5	1
1259	11 18.7	06 04	0.516	-3.29	223.9	60.7	18.0	6	2
1260	11 18.9	02 52	0.514	-3.29	227.9	58.2	17.5	6	2
1261	11 19.5	49 08	0.557	-3.29	120.9	63.4	17.2	5	1
1262	11 19.5	11 26	0.520	-3.29	216.2	64.7	17.3	6	2
1263	11 19.5	-09 00	0.506	-3.29	238.6	48.2	17.7	6	1
1264	11 19.6	17 57	0.525	-3.29	203.0	68.7	17.1	5	2
1265	11 20.2	42 09	0.547	-3.29	133.7	68.0	17.8	6	1
1266*	11 20.3	37 23	0.541	-3.29	145.5	70.4	17.2	5	0
1267*	11 20.3	27 40	0.532	-3.29	175.5	72.0	15.4	3	0
1268	11 20.8	24 40	0.529	-3.29	185.0	71.6	17.2	5	1
1269	11 21.3	34 57	0.538	-3.29	152.2	71.4	17.5	6	1
1270*	11 21.4	54 52	0.565	-3.29	112.7	59.2	15.4	3	0
1271	11 21.6	-08 48	0.506	-3.29	239.2	48.6	17.7	6	1
1272	11 22.0	24 36	0.529	-3.30	185.5	71.8	17.2	5	2
1273	11 22.0	-06 15	0.508	-3.30	237.5	50.9	17.6	6	1
1274	11 22.1	20 42	0.526	-3.30	196.9	70.5	17.2	5	1
1275*	11 22.2	37 29	0.540	-3.30	144.7	70.7	15.7	4	0
1276	11 22.3	33 50	0.537	-3.30	155.4	71.9	17.6	6	1
1277	11 22.5	13 43	0.521	-3.30	213.2	66.8	17.8	6	1
1278	11 22.6	21 17	0.526	-3.30	195.4	70.9	17.3	6	3
1279*	11 22.7	68 02	0.602	-3.30	100.9	48.0	16.5	5	0
1280	11 22.7	35 29	0.538	-3.30	150.3	71.5	17.5	6	1

No.	R.A. (1855)	Decl.	Precession R.A. (1900)	Precession Decl.	l	b	Mag.	Dist.	Rich.
1281	11 22.7	34 11	0.537	-3.30	154.3	71.9	17.6	6	1
1282	11 22.9	40 48	0.543	-3.30	136.0	69.2	17.6	6	1
1283	11 23.0	61 34	0.578	-3.30	105.7	53.7	17.2	5	1
1284	11 23.1	35 51	0.538	-3.30	149.2	71.5	17.5	6	1
1285	11 23.1	-13 46	0.503	-3.30	242.8	44.3	17.0	5	1
1286	11 23.2	23 10	0.527	-3.30	190.1	71.7	17.6	6	1
1287*	11 23.3	67 35	0.598	-3.30	101.1	48.4	17.0	5	0
1288	11 23.3	06 47	0.516	-3.30	224.8	62.0	17.6	6	2
1289*	11 23.4	61 34	0.578	-3.30	105.7	53.7	17.0	5	0
1290	11 23.5	34 24	0.536	-3.30	153.5	72.0	17.5	6	1
1291	11 24.0	56 50	0.565	-3.30	110.0	57.8	15.4	3	1
1292	11 24.0	36 38	0.538	-3.30	146.7	71.3	17.5	6	2
1293	11 24.1	39 52	0.541	-3.30	137.9	69.9	17.8	6	1
1294*	11 24.2	55 03	0.562	-3.30	111.9	59.3	18.0	6	0
1295	11 24.3	-06 44	0.508	-3.30	238.6	50.8	17.1	5	1
1296*	11 24.4	-04 22	0.509	-3.30	236.8	52.9	17.0	5	0
1297*	11 24.5	77 02	0.661	-3.30	95.6	39.9	16.1	4	0
1298	11 24.6	45 37	0.547	-3.30	125.4	66.5	17.0	5	1
1299	11 24.6	34 47	0.536	-3.30	152.1	72.1	17.5	6	2
1300*	11 24.7	-19 06	0.500	-3.30	246.1	39.6	17.6	6	1
1301*	11 24.8	75 52	0.647	-3.30	96.1	41.0	16.5	5	0
1302	11 24.9	67 13	0.593	-3.30	101.2	48.8	16.7	5	2
1303	11 25.0	37 36	0.538	-3.30	143.7	71.1	18.0	6	1
1304	11 25.0	36 16	0.537	-3.30	147.5	71.7	17.5	6	2
1305*	11 25.2	35 35	0.536	-3.30	149.5	72.0	17.2	5	0
1306*	11 25.3	47 25	0.549	-3.30	122.1	65.3	17.6	6	0
1307	11 25.3	15 20	0.521	-3.30	211.1	68.4	16.8	5	1
1308*	11 25.5	-03 11	0.510	-3.30	236.3	54.0	15.7	4	0
1309	11 25.7	-11 03	0.506	-3.30	242.0	47.0	17.0	5	2
1310	11 26.0	40 39	0.540	-3.30	135.5	69.8	17.8	6	1
1311*	11 26.0	-23 15	0.498	-3.30	248.4	35.8	17.4	6	1
1312	11 26.3	50 52	0.552	-3.31	116.6	62.8	17.6	6	1
1313	11 26.6	17 53	0.523	-3.31	205.7	70.1	17.2	5	1
1314*	11 26.9	49 51	0.550	-3.31	117.8	63.7	13.9	1	0
1315*	11 27.5	72 44	0.613	-3.31	97.5	43.9	16.5	5	0
1316*	11 27.8	38 12	0.537	-3.31	141.2	71.3	17.6	6	0
1317	11 27.8	-12 44	0.505	-3.31	243.7	45.7	16.5	5	2
1318	11 28.4	55 46	0.557	-3.31	110.1	59.0	15.0	3	1
1319	11 28.5	40 53	0.538	-3.31	134.1	70.0	17.8	6	2
1320*	11 28.5	-05 01	0.509	-3.31	238.8	52.8	17.6	6	0

No.	R.A. (1855)	Decl.	Precession R.A. (1900)	Precession Decl.	l	b	Mag.	Dist.	Rich.
1321*	11 28.7	48 53	0.547	-3.31	118.7	64.6	17.8	6	0
1322*	11 28.8	64 02	0.574	-3.31	102.8	51.9	17.2	5	0
1323	11 28.9	-07 14	0.508	-3.31	240.6	50.8	17.2	5	1
1324	11 29.1	57 54	0.560	-3.31	107.9	57.3	17.0	5	1
1325	11 29.2	08 00	0.516	-3.31	225.6	63.8	17.2	5	1
1326	11 29.3	40 59	0.538	-3.31	133.6	70.1	17.8	6	2
1327	11 29.4	27 20	0.527	-3.31	177.3	74.0	17.5	6	1
1328	11 29.8	38 11	0.535	-3.31	140.7	71.7	17.2	5	1
1329	11 30.1	71 56	0.601	-3.31	97.7	44.7	16.5	5	1
1330*	11 30.5	50 20	0.547	-3.31	116.1	63.7	17.8	6	0
1331	11 30.6	64 24	0.572	-3.31	102.3	51.6	17.6	6	2
1332*	11 30.7	-08 33	0.508	-3.31	242.1	49.8	16.0	4	0
1333*	11 31.4	50 41	0.546	-3.32	115.4	63.5	17.4	6	0
1334*	11 31.5	-03 31	0.510	-3.32	238.8	54.4	15.7	4	0
1335	11 31.8	68 57	0.583	-3.32	99.2	47.5	17.2	5	1
1336*	11 31.8	33 13	0.530	-3.32	155.8	74.0	16.0	4	0
1337	11 31.9	10 58	0.517	-3.32	222.2	66.5	17.2	5	1
1338*	11 32.9	19 03	0.521	-3.32	205.2	72.0	16.9	5	0
1339*	11 33.1	73 53	0.602	-3.32	96.4	43.0	17.4	6	0
1340*	11 33.1	45 41	0.539	-3.32	122.6	67.5	17.2	5	0
1341	11 33.1	11 12	0.517	-3.32	222.4	66.9	17.6	6	1
1342	11 33.2	10 53	0.517	-3.32	223.0	66.7	17.2	5	1
1343*	11 33.3	61 28	0.560	-3.32	104.0	54.4	17.2	5	0
1344	11 33.5	-09 56	0.508	-3.32	243.9	48.8	16.6	5	1
1345	11 33.7	11 30	0.517	-3.32	222.2	67.2	17.2	5	1
1346	11 33.7	06 30	0.515	-3.32	229.6	63.3	16.8	5	1
1347*	11 33.7	-24 43	0.500	-3.32	251.1	35.0	17.0	5	1
1348	11 33.9	-11 34	0.507	-3.32	245.0	47.4	17.0	5	2
1349	11 34.2	56 10	0.549	-3.32	108.4	59.1	16.9	5	1
1350*	11 34.2	25 24	0.524	-3.32	185.0	74.7	17.6	6	0
1351	11 34.6	59 21	0.553	-3.32	105.4	56.4	17.8	6	2
1352*	11 34.6	-20 40	0.503	-3.32	249.7	38.9	17.8	6	1
1353	11 34.7	25 46	0.524	-3.32	183.7	74.9	17.6	6	1
1354	11 34.7	10 58	0.517	-3.32	223.5	67.0	17.2	5	1
1355	11 35.0	42 43	0.535	-3.32	127.8	69.8	17.6	6	1
1356	11 35.0	11 15	0.517	-3.32	223.2	67.2	17.2	5	1
1357*	11 35.1	62 06	0.557	-3.32	103.2	53.9	16.9	5	0
1358	11 35.3	09 02	0.516	-3.32	226.9	65.6	17.0	5	1
1359*	11 35.6	62 28	0.557	-3.32	102.8	53.6	17.2	5	0
1360	11 35.6	11 50	0.517	-3.32	222.5	67.8	17.2	5	1

No.	R.A. (1855)	Decl.	Precession R.A. (1900)	Precession Decl.	l	b	Mag.	Dist.	Rich.
1361	11 36.0	47 10	0.537	-3.32	119.1	66.7	17.4	6	1
1362*	11 36.1	08 18	0.515	-3.32	228.3	65.1	16.0	4	0
1363*	11 36.2	44 33	0.535	-3.32	123.6	68.7	17.2	5	0
1364	11 36.2	-00 58	0.512	-3.32	238.5	57.2	16.0	4	1
1365	11 36.8	31 43	0.526	-3.32	160.4	75.4	15.7	4	1
1366	11 36.9	68 14	0.568	-3.32	99.0	48.4	16.8	5	1
1367	11 37.0	20 39	0.521	-3.32	202.2	73.6	13.5	1	2
1368	11 37.2	52 04	0.540	-3.32	112.0	62.9	16.9	5	1
1369*	11 37.2	43 10	0.533	-3.32	126.0	69.8	17.2	5	0
1370	11 37.4	50 09	0.538	-3.32	114.3	64.5	17.6	6	1
1371	11 38.0	16 21	0.518	-3.33	214.4	71.4	16.6	5	1
1372	11 38.0	12 20	0.517	-3.33	222.8	68.5	17.2	5	1
1373	11 38.0	-01 36	0.511	-3.33	239.8	56.9	17.2	5	2
1374	11 38.2	50 33	0.538	-3.33	113.6	64.2	17.4	6	1
1375*	11 38.7	-07 27	0.509	-3.33	244.3	51.6	16.6	5	0
1376	11 38.8	-00 17	0.512	-3.33	239.1	58.2	16.6	5	1
1377	11 39.2	56 33	0.543	-3.33	106.8	59.1	15.0	3	1
1378	11 39.3	24 19	0.521	-3.33	190.2	75.6	17.5	6	1
1379*	11 39.6	08 46	0.515	-3.33	229.3	66.0	17.0	5	0
1380	11 40.0	26 13	0.522	-3.33	182.8	76.2	16.6	5	1
1381	11 40.2	76 02	0.589	-3.33	94.9	41.1	17.0	5	2
1382	11 40.3	72 15	0.572	-3.33	96.5	44.7	15.9	4	1
1383	11 40.4	55 26	0.540	-3.33	107.6	60.2	15.7	4	1
1384	11 40.5	23 22	0.520	-3.33	194.2	75.5	17.2	5	1
1385	11 40.6	12 22	0.516	-3.33	224.0	69.0	17.2	5	1
1386	11 40.9	-01 09	0.512	-3.33	240.7	57.6	17.2	5	1
1387	11 41.1	52 26	0.536	-3.33	110.5	62.9	17.0	5	1
1388	11 41.5	23 12	0.520	-3.33	195.1	75.7	17.3	6	1
1389*	11 41.9	-00 35	0.512	-3.33	240.6	58.2	16.6	5	0
1390*	11 42.1	13 04	0.516	-3.33	223.5	69.8	16.0	4	0
1391	11 42.4	-11 30	0.508	-3.33	247.9	48.2	18.0	6	2
1392*	11 43.1	00 13	0.512	-3.33	240.5	59.1	16.6	5	0
1393*	11 43.2	47 49	0.530	-3.33	115.7	66.9	17.8	6	0
1394	11 43.5	43 12	0.527	-3.33	123.5	70.6	17.3	6	1
1395*	11 43.5	-07 41	0.510	-3.33	246.2	51.9	17.5	6	0
1396*	11 43.6	55 40	0.535	-3.33	106.6	60.2	17.2	5	0
1397*	11 43.6	34 20	0.523	-3.33	148.5	75.9	17.7	6	0
1398	11 43.6	-06 52	0.510	-3.33	245.7	52.6	17.8	6	1
1399	11 43.7	-02 18	0.511	-3.33	242.7	56.9	16.0	4	2
1400*	11 43.8	55 55	0.535	-3.33	106.3	60.0	17.2	5	0
1401	11 44.5	38 05	0.524	-3.33	135.6	74.2	17.0	5	3
1402*	11 44.8	61 14	0.539	-3.33	102.0	55.2	17.2	5	0
1403	11 44.8	29 12	0.520	-3.33	170.0	77.4	17.6	6	1
1404*	11 44.9	-02 01	0.512	-3.33	243.0	57.2	16.6	5	0
1405	11 45.0	28 06	0.520	-3.33	175.1	77.5	17.6	6	1
1406	11 45.5	68 42	0.548	-3.33	97.6	48.2	17.2	5	1
1407	11 46.1	-00 57	0.512	-3.33	242.7	58.3	17.0	5	1
1408	11 46.3	16 12	0.516	-3.34	219.1	72.7	16.9	5	1
1409	11 46.5	49 53	0.528	-3.34	111.8	65.5	17.2	5	1
1410*	11 46.5	38 32	0.523	-3.34	133.4	74.2	17.6	6	0
1411	11 47.8	00 16	0.512	-3.34	242.5	59.6	17.5	6	1
1412	11 47.9	74 17	0.554	-3.34	94.9	42.9	15.9	4	2
1413	11 47.9	24 11	0.517	-3.34	193.4	77.4	17.1	5	3
1414	11 48.0	17 06	0.516	-3.34	217.8	73.6	17.2	5	1
1415	11 48.2	58 41	0.531	-3.34	103.0	57.7	17.0	5	1
1416	11 48.4	11 35	0.514	-3.34	229.6	69.6	17.6	6	1
1417	11 48.6	35 25	0.520	-3.34	142.6	76.3	17.6	6	1
1418*	11 48.6	-17 51	0.508	-3.34	252.7	42.6	17.4	6	0
1419	11 48.8	00 34	0.512	-3.34	242.7	60.0	17.0	5	1
1420	11 49.1	26 54	0.517	-3.34	181.1	78.3	17.2	5	1
1421	11 49.3	68 47	0.539	-3.34	97.1	48.2	17.2	5	1
1422*	11 49.7	-06 14	0.511	-3.34	247.7	53.8	17.8	6	0
1423	11 49.9	34 28	0.519	-3.34	145.6	77.0	16.5	5	1
1424	11 50.1	05 51	0.513	-3.34	238.4	64.9	16.6	5	1
1425	11 50.7	27 12	0.517	-3.34	179.8	78.7	17.2	5	1
1426	11 50.8	-12 12	0.510	-3.34	251.1	48.2	17.2	5	1
1427	11 50.9	31 31	0.517	-3.34	158.1	78.3	17.0	5	1
1428	11 50.9	10 40	0.514	-3.34	232.5	69.1	17.8	6	1
1429*	11 51.6	36 34	0.518	-3.34	137.1	76.2	17.6	6	0
1430	11 52.0	50 36	0.521	-3.34	109.1	65.3	17.6	6	2
1431	11 52.0	30 59	0.517	-3.34	160.4	78.7	17.2	5	1
1432*	11 52.1	68 55	0.532	-3.34	96.7	48.2	17.7	6	0
1433	11 52.2	26 41	0.516	-3.34	182.7	78.9	17.1	5	1
1434*	11 52.8	-06 23	0.511	-3.34	249.0	53.9	17.2	5	0
1435*	11 52.9	11 30	0.513	-3.34	232.4	70.1	17.0	5	0
1436	11 53.0	57 04	0.523	-3.34	103.1	59.4	15.4	3	1
1437	11 53.0	04 09	0.513	-3.34	241.6	63.7	17.2	5	3
1438	11 53.2	30 30	0.516	-3.34	162.6	79.0	17.5	6	1
1439*	11 53.3	51 16	0.520	-3.34	108.0	64.8	17.2	5	0
1440*	11 53.3	-22 35	0.509	-3.34	255.7	38.3	17.6	6	0

			Precession						
No.	R.A. (1855)	Decl.	R.A. (1900)	Decl.	l	b	Mag.	Dist.	Rich.
1441	11 53.4	36 23	0.517	-3.34	136.8	76.6	17.2	5	1
1442	11 53.6	16 01	0.514	-3.34	224.0	73.8	17.0	5	1
1443	11 54.0	23 54	0.515	-3.34	197.0	78.6	17.8	6	1
1444	11 54.2	30 50	0.515	-3.34	160.6	79.2	17.6	6	2
1445	11 54.3	00 39	0.512	-3.34	245.2	60.6	17.6	6	2
1446	11 54.4	58 50	0.521	-3.34	101.5	57.9	17.0	5	2
1447	11 54.6	24 38	0.515	-3.34	193.7	79.0	17.4	6	1
1448	11 55.5	-06 02	0.512	-3.34	250.0	54.4	16.6	5	1
1449	11 55.6	29 23	0.515	-3.34	168.1	79.7	17.2	5	1
1450*	11 55.6	-22 31	0.510	-3.34	256.3	38.5	17.6	6	2
1451	11 55.8	-20 43	0.511	-3.34	255.9	40.3	17.3	6	3
1452*	11 56.2	52 33	0.517	-3.34	105.8	63.8	15.7	4	0
1453*	11 56.2	-03 51	0.512	-3.34	249.0	56.5	17.8	6	0
1454	11 56.4	51 50	0.517	-3.34	106.4	64.5	17.2	5	1
1455	11 56.4	28 48	0.514	-3.34	171.3	80.0	17.2	5	2
1456	11 56.4	05 03	0.512	-3.34	242.5	64.9	17.0	5	1
1457*	11 56.7	53 14	0.516	-3.34	105.0	63.2	17.2	5	0
1458*	11 56.7	-04 16	0.512	-3.34	249.5	56.2	17.3	6	0
1459	11 56.8	03 19	0.512	-3.34	244.3	63.3	17.0	5	1
1460	11 57.1	54 06	0.516	-3.34	104.2	62.4	18.0	6	1
1461*	11 57.2	43 20	0.515	-3.34	117.1	72.0	16.6	5	0
1462	11 57.3	15 52	0.513	-3.34	226.8	74.3	17.2	5	1
1463	11 57.3	04 45	0.512	-3.34	243.3	64.7	17.2	5	1
1464	11 57.4	27 32	0.513	-3.34	178.7	80.2	18.0	6	1
1465	11 57.5	32 56	0.514	-3.34	148.8	79.1	17.8	6	1
1466	11 57.5	23 26	0.513	-3.34	200.9	79.1	17.2	5	1
1467*	11 58.1	73 25	0.518	-3.34	94.3	44.0	17.4	6	0
1468	11 58.2	52 14	0.514	-3.34	105.4	64.2	16.0	4	1
1469	11 58.3	-06 19	0.512	-3.34	251.2	54.4	17.2	5	2
1470	11 59.6	72 27	0.513	-3.34	94.5	44.9	17.4	6	2
1471*	12 00.1	53 25	0.512	-3.34	103.8	63.2	17.8	6	0
1472	12 00.3	31 37	0.512	-3.34	154.3	80.2	17.8	6	2
1473	12 00.5	31 25	0.512	-3.34	155.3	80.3	17.8	6	1
1474	12 00.5	15 46	0.512	-3.34	229.3	74.7	16.0	4	1
1475	12 00.7	25 13	0.512	-3.34	193.1	80.5	17.8	6	1
1476	12 00.9	31 47	0.512	-3.34	153.1	80.3	17.6	6	1
1477	12 01.6	64 53	0.509	-3.34	97.0	52.3	18.0	6	1
1478	12 02.1	31 16	0.511	-3.34	155.4	80.7	17.8	6	2
1479*	12 02.6	-16 02	0.513	-3.34	256.6	45.2	17.7	6	0
1480	12 03.4	31 40	0.510	-3.34	152.5	80.8	17.0	5	2
1481	12 03.5	16 41	0.511	-3.34	229.4	75.8	17.0	5	1
1482*	12 03.5	-04 47	0.512	-3.34	252.7	56.2	17.2	5	0
1483*	12 03.6	36 06	0.510	-3.34	131.7	78.4	17.6	6	0
1484	12 04.0	72 54	0.499	-3.34	93.9	44.6	17.4	6	1
1485*	12 04.0	-03 05	0.512	-3.34	252.1	57.9	17.6	6	0
1486*	12 04.5	31 23	0.509	-3.34	153.6	81.1	17.2	5	0
1487	12 04.5	30 48	0.509	-3.34	157.2	81.3	17.8	6	2
1488	12 05.0	-11 01	0.513	-3.34	255.8	50.2	17.8	6	2
1489	12 05.2	28 18	0.509	-3.34	174.0	81.9	17.8	6	2
1490	12 05.2	19 26	0.510	-3.34	222.9	78.2	17.5	6	1
1491*	12 05.5	08 42	0.511	-3.34	244.1	69.1	17.2	5	0
1492	12 05.7	34 59	0.508	-3.34	134.5	79.4	17.2	5	1
1493	12 05.8	06 51	0.511	-3.34	246.1	67.4	17.2	5	1
1494	12 05.9	24 45	0.509	-3.34	198.4	81.4	17.6	6	1
1495	12 06.1	30 03	0.509	-3.34	161.5	81.9	17.0	5	2
1496	12 06.2	60 05	0.502	-3.34	98.2	57.1	16.0	4	1
1497	12 06.8	27 28	0.509	-3.34	180.0	82.2	17.8	6	2
1498	12 06.9	32 28	0.508	-3.34	145.9	81.1	17.6	6	1
1499	12 06.9	15 34	0.510	-3.34	234.6	75.4	16.6	5	1
1500*	12 07.0	75 12	0.486	-3.34	93.0	42.3	15.6	3	0
1501	12 07.0	64 02	0.498	-3.34	96.4	53.3	17.2	5	1
1502	12 07.7	-07 26	0.513	-3.34	255.6	53.9	17.2	5	1
1503*	12 07.9	20 15	0.509	-3.34	222.3	79.2	17.2	5	0
1504	12 08.0	28 20	0.508	-3.34	173.6	82.5	17.6	6	2
1505	12 08.3	19 30	0.509	-3.34	225.3	78.7	17.5	6	1
1506	12 08.5	32 35	0.507	-3.34	144.1	81.3	18.0	6	1
1507*	12 08.7	60 47	0.497	-3.34	97.3	56.5	15.8	4	0
1508	12 08.8	18 18	0.509	-3.34	229.5	77.9	17.2	5	1
1509*	12 09.0	36 26	0.506	-3.34	126.5	78.9	17.0	5	0
1510	12 09.2	28 00	0.507	-3.34	176.1	82.8	18.0	6	2
1511*	12 09.3	-18 27	0.515	-3.34	259.4	43.1	17.4	6	0
1512	12 09.6	46 02	0.502	-3.34	107.1	70.6	17.8	6	1
1513*	12 10.2	73 38	0.478	-3.34	93.1	43.9	17.1	5	0
1514	12 10.6	21 28	0.508	-3.34	219.9	80.5	17.6	6	3
1515	12 11.4	28 47	0.506	-3.34	169.5	83.2	17.6	6	2
1516	12 11.5	06 03	0.511	-3.34	250.3	67.1	16.6	5	1
1517*	12 11.7	-04 13	0.513	-3.34	256.0	57.2	16.6	5	0
1518*	12 12.0	64 19	0.488	-3.34	95.4	53.1	17.0	5	0
1519	12 12.0	27 44	0.506	-3.34	178.4	83.4	17.5	6	1
1520*	12 12.1	-12 28	0.515	-3.34	258.9	49.1	16.8	5	0

No.	R.A. (1855)	Decl.	Precession R.A. (1900)	Precession Decl.	l	b	Mag.	Dist.	Rich.
1521	12 12.1	-12 54	0.515	-3.34	259.0	48.7	16.8	5	1
1522	12 12.7	50 00	0.497	-3.34	102.0	67.1	17.8	6	1
1523*	12 13.9	06 57	0.511	-3.33	251.1	68.2	17.2	5	0
1524	12 14.4	08 39	0.510	-3.33	250.0	69.8	17.2	5	2
1525	12 14.6	-00 21	0.512	-3.33	255.8	61.2	18.0	6	3
1526	12 14.8	14 33	0.508	-3.33	243.2	75.4	16.6	5	1
1527*	12 15.5	13 02	0.508	-3.33	246.0	74.1	17.2	5	0
1528	12 15.9	59 43	0.486	-3.33	96.1	57.7	17.8	6	1
1529*	12 16.4	62 02	0.482	-3.33	95.3	55.5	18.0	6	0
1530	12 16.4	02 54	0.511	-3.33	255.2	64.4	17.8	6	3
1531	12 17.1	58 31	0.485	-3.33	96.3	58.9	17.8	6	1
1532	12 17.1	21 36	0.506	-3.33	226.3	81.7	17.3	6	1
1533	12 17.1	01 43	0.512	-3.33	256.2	63.3	18.0	6	2
1534*	12 17.2	62 19	0.480	-3.33	95.0	55.2	17.0	5	0
1535	12 17.9	-14 52	0.517	-3.33	261.5	47.0	16.6	5	1
1536	12 18.8	77 56	0.427	-3.33	91.6	39.7	16.9	5	1
1537*	12 19.0	-25 02	0.521	-3.33	263.5	36.9	17.6	6	1
1538	12 19.3	57 42	0.482	-3.33	96.0	59.8	18.0	6	1
1539	12 19.5	63 22	0.474	-3.33	94.3	54.2	17.2	5	2
1540	12 19.8	05 02	0.510	-3.33	256.0	66.7	17.8	6	2
1541	12 20.1	09 39	0.509	-3.33	253.2	71.2	16.0	4	1
1542	12 20.6	50 15	0.488	-3.33	98.8	67.1	17.2	5	1
1543*	12 20.6	31 11	0.500	-3.33	142.1	84.2	17.2	5	0
1544	12 21.0	64 14	0.470	-3.33	93.8	53.4	17.2	5	1
1545	12 21.2	48 13	0.489	-3.33	99.7	69.1	17.8	6	1
1546	12 21.3	65 25	0.467	-3.33	93.5	52.2	18.0	6	2
1547	12 21.3	27 34	0.501	-3.33	181.1	85.5	17.2	5	1
1548	12 21.7	20 14	0.504	-3.33	237.6	81.2	17.5	6	3
1549*	12 21.8	29 45	0.500	-3.33	154.3	85.2	17.3	6	0
1550	12 22.2	48 31	0.488	-3.33	99.0	68.9	17.8	6	3
1551	12 22.5	37 28	0.495	-3.33	111.4	79.5	17.2	5	1
1552	12 22.5	12 33	0.507	-3.33	252.5	74.1	16.6	5	1
1553	12 23.5	11 23	0.507	-3.32	254.4	73.1	17.8	6	2
1554	12 23.7	16 46	0.505	-3.32	248.2	78.2	17.6	6	1
1555	12 24.5	-12 36	0.517	-3.32	263.5	49.4	17.2	5	1
1556*	12 25.7	-21 13	0.522	-3.32	265.0	40.9	17.6	6	0
1557	12 26.0	63 39	0.461	-3.32	93.0	54.0	18.0	6	2
1558*	12 26.5	-12 47	0.518	-3.32	264.3	49.3	17.2	5	0
1559	12 26.7	67 55	0.448	-3.32	92.2	49.8	17.2	5	1
1560*	12 26.8	15 59	0.505	-3.32	252.8	77.7	18.1	7	2
1561*	12 26.9	70 10	0.440	-3.32	91.9	47.5	17.4	6	0
1562	12 27.2	41 59	0.488	-3.32	100.9	75.5	17.5	6	1
1563	12 27.3	54 52	0.474	-3.32	94.6	62.8	17.6	6	1
1564*	12 27.5	02 39	0.511	-3.32	261.6	64.7	16.6	5	0
1565	12 28.2	42 10	0.487	-3.32	100.0	75.3	17.6	6	2
1566	12 28.5	65 11	0.452	-3.32	92.3	52.5	16.9	6	2
1567*	12 28.9	27 33	0.497	-3.31	183.3	87.1	17.2	5	0
1568	12 29.0	54 13	0.473	-3.31	94.2	63.4	17.8	6	1
1569*	12 29.0	17 24	0.503	-3.31	253.4	79.2	17.2	5	0
1570	12 29.1	20 37	0.501	-3.31	247.2	82.3	17.8	6	1
1571	12 29.2	84 09	0.236	-3.31	90.4	33.6	17.6	6	3
1572	12 29.2	-13 54	0.519	-3.31	265.4	48.2	17.3	6	1
1573*	12 29.2	-14 09	0.519	-3.31	265.4	48.0	17.3	6	0
1574*	12 29.4	-09 55	0.517	-3.31	265.0	52.2	16.8	5	0
1575*	12 30.1	27 37	0.497	-3.31	182.3	87.4	17.8	6	0
1576	12 30.3	64 00	0.452	-3.31	92.1	53.7	18.0	6	3
1577	12 30.4	00 31	0.512	-3.31	263.8	62.6	17.8	6	1
1578*	12 31.1	43 52	0.483	-3.31	96.9	73.7	17.2	5	0
1579*	12 31.5	66 39	0.441	-3.31	91.6	51.1	17.6	6	0
1580	12 32.0	78 44	0.357	-3.31	90.6	39.0	17.5	6	2
1581	12 32.4	03 33	0.510	-3.31	264.3	65.7	17.2	5	1
1582	12 32.7	52 54	0.470	-3.31	93.2	64.8	17.8	6	2
1583	12 32.9	-15 10	0.521	-3.31	266.8	47.0	17.8	6	1
1584	12 33.2	-17 47	0.522	-3.31	267.1	44.4	16.9	5	1
1585*	12 33.7	-15 42	0.521	-3.31	267.2	46.5	16.9	5	0
1586*	12 33.8	10 45	0.506	-3.30	263.3	72.9	18.0	6	0
1587*	12 34.0	28 21	0.494	-3.30	160.3	88.2	17.6	6	0
1588*	12 34.1	-04 00	0.514	-3.30	266.3	58.2	17.2	5	0
1589*	12 34.4	19 24	0.500	-3.30	258.1	81.5	16.6	5	0
1590	12 34.5	73 57	0.396	-3.30	90.7	43.8	16.8	5	1
1591	12 34.6	50 43	0.471	-3.30	92.9	67.0	17.6	6	2
1592*	12 34.9	30 36	0.492	-3.30	117.3	86.8	18.0	6	0
1593*	12 35.0	34 07	0.489	-3.30	102.5	83.5	17.2	5	0
1594	12 35.0	28 18	0.494	-3.30	159.6	88.4	17.8	6	1
1595	12 35.0	-15 38	0.521	-3.30	267.6	46.6	17.7	6	1
1596*	12 35.2	20 33	0.499	-3.30	257.9	82.6	17.8	6	0
1597	12 35.3	73 02	0.400	-3.30	90.7	44.7	17.5	6	1
1598*	12 35.3	29 55	0.492	-3.30	123.1	87.4	18.0	6	0
1599*	12 35.4	03 37	0.510	-3.30	266.1	65.8	17.2	5	0
1600*	12 35.4	-16 29	0.522	-3.30	267.8	45.7	17.7	6	0

			Precession						
No.	R. A. (1855)	Decl.	R. A. (1900)	Decl.	l	b	Mag.	Dist.	Rich.
1601	12 36.2	09 47	0.506	-3.30	265.5	72.0	17.2	5	1
1602	12 36.3	28 06	0.493	-3.30	163.7	88.7	17.8	6	1
1603	12 36.3	-14 46	0.521	-3.30	268.0	47.5	17.2	5	1
1604*	12 36.3	-22 19	0.527	-3.30	268.3	39.9	17.6	6	1
1605	12 36.4	-20 08	0.525	-3.30	268.3	42.1	17.0	5	1
1606	12 37.1	-11 12	0.519	-3.30	268.2	51.0	17.0	5	1
1607	12 37.7	76 57	0.355	-3.30	90.3	40.8	16.7	5	2
1608*	12 38.6	34 12	0.487	-3.29	95.9	83.5	17.2	5	0
1609	12 39.3	27 14	0.492	-3.29	222.9	89.2	16.8	5	1
1610	12 40.1	30 50	0.489	-3.29	96.8	86.9	17.2	5	1
1611	12 40.1	19 43	0.498	-3.29	267.1	82.0	17.8	6	1
1612*	12 40.1	-00 54	0.513	-3.29	269.1	61.3	17.6	6	0
1613	12 40.4	36 22	0.483	-3.29	91.9	81.4	17.6	6	1
1614	12 40.5	70 29	0.402	-3.29	90.2	47.3	17.5	6	1
1615	12 41.0	49 41	0.466	-3.29	90.4	68.1	18.0	6	1
1616*	12 41.1	55 51	0.453	-3.29	90.2	61.9	16.0	4	0
1617	12 41.2	60 00	0.443	-3.29	90.1	57.7	17.6	6	3
1618	12 41.7	11 40	0.504	-3.29	269.9	73.9	17.5	6	1
1619	12 42.2	29 19	0.489	-3.28	87.1	88.4	17.8	6	1
1620*	12 42.3	-00 48	0.513	-3.28	270.3	61.4	17.2	5	0
1621	12 42.5	63 29	0.430	-3.28	89.9	54.3	16.5	5	1
1622	12 42.9	50 38	0.461	-3.28	89.6	67.1	18.0	6	2
1623	12 43.0	48 32	0.465	-3.28	89.4	69.2	17.5	6	1
1624	12 43.0	09 27	0.505	-3.28	271.0	71.7	17.8	6	1
1625*	12 43.3	-20 00	0.527	-3.28	270.5	42.2	17.0	5	0
1626*	12 43.5	32 08	0.486	-3.28	85.3	85.6	17.8	6	0
1627*	12 43.8	14 08	0.501	-3.28	272.1	76.4	18.0	6	0
1628	12 44.0	29 25	0.488	-3.28	74.1	88.3	17.4	6	1
1629	12 44.3	04 44	0.508	-3.28	271.6	67.0	17.5	6	1
1630	12 44.4	05 22	0.508	-3.28	271.7	67.6	16.7	5	1
1631*	12 45.2	-14 39	0.523	-3.28	271.2	47.6	15.4	3	0
1632	12 46.0	29 37	0.487	-3.27	63.9	87.9	17.2	5	2
1633*	12 46.2	-25 36	0.533	-3.27	271.2	36.6	17.6	6	1
1634	12 46.5	-05 54	0.517	-3.27	272.1	56.3	17.6	6	1
1635	12 46.8	-08 09	0.519	-3.27	272.1	54.1	17.2	5	1
1636	12 47.4	63 37	0.420	-3.27	88.9	54.1	17.8	6	2
1637	12 47.4	51 37	0.454	-3.27	87.9	66.1	17.0	5	1
1638*	12 47.5	19 47	0.496	-3.27	279.6	81.9	16.0	4	0
1639*	12 47.7	10 57	0.503	-3.27	275.0	73.1	17.5	6	0
1640	12 48.4	63 21	0.419	-3.27	88.7	54.4	17.8	6	1
1641	12 48.8	29 14	0.486	-3.27	44.5	87.9	17.6	6	1
1642	12 48.9	07 11	0.506	-3.27	275.0	69.4	17.3	6	1
1643	12 49.2	44 52	0.465	-3.26	85.6	72.8	17.7	6	1
1644	12 49.6	-16 35	0.526	-3.26	272.7	45.6	15.7	4	1
1645	12 49.7	-14 06	0.524	-3.26	272.9	48.1	17.8	6	1
1646*	12 49.8	62 57	0.418	-3.26	88.4	54.8	16.9	5	0
1647	12 50.3	20 53	0.494	-3.26	286.2	82.9	17.8	6	1
1648*	12 51.2	-25 51	0.536	-3.26	272.6	36.4	16.9	5	1
1649*	12 51.3	10 33	0.503	-3.26	277.8	72.7	17.2	5	0
1650	12 51.3	-00 59	0.513	-3.26	274.9	61.2	17.0	5	2
1651	12 51.9	-03 25	0.515	-3.26	274.9	58.7	16.0	4	1
1652	12 52.1	-12 43	0.523	-3.26	273.9	49.5	17.4	6	1
1653	12 52.3	12 08	0.501	-3.25	279.5	74.2	17.7	6	1
1654*	12 52.4	30 48	0.482	-3.25	53.5	86.2	16.9	5	0
1655	12 52.5	66 10	0.398	-3.25	88.3	51.5	18.0	6	2
1656	12 52.8	28 46	0.484	-3.25	23.4	87.4	13.5	1	2
1657	12 52.8	20 23	0.493	-3.25	289.4	82.2	17.5	6	1
1658	12 53.7	-02 40	0.515	-3.25	275.9	59.5	17.2	5	1
1659*	12 54.2	04 28	0.508	-3.25	277.8	66.5	17.5	6	0
1660	12 54.8	51 07	0.447	-3.25	84.9	66.5	17.8	6	1
1661	12 54.8	29 52	0.482	-3.25	37.5	86.5	17.6	6	2
1662	12 55.2	09 06	0.504	-3.24	280.3	71.1	17.2	5	1
1663	12 55.3	-01 45	0.514	-3.24	276.8	60.3	17.0	5	1
1664*	12 55.9	-23 27	0.535	-3.24	274.2	38.7	17.3	6	2
1665	12 56.2	27 28	0.484	-3.24	355.8	86.8	17.7	6	3
1666	12 56.4	52 41	0.441	-3.24	84.8	64.9	16.8	5	1
1667	12 56.4	32 36	0.477	-3.24	57.9	84.2	17.6	6	2
1668	12 56.7	20 03	0.492	-3.24	294.6	81.6	16.6	5	1
1669*	12 57.1	19 52	0.492	-3.24	294.7	81.4	17.8	6	0
1670	12 57.2	21 07	0.491	-3.24	298.6	82.5	17.6	6	1
1671	12 57.7	-21 53	0.534	-3.24	274.8	40.2	17.4	6	1
1672	12 57.9	34 21	0.474	-3.24	63.4	82.6	17.2	5	1
1673*	12 58.1	52 18	0.440	-3.23	84.0	65.3	16.9	5	0
1674	12 58.2	68 17	0.372	-3.23	87.7	49.4	17.2	5	3
1675	12 58.4	35 20	0.472	-3.23	66.1	81.6	17.2	5	1
1676*	12 58.5	48 34	0.448	-3.23	82.3	68.9	17.5	6	0
1677	12 59.0	31 41	0.477	-3.23	47.6	84.6	17.7	6	2
1678	12 59.2	63 02	0.400	-3.23	86.6	54.6	17.4	6	1
1679	12 59.7	32 35	0.475	-3.23	52.4	83.8	17.5	6	2
1680*	13 00.0	40 35	0.463	-3.23	74.9	76.6	17.0	5	0

			Precession						
No.	R.A. (1855)	Decl.	R.A. (1900)	Decl.	l	b	Mag.	Dist.	Rich.
1681	13 00.3	72 39	0.327	-3.23	88.1	45.0	17.1	5	1
1682	13 00.3	47 20	0.449	-3.23	80.8	70.1	17.5	6	1
1683	13 01.5	72 39	0.323	-3.22	87.9	45.0	17.1	5	1
1684	13 01.9	11 12	0.500	-3.22	286.9	72.8	17.2	5	1
1685*	A3 02.1	35 32	0.470	-3.22	62.3	81.1	17.2	5	0
1686	13 03.7	22 39	0.487	-3.21	315.4	82.9	18.0	6	1
1687*	13 03.9	59 11	0.409	-3.21	84.6	58.3	17.5	6	0
1688*	13 04.0	-03 55	0.516	-3.21	280.5	57.9	17.6	6	0
1689	13 04.1	-00 36	0.513	-3.21	281.6	61.1	17.6	6	4
1690	13 04.2	20 10	0.490	-3.21	305.2	80.9	17.2	5	1
1691	13 04.7	39 59	0.460	-3.21	70.3	76.9	15.4	3	1
1692*	13 04.8	-00 10	0.512	-3.21	282.1	61.5	17.2	5	0
1693*	13 04.9	49 16	0.440	-3.21	79.9	68.0	17.2	5	0
1694	13 04.9	34 47	0.469	-3.21	56.4	81.4	17.2	5	1
1695	13 06.2	62 27	0.390	-3.20	85.1	55.1	17.8	6	1
1696*	13 06.3	50 20	0.435	-3.20	80.0	66.9	17.7	6	0
1697	13 06.5	47 02	0.444	-3.20	77.6	70.1	17.5	6	2
1698	13 06.6	-06 15	0.519	-3.20	280.9	55.5	17.6	6	1
1699	13 07.1	-21 17	0.537	-3.20	277.8	40.6	17.4	6	1
1700	13 07.8	29 30	0.475	-3.20	18.6	84.0	17.2	5	1
1701*	13 07.9	61 47	0.391	-3.20	84.5	55.7	17.0	5	0
1702	13 08.1	45 54	0.445	-3.19	75.8	71.1	17.8	6	1
1703	13 08.9	52 36	0.426	-3.19	80.4	64.6	18.0	6	2
1704	13 09.1	65 22	0.368	-3.19	85.4	52.1	17.8	6	3
1705	13 09.6	73 39	0.285	-3.19	87.3	44.0	17.7	6	1
1706	13 09.8	42 10	0.452	-3.19	70.3	74.5	17.2	5	2
1707	13 09.9	59 00	0.401	-3.19	83.1	58.4	17.6	6	1
1708	13 10.5	47 16	0.439	-3.18	75.9	69.7	17.8	6	1
1709*	13 10.9	-20 42	0.538	-3.18	279.0	41.0	16.4	4	0
1710*	13 11.4	44 25	0.445	-3.18	72.4	72.3	17.2	5	0
1711*	13 11.5	11 45	0.498	-3.18	295.0	72.6	17.2	5	0
1712	13 11.7	35 03	0.464	-3.18	50.7	80.3	18.0	6	1
1713	13 13.5	58 51	0.396	-3.17	82.2	58.4	17.2	5	1
1714	13 13.9	34 14	0.464	-3.17	45.3	80.6	18.0	6	1
1715	13 14.2	38 30	0.456	-3.17	59.9	77.3	17.0	5	1
1716	13 14.2	34 40	0.463	-3.17	47.0	80.2	17.8	6	1
1717	13 14.4	42 12	0.448	-3.17	67.5	74.1	17.2	5	1
1718	13 14.6	67 37	0.339	-3.17	85.2	49.8	17.8	6	2
1719*	13 14.7	37 09	0.458	-3.17	55.7	78.3	18.0	6	0
1720*	13 14.7	03 51	0.507	-3.17	289.6	64.8	17.6	6	0
1721*	13 15.2	20 09	0.486	-3.16	316.9	79.2	17.8	6	0
1722	13 15.3	70 52	0.305	-3.16	86.0	46.6	17.7	6	2
1723*	13 15.5	37 58	0.456	-3.16	57.5	77.6	17.0	5	0
1724	13 15.6	23 46	0.480	-3.16	334.3	81.4	17.5	6	1
1725	13 16.1	-16 03	0.533	-3.16	281.8	45.4	17.7	6	1
1726	13 16.2	17 51	0.489	-3.16	310.4	77.3	17.2	5	1
1727*	13 16.3	-22 18	0.542	-3.16	280.3	39.3	17.4	6	0
1728*	13 16.5	12 02	0.496	-3.16	299.0	72.3	17.6	6	0
1729	13 16.5	-02 37	0.515	-3.16	286.8	58.5	17.2	5	1
1730	13 16.6	22 13	0.482	-3.16	326.8	80.4	17.6	6	1
1731	13 17.1	58 56	0.390	-3.15	81.4	58.2	17.2	5	2
1732	13 17.2	-19 29	0.538	-3.15	281.3	42.0	17.5	6	1
1733	13 17.7	02 57	0.508	-3.15	290.6	63.8	18.0	6	2
1734*	13 18.1	55 58	0.402	-3.15	79.5	61.0	17.3	6	0
1735	13 18.9	13 09	0.494	-3.15	302.5	73.0	17.8	6	1
1736*	13 18.9	-26 22	0.549	-3.15	280.2	35.2	14.8	2	0
1737	13 19.3	50 19	0.421	-3.14	75.0	66.3	17.3	6	1
1738	13 19.5	58 22	0.389	-3.14	80.5	58.7	16.6	5	2
1739	13 19.5	30 12	0.468	-3.14	18.8	81.4	17.6	6	1
1740	13 19.7	42 25	0.443	-3.14	64.8	73.4	17.6	6	1
1741	13 20.1	72 14	0.274	-3.14	85.9	45.2	17.1	5	1
1742*	13 20.1	14 20	0.493	-3.14	305.5	73.9	17.5	6	0
1743	13 20.2	04 22	0.506	-3.14	293.1	64.9	17.8	6	1
1744	13 20.4	60 04	0.379	-3.14	81.2	57.0	17.2	5	1
1745*	13 21.0	54 35	0.404	-3.13	77.8	62.2	18.4	7	2
1746*	13 21.2	36 13	0.455	-3.13	47.9	78.1	17.2	5	0
1747	13 21.3	53 23	0.408	-3.13	76.8	63.4	18.0	6	1
1748	13 22.8	19 10	0.485	-3.13	319.8	77.3	17.4	6	1
1749	13 23.0	38 23	0.449	-3.12	53.6	76.3	16.0	4	1
1750*	13 23.4	-01 06	0.514	-3.12	290.8	59.5	15.9	4	0
1751*	13 23.8	-05 00	0.519	-3.12	288.8	55.7	17.6	6	0
1752*	13 24.2	32 31	0.461	-3.12	30.1	79.7	17.2	5	0
1753	13 24.3	05 36	0.504	-3.12	296.4	65.7	17.3	6	1
1754	13 24.4	-10 55	0.527	-3.12	286.4	50.0	17.0	5	1
1755	13 24.7	16 43	0.488	-3.12	314.2	75.2	17.5	6	1
1756*	13 25.4	62 58	0.353	-3.11	81.6	54.1	17.6	6	0
1757*	13 25.6	-22 32	0.546	-3.11	283.0	38.6	17.0	5	1
1758	13 26.6	51 16	0.410	-3.11	73.3	65.0	18.0	6	3
1759	13 27.0	21 00	0.480	-3.10	329.2	77.7	17.6	6	3
1760	13 27.1	20 58	0.480	-3.10	329.1	77.7	17.2	5	3

			Precession						
No.	R. A. (1855)	Decl.	R. A. (1900)	Decl.	l	b	Mag.	Dist.	Rich.
1761	13 27.3	58 24	0.378	-3.10	78.6	58.3	17.8	6	2
1762	13 28.7	23 51	0.475	-3.09	342.4	78.8	17.6	6	1
1763	13 29.0	41 43	0.437	-3.09	58.5	73.0	17.7	6	3
1764*	13 29.5	60 40	0.361	-3.09	79.5	56.1	17.2	5	0
1765	13 29.7	11 11	0.495	-3.09	306.5	70.0	17.8	6	2
1766	13 30.5	33 13	0.456	-3.08	30.5	78.2	17.5	6	1
1767	13 30.8	59 58	0.363	-3.08	78.8	56.7	15.7	4	1
1768*	13 30.9	-13 13	0.532	-3.08	287.8	47.3	17.2	5	0
1769	13 32.5	28 31	0.465	-3.07	6.9	78.8	17.2	5	1
1770	13 33.8	42 02	0.432	-3.07	56.8	72.2	17.6	6	1
1771*	13 34.1	-25 33	0.555	-3.06	284.5	35.2	16.8	5	1
1772	13 34.4	-10 22	0.528	-3.06	290.3	49.8	17.0	5	1
1773	13 34.8	02 59	0.507	-3.06	299.4	62.2	15.6	3	1
1774	13 34.9	40 45	0.435	-3.06	53.4	73.0	17.6	6	2
1775	13 35.2	27 06	0.466	-3.06	360.0	78.1	15.7	4	2
1776*	13 35.8	58 46	0.363	-3.05	76.9	57.6	17.2	5	0
1777	13 36.0	72 21	0.227	-3.05	84.3	44.8	17.6	6	1
1778*	13 36.5	-10 25	0.529	-3.05	291.0	49.6	16.6	5	0
1779*	13 37.3	48 21	0.409	-3.04	66.2	66.8	17.6	6	0
1780	13 37.3	03 37	0.506	-3.04	301.2	62.5	16.6	5	1
1781*	13 37.9	30 35	0.457	-3.04	16.4	77.4	15.4	3	0
1782	13 37.9	14 26	0.488	-3.04	317.3	71.4	17.5	6	1
1783*	13 38.0	56 20	0.374	-3.04	74.5	59.7	16.3	4	0
1784	13 38.3	06 29	0.502	-3.04	304.8	64.9	17.3	6	1
1785	13 38.4	38 53	0.437	-3.04	47.0	73.8	17.2	5	2
1786	13 39.5	45 43	0.416	-3.03	61.4	68.7	17.6	6	1
1787	13 39.5	37 32	0.440	-3.03	42.6	74.4	17.8	6	1
1788	13 39.7	54 30	0.380	-3.03	72.4	61.2	17.7	6	1
1789*	13 39.9	40 23	0.432	-3.03	50.3	72.6	17.8	6	0
1790	13 40.8	54 46	0.378	-3.02	72.4	60.9	17.7	6	1
1791*	13 40.8	-24 44	0.556	-3.02	286.5	35.6	17.0	5	1
1792	13 41.4	31 34	0.453	-3.02	20.0	76.5	17.8	6	1
1793	13 41.8	33 01	0.450	-3.02	25.8	76.0	16.4	4	1
1794*	13 42.1	-25 37	0.558	-3.01	286.6	34.7	17.0	5	1
1795	13 42.3	27 19	0.462	-3.01	1.7	76.6	16.0	4	2
1796	13 42.5	-11 12	0.531	-3.01	292.7	48.4	17.2	5	1
1797	13 42.8	25 44	0.466	-3.01	355.1	76.2	17.0	5	1
1798*	13 42.9	58 19	0.355	-3.01	75.0	57.6	17.6	6	0
1799	13 43.0	36 10	0.441	-3.01	36.8	74.6	17.2	5	1
1800*	13 43.0	28 48	0.459	-3.01	8.1	76.5	15.4	3	0
1801	13 43.3	06 03	0.502	-3.01	306.8	63.8	17.8	6	1
1802*	13 43.3	-26 00	0.559	-3.01	286.8	34.3	17.0	5	1
1803	13 43.4	71 34	0.221	-3.01	83.1	45.4	17.5	6	1
1804	13 43.4	49 58	0.396	-3.01	66.3	64.9	17.6	6	1
1805	13 44.0	58 06	0.355	-3.00	74.6	57.8	17.8	6	1
1806	13 44.0	22 02	0.473	-3.00	341.3	74.8	18.0	6	1
1807	13 44.7	-09 02	0.528	-3.00	294.7	50.2	18.0	6	1
1808*	13 45.0	10 08	0.494	-3.00	313.2	67.0	17.2	5	0
1809	13 46.0	05 53	0.502	-2.99	307.8	63.3	15.8	4	1
1810	13 46.3	36 59	0.437	-2.99	38.3	73.6	17.2	5	1
1811	13 46.7	71 45	0.209	-2.99	82.9	45.1	17.5	6	1
1812*	13 46.8	38 26	0.433	-2.98	42.4	72.7	17.0	5	0
1813*	13 47.1	36 15	0.439	-2.98	35.7	73.8	16.0	4	0
1814	13 47.1	15 38	0.484	-2.98	324.7	70.6	17.2	5	1
1815	13 47.1	04 45	0.504	-2.98	307.0	62.2	17.8	6	1
1816*	13 47.6	-25 39	0.560	-2.98	288.0	34.3	17.6	6	1
1817	13 47.7	29 18	0.455	-2.98	10.0	75.5	17.2	5	1
1818*	13 47.7	27 37	0.459	-2.98	3.3	75.4	17.2	5	0
1819	13 48.5	25 05	0.465	-2.97	353.7	74.8	17.2	5	1
1820	13 49.1	11 30	0.491	-2.97	317.5	67.4	17.6	6	1
1821	13 49.5	31 32	0.449	-2.97	18.5	74.8	17.5	6	1
1822*	13 50.4	-24 41	0.560	-2.96	289.1	35.0	17.6	6	2
1823	13 50.9	45 38	0.406	-2.96	57.2	67.5	17.5	6	1
1824	13 51.1	27 33	0.458	-2.96	3.3	74.7	17.2	5	1
1825*	13 51.1	21 22	0.472	-2.96	341.7	73.0	15.7	4	0
1826	13 51.3	31 18	0.449	-2.95	17.4	74.5	17.5	6	2
1827	13 51.4	22 25	0.469	-2.95	345.2	73.4	16.6	5	1
1828	13 51.5	19 06	0.476	-2.95	335.3	71.9	16.6	5	1
1829	13 52.0	39 00	0.427	-2.95	42.1	71.6	17.8	6	1
1830	13 52.1	48 07	0.395	-2.95	60.9	65.5	17.5	6	1
1831	13 52.6	28 42	0.455	-2.95	7.7	74.4	15.4	3	1
1832	13 52.7	30 15	0.451	-2.95	13.4	74.3	17.2	5	1
1833	13 52.9	05 20	0.502	-2.94	310.2	61.9	17.0	5	1
1834	13 53.2	50 15	0.385	-2.94	63.7	63.7	17.2	5	1
1835*	13 53.7	03 34	0.505	-2.94	308.5	60.4	17.6	6	0
1836*	13 53.9	-10 55	0.533	-2.94	296.8	47.6	15.7	4	0
1837	13 54.0	-10 28	0.532	-2.94	297.1	48.0	15.7	4	1
1838	13 54.2	41 46	0.417	-2.93	48.2	69.7	18.0	6	3
1839	13 55.0	-04 09	0.520	-2.93	301.8	53.5	17.4	6	1
1840*	13 55.1	31 17	0.447	-2.93	16.9	73.7	17.2	5	0

			Precession						
No.	R. A. (1855)	Decl.	R. A. (1900)	Decl.	l	b	Mag.	Dist.	Rich.
1841	13 55.2	24 01	0.464	-2.93	351.4	73.1	17.5	6	1
1842	13 55.3	18 30	0.476	-2.93	335.2	70.8	17.2	5	1
1843*	13 55.4	14 19	0.485	-2.93	325.6	68.3	17.8	6	0
1844*	13 55.5	11 13	0.491	-2.93	319.9	66.1	17.2	5	0
1845*	13 55.6	-08 25	0.528	-2.92	298.9	49.7	17.2	5	0
1846*	13 55.6	-24 41	0.562	-2.92	290.5	34.6	17.6	6	2
1847	13 56.0	23 26	0.465	-2.92	349.7	72.7	17.6	6	1
1848	13 56.4	74 50	0.112	-2.92	83.5	42.0	17.7	6	1
1849*	13 56.6	16 08	0.481	-2.92	330.0	69.2	16.6	5	0
1850	13 56.6	09 50	0.493	-2.92	318.1	64.9	17.5	6	1
1851	13 57.0	72 50	0.160	-2.92	82.4	43.8	17.2	5	2
1852	13 57.0	16 28	0.480	-2.92	330.9	69.3	16.6	5	1
1853*	13 57.6	-19 05	0.550	-2.91	293.5	39.7	17.3	6	1
1854	13 57.9	31 47	0.444	-2.91	18.4	73.0	17.5	6	1
1855	13 59.4	47 47	0.390	-2.90	58.2	64.9	17.6	6	1
1856	13 59.4	25 49	0.459	-2.90	358.1	72.6	17.2	5	1
1857*	14 00.2	-24 05	0.562	-2.89	291.9	34.8	17.6	6	1
1858*	14 00.4	-03 38	0.519	-2.89	304.2	53.3	17.6	6	0
1859*	14 00.6	60 48	0.312	-2.89	73.6	54.4	17.8	6	0
1860	14 00.6	14 40	0.483	-2.89	328.5	67.5	17.2	5	1
1861	14 00.9	28 31	0.451	-2.89	7.2	72.6	17.2	5	1
1862	14 00.9	07 15	0.498	-2.89	316.1	62.2	17.2	5	1
1863	14 01.0	27 58	0.453	-2.89	5.4	72.5	17.2	5	2
1864	14 01.0	06 09	0.500	-2.89	314.7	61.4	17.0	5	1
1865*	14 01.2	59 22	0.322	-2.88	72.2	55.6	17.8	6	0
1866	14 02.6	07 25	0.497	-2.87	317.0	62.1	17.2	5	1
1867	14 02.7	31 51	0.441	-2.87	18.1	72.0	17.5	6	1
1868	14 02.8	28 19	0.451	-2.87	6.6	72.1	17.5	6	1
1869*	14 02.9	30 09	0.446	-2.87	12.6	72.1	17.2	5	0
1870*	14 03.6	07 21	0.497	-2.87	317.3	61.9	17.2	5	0
1871*	14 04.6	-12 50	0.538	-2.86	299.0	44.7	17.1	5	0
1872*	14 04.9	62 39	0.289	-2.86	74.5	52.5	17.2	5	0
1873*	14 05.2	28 50	0.448	-2.85	8.3	71.6	16.3	4	0
1874	14 05.3	30 26	0.444	-2.85	13.4	71.6	17.4	6	1
1875	14 05.5	14 43	0.482	-2.85	330.5	66.6	17.6	6	1
1876	14 05.7	-13 24	0.540	-2.85	299.0	44.1	17.1	5	1
1877	14 06.0	60 28	0.307	-2.85	72.3	54.3	17.8	6	1
1878	14 06.4	29 54	0.445	-2.85	11.7	71.4	17.5	6	1
1879	14 06.5	64 17	0.270	-2.85	75.6	51.0	17.8	6	1
1880	14 06.5	23 05	0.462	-2.85	351.0	70.3	17.2	5	1
1881	14 07.0	07 32	0.497	-2.84	318.9	61.5	17.0	5	1
1882	14 07.2	00 20	0.511	-2.84	310.4	55.8	17.2	5	3
1883*	14 07.5	-22 35	0.561	-2.84	294.5	35.6	17.1	5	0
1884*	14 07.6	62 04	0.290	-2.84	73.5	52.9	17.8	6	0
1885	14 08.0	44 21	0.397	-2.83	49.6	66.1	17.0	5	1
1886	14 08.2	27 49	0.450	-2.83	5.3	70.9	17.2	5	1
1887*	14 09.6	18 16	0.473	-2.82	339.5	67.7	17.2	5	0
1888*	14 10.1	14 33	0.481	-2.82	331.8	65.6	17.5	6	0
1889	14 10.3	31 24	0.439	-2.82	16.1	70.4	17.3	6	2
1890*	14 10.4	08 52	0.494	-2.81	322.1	61.8	15.5	3	0
1891	14 11.1	28 43	0.446	-2.81	8.1	70.3	17.0	5	1
1892	14 11.5	79 25	-0.135	-2.81	84.9	37.4	16.5	5	1
1893	14 12.0	75 01	0.059	-2.80	82.4	41.4	17.5	6	1
1894	14 12.0	44 03	0.395	-2.80	48.0	65.7	17.0	5	1
1895	14 12.3	71 55	0.140	-2.80	80.4	44.1	17.7	6	2
1896*	14 12.7	38 28	0.415	-2.80	35.3	68.2	17.2	5	0
1897*	14 13.3	-08 07	0.529	-2.79	305.0	47.9	17.0	5	0
1898	14 14.0	25 50	0.453	-2.79	.0	69 4	17.0	5	1
1899*	14 14.5	18 22	0.471	-2.78	341.2	66.8	16.0	4	0
1900	14 15.0	36 42	0.420	-2.78	30.4	68.4	17.2	5	1
1901*	14 15.2	41 00	0.404	-2.78	40.8	66.7	16.6	5	0
1902	14 15.8	37 58	0.415	-2.77	33.5	67.9	17.2	5	2
1903	14 16.4	28 02	0.446	-2.77	6.4	69.1	17.0	5	1
1904	14 16.8	49 14	0.367	-2.76	56.1	61.8	15.6	3	2
1905	14 16.8	17 09	0.474	-2.76	339.2	65.7	18.0	6	2
1906*	14 16.9	18 06	0.471	-2.76	341.3	66.1	16.6	5	0
1907	14 17.1	50 23	0.361	-2.76	57.9	61.0	17.2	5	1
1908	14 17.4	27 06	0.448	-2.76	3.8	68.8	17.1	5	1
1909	14 17.5	25 36	0.452	-2.76	359.8	68.5	16.8	5	1
1910*	14 17.8	25 53	0.451	-2.75	.6	68 5	17.8	6	0
1911	14 18.5	39 37	0.407	-2.75	36.9	66.8	17.2	5	2
1912	14 19.2	27 24	0.446	-2.74	4.8	68.4	17.0	5	1
1913	14 20.0	17 20	0.472	-2.74	340.5	65.1	16.0	4	1
1914	14 20.1	38 29	0.410	-2.74	34.0	66.9	17.2	5	2
1915	14 20.4	32 50	0.429	-2.73	19.5	68.2	17.6	6	1
1916	14 20.7	-07 31	0.529	-2.73	307.8	47.4	17.8	6	1
1917	14 21.3	20 41	0.464	-2.73	348.1	66.3	18.0	6	2
1918	14 21.5	63 49	0.250	-2.72	73.0	50.5	17.5	6	3
1919*	14 22.5	06 03	0.498	-2.72	322.4	57.7	17.6	6	0
1920	14 22.7	56 26	0.316	-2.71	65.0	56.2	17.0	5	2

			Precession						
No.	R.A. (1855)	Decl.	R.A. (1900)	Decl.	l	b	Mag.	Dist.	Rich.
1921	14 22.7	23 45	0.455	-2.71	355.7	67.0	17.2	5	1
1922	14 23.3	21 15	0.461	-2.71	349.9	66.1	17.6	6	1
1923	14 23.3	20 17	0.464	-2.71	347.7	65.7	17.2	5	1
1924*	14 23.3	-21 44	0.564	-2.71	299.0	34.8	17.0	5	2
1925	14 24.0	57 31	0.306	-2.70	66.0	55.2	17.2	5	2
1926	14 24.0	25 18	0.450	-2.70	359.8	67.1	16.6	5	2
1927	14 24.6	26 19	0.447	-2.70	2.4	67.1	16.0	4	1
1928	14 24.9	05 11	0.500	-2.70	322.1	56.7	17.6	6	1
1929	14 25.6	30 11	0.435	-2.69	12.4	67.2	17.3	6	2
1930	14 26.4	32 16	0.428	-2.68	17.7	67.0	17.0	5	1
1931	14 26.5	44 55	0.380	-2.68	46.5	63.0	17.2	5	1
1932*	14 26.9	47 45	0.365	-2.68	51.5	61.4	17.2	5	0
1933	14 27.1	70 47	0.130	-2.68	78.2	44.5	17.3	6	2
1934	14 27.1	30 06	0.435	-2.68	12.2	66.9	17.4	6	3
1935*	14 27.8	-18 41	0.557	-2.67	301.9	37.0	17.5	6	1
1936	14 29.9	55 28	0.315	-2.65	62.5	56.2	17.0	5	1
1937	14 30.3	58 55	0.287	-2.65	66.6	53.6	17.2	5	2
1938	14 30.3	00 21	0.511	-2.65	318.1	52.2	17.2	5	1
1939	14 30.8	25 28	0.447	-2.64	.9	65 6	16.6	5	1
1940	14 30.9	55 47	0.312	-2.64	62.7	55.8	17.0	5	3
1941	14 31.3	31 08	0.430	-2.64	14.8	66.0	17.5	6	1
1942	14 31.3	04 18	0.502	-2.64	323.0	54.9	17.5	6	3
1943	14 31.4	30 52	0.431	-2.64	14.1	66.0	17.6	6	2
1944	14 31.6	31 03	0.430	-2.64	14.5	65.9	17.2	5	1
1945*	14 31.9	-21 40	0.566	-2.63	301.2	33.9	17.6	6	1
1946	14 32.2	40 51	0.393	-2.63	37.3	63.9	17.6	6	1
1947	14 32.3	40 04	0.397	-2.63	35.6	64.1	17.5	6	1
1948*	14 32.6	49 14	0.353	-2.63	52.9	59.8	17.2	5	0
1949	14 33.3	18 46	0.465	-2.62	346.7	62.9	17.2	5	1
1950	14 33.6	13 42	0.478	-2.62	337.4	60.4	17.2	5	1
1951	14 34.0	83 57	-0.796	-2.61	86.6	33.0	17.7	6	1
1952	14 34.8	29 16	0.434	-2.61	10.3	65.2	18.0	6	2
1953*	14 35.0	13 55	0.478	-2.61	338.1	60.3	16.6	5	0
1954	14 35.8	29 09	0.434	-2.60	10.0	65.0	17.6	6	2
1955*	14 36.4	-03 55	0.522	-2.59	315.6	48.0	17.8	6	0
1956	14 36.8	32 17	0.423	-2.59	17.4	64.8	17.6	6	2
1957	14 37.0	31 50	0.425	-2.59	16.4	64.7	17.8	6	3
1958	14 37.1	31 36	0.425	-2.59	15.8	64.7	17.8	6	2
1959	14 37.2	18 20	0.465	-2.59	346.6	61.9	17.4	6	1
1960	14 37.8	19 58	0.461	-2.58	350.0	62.4	16.6	5	1
1961	14 38.4	31 49	0.424	-2.57	16.3	64.5	17.8	6	3
1962*	14 38.5	55 50	0.303	-2.57	61.5	55.0	17.2	5	0
1963	14 38.7	32 06	0.423	-2.57	16.9	64.4	17.7	6	2
1964*	14 39.0	-08 10	0.532	-2.57	312.6	44.3	16.9	5	0
1965*	14 39.4	37 05	0.404	-2.56	28.2	63.6	17.6	6	0
1966	14 40.2	59 31	0.269	-2.56	65.8	52.3	18.0	6	2
1967	14 40.2	10 24	0.486	-2.56	333.9	57.2	17.8	6	1
1968	14 40.7	32 29	0.421	-2.55	17.8	63.9	17.8	6	1
1969	14 40.8	64 19	0.213	-2.55	70.9	48.8	17.7	6	1
1970	14 40.8	13 59	0.476	-2.55	339.7	59.1	17.2	5	1
1971*	14 41.1	15 25	0.472	-2.55	342.2	59.8	17.2	5	0
1972*	14 41.9	24 33	0.446	-2.54	.1	62 9	17.2	5	0
1973	14 42.0	28 03	0.435	-2.54	7.8	63.5	17.6	6	2
1974	14 43.7	75 27	-0.050	-2.52	80.4	40.0	17.5	6	1
1975	14 43.7	69 39	0.119	-2.52	75.7	44.6	17.1	5	1
1976	14 43.8	21 34	0.454	-2.52	354.2	61.7	16.9	5	1
1977*	14 43.8	-23 54	0.577	-2.52	302.6	30.6	17.0	5	2
1978	14 43.9	15 12	0.472	-2.52	342.5	59.1	16.8	5	1
1979	14 44.9	31 53	0.421	-2.51	16.4	63.1	17.2	5	2
1980	14 45.0	23 16	0.449	-2.51	357.8	61.9	17.2	5	1
1981*	14 45.0	-23 47	0.577	-2.51	303.0	30.5	17.0	5	0
1982*	14 45.1	31 20	0.423	-2.51	15.2	63.0	16.6	5	0
1983	14 46.0	17 21	0.466	-2.50	346.7	59.6	15.4	3	1
1984	14 46.1	28 33	0.432	-2.50	9.1	62.7	17.2	5	2
1985	14 46.1	06 32	0.495	-2.50	330.0	53.7	17.2	5	1
1986	14 46.6	22 31	0.451	-2.50	356.5	61.3	16.9	5	1
1987*	14 46.9	32 58	0.416	-2.49	18.7	62.6	17.6	6	0
1988*	14 46.9	21 23	0.454	-2.49	354.3	60.9	17.2	5	0
1989	14 47.2	06 18	0.496	-2.49	330.0	53.4	17.2	5	1
1990	14 47.5	28 41	0.431	-2.49	9.5	62.4	17.2	5	3
1991	14 47.8	19 14	0.460	-2.48	350.4	60.0	15.4	3	1
1992*	14 48.4	45 48	0.359	-2.48	44.4	59.2	17.8	6	0
1993	14 48.6	02 27	0.506	-2.48	325.7	50.5	17.5	6	1
1994	14 48.6	-05 15	0.526	-2.48	317.7	45.0	17.7	6	1
1995*	14 49.0	58 39	0.266	-2.47	63.5	52.1	18.4	7	1
1996*	14 49.0	-23 20	0.577	-2.47	304.1	30.4	17.4	6	0
1997*	14 49.3	20 40	0.455	-2.47	353.4	60.2	17.0	5	0
1998*	14 49.6	02 06	0.507	-2.47	325.6	50.1	17.5	6	0
1999	14 49.8	54 55	0.298	-2.47	58.5	54.3	15.7	4	1
2000	14 50.3	55 04	0.296	-2.46	58.6	54.2	16.6	5	1

			Precession						
No.	R. A. (1855)	Decl.	R. A. (1900)	Decl.	l	b	Mag.	Dist.	Rich.
2001	14 50.6	23 21	0.447	-2.46	358.7	60.7	17.2	5	1
2002	14 51.2	68 58	0.119	-2.45	74.3	44.7	17.7	6	1
2003	14 52.1	20 02	0.457	-2.44	352.6	59.3	17.2	5	1
2004*	14 52.2	25 31	0.439	-2.44	3.2	60.9	17.0	5	0
2005	14 52.5	28 24	0.430	-2.44	9.1	61.3	16.0	4	2
2006	14 53.0	20 15	0.456	-2.43	353.2	59.2	17.2	5	1
2007	14 53.2	38 35	0.390	-2.43	30.1	60.6	16.9	5	1
2008	14 53.6	23 43	0.445	-2.43	359.8	60.1	17.5	6	2
2009	14 53.7	21 57	0.450	-2.43	356.4	59.6	17.2	5	1
2010	14 54.7	81 45	-0.549	-2.42	84.5	34.5	17.5	6	1
2011	14 55.1	50 20	0.327	-2.41	51.0	56.1	17.2	5	1
2012	14 55.1	17 06	0.465	-2.41	348.0	57.5	16.6	5	1
2013	14 55.4	61 05	0.233	-2.41	65.6	49.9	18.0	6	2
2014*	14 55.5	-15 28	0.555	-2.41	311.0	36.0	17.5	6	1
2015	14 55.6	56 34	0.278	-2.41	59.9	52.7	17.6	6	1
2016	14 55.7	11 47	0.480	-2.41	339.7	54.9	17.6	6	1
2017	14 56.1	23 45	0.444	-2.40	.2	59 6	16.6	5	1
2018	14 56.3	47 51	0.341	-2.40	46.8	57.1	16.6	5	1
2019*	14 56.7	27 46	0.430	-2.40	8.1	60.3	16.3	4	0
2020*	14 56.7	08 30	0.489	-2.40	335.3	52.8	16.0	4	0
2021	14 57.1	23 36	0.444	-2.39	360.0	59.3	17.0	5	1
2022	14 58.2	29 00	0.425	-2.38	10.6	60.1	15.6	3	1
2023	14 58.5	03 26	0.503	-2.38	329.4	49.4	17.2	5	1
2024	15 00.6	47 42	0.339	-2.36	46.0	56.5	18.0	6	1
2025	15 00.9	35 02	0.401	-2.35	22.6	59.6	17.2	5	1
2026	15 01.1	00 17	0.511	-2.35	326.5	46.8	16.7	5	1
2027*	15 02.1	43 20	0.362	-2.34	38.3	57.8	17.7	6	0
2028	15 02.4	08 05	0.490	-2.34	336.1	51.4	15.7	4	1
2029	15 03.8	06 19	0.494	-2.32	334.2	50.1	16.0	4	2
2030	15 03.8	00 28	0.511	-2.32	327.4	46.4	16.9	5	1
2031*	15 04.0	-10 39	0.542	-2.32	316.8	38.4	17.1	5	1
2032	15 04.2	78 23	-0.268	-2.32	81.6	36.9	17.9	6	1
2033*	15 04.3	06 55	0.493	-2.32	335.0	50.4	15.7	4	0
2034	15 04.4	34 05	0.404	-2.32	20.7	58.9	16.9	5	2
2035	15 04.5	-05 31	0.527	-2.32	321.5	42.1	17.1	5	1
2036*	15 04.8	18 37	0.458	-2.31	352.2	56.0	16.0	4	0
2037	15 05.2	72 46	-0.007	-2.31	76.7	41.1	17.5	6	1
2038*	15 05.5	15 47	0.467	-2.30	347.8	54.7	17.2	5	0
2039*	15 05.6	10 21	0.483	-2.30	339.9	52.0	17.2	5	0
2040	15 05.6	07 59	0.490	-2.30	336.7	50.7	15.7	4	1

			Precession						
No.	R. A. (1855)	Decl.	R. A. (1900)	Decl.	l	b	Mag.	Dist.	Rich.
2041*	15 05.7	69 26	0.082	-2.30	73.5	43.4	17.0	5	0
2042	15 05.7	37 06	0.390	-2.30	26.5	58.4	17.2	5	1
2043	15 06.0	16 59	0.463	-2.30	349.8	55.1	17.2	5	1
2044	15 06.0	14 52	0.469	-2.30	346.5	54.2	17.6	6	1
2045	15 06.7	-02 13	0.518	-2.29	325.3	44.1	17.1	5	1
2046	15 06.9	35 24	0.397	-2.29	23.2	58.4	16.9	5	1
2047	15 07.3	78 41	-0.300	-2.29	81.7	36.6	17.9	6	1
2048	15 08.1	04 56	0.498	-2.28	333.5	48.4	16.0	4	1
2049*	15 08.8	32 20	0.409	-2.27	17.4	58.0	17.0	5	0
2050	15 08.9	00 39	0.510	-2.27	328.8	45.6	17.1	5	1
2051	15 09.3	-00 25	0.513	-2.26	327.7	44.8	17.4	6	2
2052*	15 09.6	07 33	0.490	-2.26	337.0	49.7	15.0	3	0
2053	15 09.8	-00 09	0.512	-2.26	328.1	44.9	17.4	6	1
2054	15 10.6	55 20	0.274	-2.25	56.4	51.6	17.6	6	1
2055*	15 11.6	06 45	0.492	-2.24	336.5	48.8	16.0	4	0
2056	15 13.1	28 48	0.421	-2.22	11.0	56.8	16.9	5	1
2057*	15 13.1	-10 09	0.542	-2.22	319.4	37.3	17.1	5	1
2058	15 13.9	72 24	-0.014	-2.21	75.7	40.9	17.9	6	1
2059	15 14.2	29 22	0.418	-2.21	12.0	56.6	17.0	5	1
2060*	15 14.4	-11 39	0.547	-2.21	318.4	36.0	17.7	6	1
2061	15 15.3	31 11	0.411	-2.20	15.4	56.6	15.7	4	1
2062	15 15.5	32 37	0.405	-2.20	18.0	56.6	16.6	5	1
2063	15 16.0	09 10	0.485	-2.19	340.5	49.2	15.1	3	1
2064*	15 16.4	49 10	0.317	-2.19	46.6	53.5	16.6	5	0
2065	15 16.6	28 15	0.422	-2.19	10.2	56.0	15.6	3	2
2066	15 16.6	01 34	0.508	-2.19	331.5	44.7	17.2	5	2
2067	15 17.3	31 26	0.409	-2.18	15.9	56.2	15.7	4	1
2068	15 17.8	72 01	-0.009	-2.17	75.1	40.9	17.7	6	2
2069	15 18.0	30 25	0.413	-2.17	14.1	55.9	16.6	5	2
2070	15 18.6	35 46	0.390	-2.16	23.6	56.0	17.5	6	1
2071	15 19.2	37 32	0.381	-2.16	26.8	55.7	17.2	5	1
2072*	15 19.3	18 44	0.454	-2.16	354.6	52.9	17.0	5	0
2073	15 19.6	28 56	0.418	-2.15	11.5	55.4	16.9	5	1
2074*	15 20.4	64 17	0.157	-2.14	66.7	45.7	17.1	5	0
2075*	15 21.0	74 32	-0.107	-2.14	77.3	39.1	17.1	5	0
2076	15 21.1	44 39	0.343	-2.13	38.9	54.2	17.8	6	2
2077	15 21.5	62 34	0.182	-2.13	64.5	46.5	17.7	6	1
2078*	15 21.9	-12 31	0.550	-2.13	319.3	34.1	17.5	6	0
2079	15 22.1	29 23	0.415	-2.12	12.4	54.9	15.4	3	1
2080*	15 22.4	42 14	0.356	-2.12	34.8	54.5	17.3	6	0

					Precession						
No.	R.A. (1855)		Decl.		R.A. (1900)	Decl.	l	b	Mag.	Dist.	Rich.
2081*	15	22.6	-10	30	0.544	-2.12	321.2	35.4	17.7	6	1
2082*	15	23.4	03	57	0.500	-2.11	335.6	44.8	17.0	5	0
2083	15	23.5	31	15	0.407	-2.11	15.7	54.8	16.9	5	1
2084	15	24.5	35	48	0.387	-2.10	23.6	54.8	17.3	6	1
2085	15	24.6	07	52	0.488	-2.10	340.5	46.8	17.7	6	1
2086	15	24.7	72	53	-0.051	-2.09	75.5	40.0	17.7	6	2
2087	15	25.0	72	06	-0.026	-2.09	74.7	40.5	17.6	6	1
2088	15	25.7	39	22	0.369	-2.08	29.7	54.3	17.5	6	1
2089	15	26.6	28	31	0.417	-2.07	11.2	53.8	15.8	4	1
2090*	15	27.1	62	04	0.182	-2.07	63.4	46.3	17.1	5	0
2091	15	27.3	10	44	0.479	-2.07	344.6	47.7	17.5	6	1
2092	15	27.5	31	39	0.404	-2.06	16.5	54.0	15.7	4	1
2093	15	28.8	37	32	0.377	-2.05	26.5	53.8	17.2	5	2
2094	15	29.1	-01	33	0.517	-2.04	330.9	40.3	16.7	5	1
2095*	15	29.6	41	01	0.359	-2.04	32.4	53.3	17.8	6	0
2096	15	29.9	37	50	0.375	-2.04	27.0	53.6	17.0	5	2
2097*	15	30.1	40	05	0.363	-2.03	30.8	53.4	17.8	6	0
2098	15	30.6	70	01	0.025	-2.03	72.2	41.4	17.7	6	1
2099	15	30.7	44	14	0.340	-2.03	37.6	52.6	17.8	6	1
2100	15	31.0	38	08	0.373	-2.02	27.5	53.4	17.0	5	3
2101*	15	31.2	12	46	0.472	-2.02	348.0	47.8	17.2	5	0
2102	15	32.2	70	40	0.005	-2.01	72.7	40.9	17.7	6	1
2103*	15	32.4	-01	42	0.517	-2.01	331.4	39.6	17.1	5	0
2104*	15	32.5	-02	50	0.521	-2.00	330.3	38.8	17.4	6	2
2105	15	32.8	74	35	-0.135	-2.00	76.7	38.4	17.2	5	1
2106	15	33.3	34	09	0.391	-2.00	20.8	52.9	17.2	5	1
2107	15	33.4	22	15	0.439	-1.99	1.8	50.9	15.7	4	1
2108*	15	33.5	18	22	0.453	-1.99	356.0	49.6	15.7	4	0
2109*	15	33.5	06	30	0.492	-1.99	340.6	44.2	17.4	6	0
2110	15	33.9	31	11	0.404	-1.99	16.0	52.6	17.0	5	1
2111	15	34.0	34	53	0.387	-1.99	22.1	52.8	17.8	6	3
2112*	15	34.4	36	46	0.378	-1.98	25.2	52.7	17.8	6	0
2113*	15	34.4	05	09	0.496	-1.98	339.2	43.2	17.1	5	0
2114*	15	35.5	43	30	0.341	-1.97	36.1	51.9	17.8	6	0
2115	15	35.7	70	32	0.003	-1.97	72.4	40.8	17.8	6	2
2116	15	37.3	43	18	0.342	-1.95	35.7	51.6	17.8	6	1
2117	15	37.4	44	14	0.336	-1.95	37.2	51.4	17.8	6	1
2118*	15	37.5	42	17	0.347	-1.95	34.1	51.7	17.1	5	0
2119*	15	38.0	09	59	0.480	-1.94	345.6	45.0	17.2	5	0
2120	15	38.3	34	58	0.385	-1.94	22.2	52.0	17.8	6	1

					Precession						
No.	R.A. (1855)		Decl.		R.A. (1900)	Decl.	l	b	Mag.	Dist.	Rich.
2121	15	38.9	70	16	0.005	-1.93	71.9	40.7	17.4	6	2
2122	15	39.0	36	36	0.377	-1.93	24.9	51.8	16.6	5	1
2123*	15	39.3	-07	44	0.537	-1.92	327.1	34.3	17.5	6	0
2124	15	39.5	36	32	0.377	-1.92	24.8	51.7	15.6	3	1
2125	15	39.6	66	47	0.087	-1.92	68.0	42.6	17.6	6	4
2126*	15	40.6	26	26	0.421	-1.91	8.8	50.4	17.6	6	0
2127*	15	41.3	76	44	-0.265	-1.90	78.4	36.7	17.9	6	0
2128*	15	41.4	-02	37	0.520	-1.90	332.3	37.2	16.5	5	0
2129	15	42.0	20	30	0.444	-1.89	.2	48 5	17.8	6	1
2130	15	42.5	37	01	0.374	-1.89	25.5	51.1	17.8	6	1
2131	15	43.1	36	31	0.376	-1.88	24.8	51.0	17.5	6	1
2132*	15	43.6	70	40	-0.013	-1.87	72.0	40.2	16.9	5	0
2133	15	44.4	36	44	0.374	-1.86	25.1	50.7	17.8	6	1
2134	15	45.0	71	28	-0.040	-1.86	72.8	39.6	17.5	6	2
2135*	15	48.9	51	01	0.281	-1.81	46.8	48.0	17.6	6	0
2136	15	49.3	51	33	0.276	-1.80	47.5	47.8	17.6	6	1
2137*	15	50.5	62	28	0.151	-1.79	62.0	43.7	17.1	5	0
2138*	15	51.1	34	11	0.384	-1.78	21.2	49.3	17.5	6	0
2139	15	52.0	65	49	0.092	-1.77	66.0	42.0	17.4	6	1
2140*	15	52.3	49	05	0.294	-1.77	43.7	47.9	17.5	6	0
2141	15	52.3	35	53	0.375	-1.77	23.8	49.1	17.2	5	1
2142	15	52.3	27	39	0.413	-1.77	11.5	48.1	16.0	4	2
2143*	15	52.7	37	49	0.365	-1.76	26.8	49.1	16.6	5	0
2144	15	53.0	70	57	-0.036	-1.76	71.8	39.4	17.5	6	2
2145*	15	54.7	33	41	0.385	-1.74	20.6	48.5	16.6	5	0
2146	15	55.0	66	46	0.069	-1.73	66.9	41.3	17.7	6	1
2147	15	55.7	16	19	0.456	-1.72	356.2	43.9	13.8	1	1
2148*	15	57.2	25	52	0.419	-1.71	9.2	46.7	15.4	3	0
2149*	15	58.1	54	17	0.245	-1.69	50.8	45.8	16.1	4	0
2150	15	58.3	71	49	-0.073	-1.69	72.4	38.5	17.7	6	1
2151	15	58.7	18	09	0.449	-1.69	358.9	44.0	13.8	1	2
2152	15	58.8	16	51	0.454	-1.69	357.3	43.5	13.8	1	1
2153*	16	00.1	14	29	0.462	-1.67	354.5	42.2	16.9	5	0
2154	16	01.2	65	30	0.088	-1.66	65.0	41.3	17.6	6	1
2155	16	01.2	25	24	0.420	-1.66	8.9	45.7	17.5	6	1
2156	16	02.6	73	36	-0.147	-1.64	74.2	37.3	17.5	6	2
2157	16	03.2	48	15	0.294	-1.63	42.0	46.3	17.7	6	1
2158*	16	03.5	43	24	0.328	-1.63	35.0	46.9	16.8	5	0
2159*	16	05.0	17	22	0.451	-1.61	358.7	42.3	15.9	4	0
2160	16	05.7	30	19	0.398	-1.60	16.1	45.7	17.9	6	1

			Precession						
No.	R.A. (1855)	Decl.	R.A. (1900)	Decl.	l	b	Mag.	Dist.	Rich.
2161	16 06.6	71 55	-0.088	-1.59	72.1	37.9	17.5	6	2
2162*	16 06.7	29 55	0.399	-1.59	15.6	45.4	13.7	1	0
2163*	16 07.8	-05 46	0.532	-1.57	334.1	30.1	17.5	6	2
2164*	16 08.1	60 47	0.161	-1.57	58.8	42.4	17.5	6	0
2165*	16 08.2	27 03	0.412	-1.57	11.7	44.5	17.4	6	0
2166	16 09.0	56 21	0.216	-1.56	53.0	43.7	17.1	5	1
2167*	16 09.1	38 48	0.353	-1.55	28.3	45.9	17.6	6	0
2168	16 09.7	54 32	0.235	-1.55	50.5	44.1	16.5	5	1
2169*	16 10.0	49 30	0.281	-1.54	43.6	45.0	15.9	4	0
2170*	16 10.7	23 33	0.426	-1.53	7.2	43.1	15.9	4	0
2171	16 11.8	72 02	-0.100	-1.52	72.0	37.5	17.9	6	1
2172	16 12.0	42 46	0.329	-1.52	34.0	45.3	17.1	5	1
2173*	16 13.3	09 15	0.480	-1.50	350.3	37.0	17.1	5	1
2174	16 14.1	61 27	0.146	-1.49	59.3	41.5	17.1	5	1
2175	16 14.6	30 16	0.396	-1.48	16.5	43.8	16.2	4	1
2176	16 14.8	71 48	-0.095	-1.48	71.6	37.4	17.1	5	2
2177*	16 15.0	26 06	0.414	-1.48	11.0	42.8	17.5	6	0
2178	16 15.4	25 00	0.419	-1.47	9.5	42.4	17.1	5	1
2179	16 15.5	42 46	0.327	-1.47	34.0	44.7	17.1	5	1
2180	16 15.9	48 01	0.290	-1.47	41.3	44.3	17.1	5	1
2181	16 16.4	77 52	-0.420	-1.46	78.2	34.4	17.7	6	1
2182*	16 16.4	14 46	0.459	-1.46	357.0	38.8	17.4	6	0
2183	16 16.8	43 04	0.325	-1.45	34.4	44.4	17.1	5	1
2184*	16 17.2	50 33	0.268	-1.45	44.8	43.7	15.9	4	0
2185	16 17.7	70 57	-0.070	-1.44	70.5	37.6	17.4	6	1
2186*	16 19.2	28 53	0.401	-1.42	14.9	42.6	17.1	5	0
2187*	16 19.4	41 36	0.333	-1.42	32.3	44.0	17.1	5	0
2188*	16 19.7	34 05	0.376	-1.42	22.0	43.4	17.1	5	0
2189	16 20.8	72 47	-0.140	-1.40	72.5	36.6	17.1	5	1
2190	16 21.4	44 02	0.316	-1.39	35.7	43.6	17.7	6	1
2191*	16 21.7	26 12	0.412	-1.39	11.6	41.4	17.7	6	0
2192	16 21.9	43 00	0.323	-1.39	34.3	43.5	17.1	5	1
2193	16 21.9	22 06	0.430	-1.39	6.4	40.2	17.1	5	1
2194*	16 22.2	57 31	0.194	-1.38	53.9	41.7	16.9	5	0
2195	16 22.5	48 52	0.280	-1.38	42.3	43.1	17.4	6	1
2196*	16 22.6	41 49	0.331	-1.38	32.6	43.4	16.9	5	0
2197	16 23.3	41 14	0.334	-1.37	31.8	43.2	13.9	1	1
2198	16 23.5	44 09	0.315	-1.37	35.8	43.2	17.7	6	2
2199	16 23.6	39 51	0.343	-1.36	30.0	43.1	13.9	1	2
2200*	16 23.6	28 30	0.402	-1.36	14.7	41.6	17.1	5	0

			Precession						
No.	R.A. (1855)	Decl.	R.A. (1900)	Decl.	l	b	Mag.	Dist.	Rich
2201	16 23.9	55 47	0.213	-1.36	51.5	41.8	17.1	5	2
2202*	16 25.3	49 09	0.276	-1.34	42.6	42.6	17.1	5	0
2203	16 25.4	73 41	-0.185	-1.34	73.3	35.9	17.1	5	2
2204*	16 25.6	05 54	0.491	-1.34	348.5	32.7	17.1	5	3
2205*	16 25.8	13 12	0.464	-1.33	356.4	36.0	16.5	5	0
2206	16 26.4	43 39	0.317	-1.33	35.2	42.7	17.7	6	1
2207	16 26.8	65 45	0.058	-1.32	64.0	38.8	17.6	6	1
2208	16 27.0	58 50	0.174	-1.32	55.4	40.7	17.1	5	1
2209*	16 27.1	73 54	-0.197	-1.32	73.5	35.7	17.9	6	0
2210*	16 27.6	05 48	0.491	-1.31	348.6	32.3	17.1	5	1
2211	16 29.2	41 15	0.332	-1.29	31.9	42.1	17.4	6	1
2212	16 29.5	49 35	0.271	-1.29	43.1	41.9	16.9	5	1
2213	16 31.8	41 35	0.329	-1.25	32.4	41.7	17.7	6	1
2214*	16 32.7	38 12	0.349	-1.24	27.9	41.2	17.6	6	0
2215	16 34.0	48 21	0.279	-1.22	41.4	41.2	17.1	5	1
2216	16 34.5	67 58	0.000	-1.22	66.4	37.4	17.4	6	1
2217	16 34.9	28 12	0.401	-1.21	15.1	39.1	17.1	5	1
2218	16 35.4	66 31	0.034	-1.21	64.6	37.7	17.7	6	4
2219	16 36.2	46 59	0.289	-1.19	39.6	40.9	17.4	6	3
2220*	16 36.4	54 03	0.225	-1.19	48.9	40.3	17.5	6	0
2221	16 36.5	43 33	0.314	-1.19	35.0	40.9	17.7	6	1
2222	16 36.5	43 05	0.317	-1.19	34.4	40.9	17.7	6	1
2223*	16 36.7	27 43	0.403	-1.19	14.6	38.6	16.5	5	0
2224*	16 36.7	13 38	0.462	-1.19	358.2	33.8	17.4	6	3
2225	16 36.8	56 03	0.203	-1.19	51.4	40.0	17.5	6	1
2226*	16 38.2	67 21	0.012	-1.17	65.5	37.2	17.6	6	0
2227	16 39.4	51 33	0.249	-1.15	45.6	40.1	17.4	6	1
2228	16 42.1	30 12	0.390	-1.11	18.1	38.0	16.9	5	1
2229*	16 42.2	65 54	0.043	-1.11	63.6	37.2	17.7	6	0
2230	16 43.2	48 52	0.271	-1.10	42.0	39.7	16.8	5	1
2231	16 43.7	56 46	0.191	-1.09	52.2	38.9	17.9	6	1
2232*	16 44.7	61 59	0.116	-1.08	58.7	37.9	18.1	7	1
2233*	16 47.9	43 25	0.312	-1.03	35.0	38.8	17.4	6	0
2234	16 48.0	56 41	0.190	-1.03	52.0	38.4	17.7	6	1
2235	16 50.1	40 16	0.332	-1.00	31.0	38.1	17.1	5	1
2236	16 52.2	71 43	-0.133	-0.97	70.2	34.7	17.1	5	1
2237	16 52.4	55 29	0.202	-0.97	50.4	37.9	17.7	6	1
2238	16 52.6	37 27	0.349	-0.97	27.6	37.3	17.4	6	1
2239*	16 52.9	59 09	0.155	-0.96	55.0	37.4	17.1	5	0
2240	16 53.9	66 59	0.009	-0.95	64.5	35.8	17.4	6	3

			Precession						
No.	R.A. (1855)	Decl.	R.A. (1900)	Decl.	l	b	Mag.	Dist.	Rich.
2241*	16 54.2	32 46	0.375	-0.95	21.9	36.1	15.6	3	0
2242*	16 54.5	54 39	0.211	-0.94	49.3	37.7	16.9	5	0
2243	16 56.6	35 17	0.361	-0.91	25.1	36.1	17.1	5	1
2244	16 57.4	34 16	0.366	-0.90	23.9	35.7	16.6	5	2
2245	16 57.4	33 45	0.369	-0.90	23.3	35.6	16.5	5	1
2246	16 59.8	64 26	0.063	-0.87	61.3	35.8	17.6	6	3
2247*	17 01.1	81 48	-0.983	-0.85	81.3	31.0	15.3	3	0
2248*	17 04.0	77 13	-0.440	-0.81	76.2	32.4	15.5	3	0
2249*	17 04.5	34 39	0.363	-0.80	24.7	34.4	15.4	3	0
2250	17 06.0	39 53	0.331	-0.78	31.1	35.0	16.5	5	1
2251*	17 06.6	25 00	0.411	-0.77	13.8	31.4	17.6	6	1
2252	17 10.2	49 34	0.257	-0.72	42.9	35.3	17.5	6	1
2253*	17 10.2	38 50	0.337	-0.72	30.0	34.1	16.5	5	0
2254*	17 11.4	19 53	0.433	-0.70	8.7	28.6	17.7	6	2
2255	17 11.6	64 16	0.060	-0.70	60.9	34.5	15.3	3	2
2256	17 12.2	78 54	-0.598	-0.69	78.0	31.5	15.3	3	2
2257*	17 12.6	32 45	0.372	-0.69	23.0	32.3	17.1	5	1
2258*	17 13.4	31 53	0.376	-0.67	22.1	31.9	17.7	6	1
2259*	17 14.4	27 49	0.397	-0.66	17.6	30.6	17.1	5	1
2260	17 15.9	72 18	-0.173	-0.64	70.3	32.8	17.1	5	2
2261*	17 17.1	32 18	0.374	-0.62	22.8	31.3	17.4	6	2
2262*	17 17.3	23 54	0.415	-0.62	13.5	28.7	17.4	6	2
2263*	17 17.4	27 05	0.400	-0.62	17.0	29.7	16.9	5	0
2264*	17 18.1	29 20	0.389	-0.61	19.5	30.2	17.7	6	0
2265*	17 18.2	77 36	-0.484	-0.61	76.4	31.5	17.4	6	0
2266*	17 19.3	32 15	0.374	-0.59	22.9	30.8	17.5	6	2
2267*	17 21.3	61 10	0.113	-0.56	57.0	33.7	17.9	6	1
2268*	17 24.0	55 28	0.193	-0.52	50.2	33.4	17.7	6	1
2269*	17 24.1	49 17	0.257	-0.52	42.8	33.0	17.9	6	0
2270*	17 24.5	55 18	0.194	-0.52	50.0	33.3	17.7	6	0
2271*	17 25.0	78 10	-0.538	-0.51	76.9	31.0	15.7	4	0
2272*	17 28.2	40 43	0.322	-0.46	32.9	31.0	16.5	5	1
2273*	17 29.3	42 30	0.310	-0.45	35.0	31.2	17.4	6	0
2274	17 30.9	77 33	-0.488	-0.42	76.2	30.8	17.2	5	2
2275*	17 32.9	53 17	0.216	-0.39	47.7	32.0	16.5	5	0
2276	17 34.1	64 08	0.056	-0.38	60.5	32.1	17.4	6	1
2277	17 34.2	71 00	-0.131	-0.38	68.5	31.6	17.5	6	1
2278*	17 35.5	39 59	0.327	-0.36	32.4	29.5	17.5	6	0
2279*	17 37.6	24 49	0.410	-0.33	16.3	24.7	17.3	6	1
2280	17 42.2	63 49	0.061	-0.26	60.1	31.2	17.9	6	1

			Precession						
No.	R.A. (1855)	Decl.	R.A. (1900)	Decl.	l	b	Mag.	Dist.	Rich.
2281*	17 42.4	64 43	0.042	-0.26	61.1	31.2	17.6	6	0
2282	17 45.2	71 52	-0.167	-0.22	69.5	30.7	17.4	6	1
2283	17 45.7	69 43	-0.089	-0.21	67.0	30.7	17.4	6	1
2284*	17 49.4	54 19	0.202	-0.15	49.2	29.7	16.9	5	0
2285*	17 49.9	42 52	0.306	-0.15	36.3	27.5	17.0	5	0
2286*	17 50.1	52 07	0.226	-0.14	46.7	29.3	16.9	5	1
2287*	17 50.2	79 38	-0.704	-0.14	78.4	29.6	17.5	6	0
2288*	17 51.2	59 44	0.131	-0.13	55.4	30.0	16.9	5	1
2289*	17 51.7	58 07	0.154	-0.12	53.6	29.8	17.5	6	1
2290*	17 53.8	73 22	-0.233	-0.09	71.2	29.9	17.1	5	0
2291*	17 53.5	51 10	0.235	-0.09	45.7	28.6	17.6	6	2
2292*	17 54.2	53 51	0.208	-0.08	48.7	28.9	17.1	5	1
2293*	17 59.0	57 39	0.161	-0.02	53.1	28.8	16.2	4	0
2294	18 01.0	85 57	-2.633	0.02	85.5	28.4	17.7	6	2
2295*	18 01.0	69 13	-0.075	0.02	66.4	29.4	16.2	4	0
2296*	18 01.3	77 42	-0.509	0.02	76.1	29.2	15.9	4	0
2297*	18 01.5	42 22	0.309	0.02	36.4	25.4	17.0	5	0
2298*	18 03.3	50 13	0.245	0.05	45.0	26.9	17.4	6	0
2299*	18 04.8	43 56	0.298	0.07	38.2	25.2	17.3	6	1
2300	18 10.7	76 39	-0.425	0.16	74.9	28.7	17.1	5	1
2301*	18 16.0	69 36	-0.085	0.23	66.9	28.1	15.8	4	0
2302*	18 17.5	57 05	0.169	0.26	53.0	26.2	17.4	6	2
2303*	18 19.0	82 52	-1.262	0.28	81.9	28.2	16.7	5	0
2304*	18 20.5	68 52	-0.061	0.30	66.1	27.6	17.0	5	0
2305	18 24.9	71 17	-0.141	0.36	68.8	27.5	17.0	5	1
2306*	18 29.4	74 38	-0.292	0.43	72.6	27.5	17.0	5	0
2307*	18 32.4	61 04	0.113	0.47	57.7	25.2	17.8	6	1
2308*	18 35.4	70 55	-0.124	0.51	68.6	26.6	16.4	4	0
2309*	18 49.1	77 33	-0.474	0.71	76.0	26.7	15.8	4	0
2310	18 50.5	73 09	-0.205	0.73	71.2	25.8	17.0	5	1
2311*	18 51.1	70 13	-0.092	0.74	68.1	25.2	16.0	4	1
2312*	18 54.1	68 11	-0.029	0.78	65.9	24.5	15.8	4	1
2313	18 58.0	78 13	-0.521	0.84	76.9	26.3	17.4	6	2
2314	19 00.1	78 49	-0.576	0.87	77.5	26.3	17.2	5	2
2315*	19 01.9	69 45	-0.070	0.89	67.8	24.2	16.3	4	1
2316	19 05.5	79 50	-0.679	0.94	78.7	26.2	17.4	6	2
2317*	19 08.9	68 50	-0.037	0.99	67.0	23.4	17.6	6	3
2318	19 12.4	77 55	-0.477	1.04	76.7	25.5	17.0	5	1
2319*	19 16.2	43 42	0.311	1.09	42.8	13.1	15.4	3	1
2320*	19 17.9	70 44	-0.088	1.11	69.2	23.2	16.9	5	2

			Precession						
No.	R. A. (1855)	Decl.	R. A. (1900)	Decl.	l	b	Mag.	Dist.	Rich.
2321*	19 33.8	73 06	-0.160	1.33	72.1	22.8	17.6	6	1
2322*	20 02.1	72 48	-0.108	1.70	72.7	20.8	17.6	6	1
2323*	20 05.5	79 47	-0.543	1.74	79.6	23.7	17.3	6	0
2324*	20 15.9	-20 47	0.582	1.87	350.7	-29.7	16.8	5	1
2325*	20 21.5	-25 24	0.598	1.93	346.1	-32.4	16.8	5	0
2326*	20 29.6	69 23	0.042	2.03	70.8	17.1	17.4	6	1
2327*	20 38.5	82 07	-0.727	2.13	82.5	23.7	16.8	5	1
2328*	20 40.0	-18 21	0.569	2.15	355.8	-34.1	16.4	4	2
2329*	20 47.9	-10 33	0.543	2.23	5.3	-32.7	17.5	6	1
2330	20 49.4	-22 36	0.580	2.25	351.8	-37.6	17.4	6	2
2331*	20 50.4	-08 19	0.536	2.26	8.0	-32.2	16.3	4	0
2332*	20 51.4	-17 30	0.564	2.27	358.0	-36.3	17.5	6	0
2333	20 52.6	-19 48	0.571	2.29	355.4	-37.4	16.8	5	1
2334	20 55.7	-25 50	0.590	2.32	348.4	-40.0	17.4	6	1
2335	20 57.7	-22 22	0.577	2.34	352.9	-39.4	17.4	6	2
2336	20 59.0	-21 45	0.575	2.35	353.7	-39.5	17.4	6	1
2337	21 09.1	-22 57	0.576	2.45	353.2	-42.1	17.4	6	1
2338	21 12.5	-26 44	0.587	2.49	348.5	-43.8	17.0	5	1
2339	21 12.9	-22 04	0.572	2.49	354.7	-42.6	17.0	5	1
2340	21 13.3	-13 24	0.547	2.50	5.4	-39.5	17.1	5	1
2341	21 13.3	-23 48	0.577	2.50	352.5	-43.2	17.0	5	2
2342	21 14.0	-13 17	0.547	2.50	5.7	-39.6	17.5	6	2
2343	21 14.8	-06 01	0.527	2.51	13.9	-36.4	17.1	5	1
2344	21 17.4	-21 25	0.569	2.53	356.0	-43.4	17.6	6	1
2345	21 19.2	-12 46	0.545	2.55	7.0	-40.6	16.9	5	2
2346*	21 20.0	-13 40	0.547	2.56	6.0	-41.1	16.5	5	0
2347	21 21.3	-22 51	0.572	2.57	354.5	-44.7	16.4	4	1
2348*	21 21.9	-11 41	0.541	2.58	8.6	-40.7	17.1	5	0
2349*	21 24.1	03 19	0.504	2.60	25.0	-33.2	17.1	5	1
2350*	21 24.4	-06 32	0.528	2.60	14.9	-38.7	17.1	5	0
2351	21 26.5	-14 03	0.547	2.62	6.5	-42.7	17.1	5	1
2352*	21 26.5	-16 29	0.553	2.62	3.4	-43.7	17.5	6	0
2353	21 26.9	-02 15	0.517	2.62	19.9	-37.0	16.8	5	1
2354	21 27.9	-15 34	0.550	2.63	4.7	-43.6	17.1	5	2
2355	21 28.0	00 45	0.510	2.63	23.2	-35.5	17.7	6	2
2356	21 28.3	-00 32	0.513	2.64	21.9	-36.3	17.1	5	2
2357	21 28.4	-23 54	0.573	2.64	353.7	-46.6	17.0	5	1
2358	21 29.1	-16 32	0.552	2.64	3.7	-44.3	17.5	6	1
2359*	21 29.2	13 48	0.479	2.64	35.3	-27.5	17.6	6	0
2360	21 29.2	-15 43	0.550	2.64	4.7	-44.0	17.7	6	1
2361	21 31.2	-14 59	0.548	2.66	5.9	-44.1	16.7	5	1
2362	21 32.8	-14 56	0.547	2.68	6.2	-44.5	16.9	5	1
2363	21 33.3	-08 59	0.533	2.68	13.6	-41.9	17.1	5	1
2364	21 33.9	-20 58	0.563	2.68	358.3	-46.9	17.4	6	1
2365	21 34.9	-19 21	0.558	2.69	.7	-46 6	17.0	5	2
2366*	21 35.2	-07 32	0.529	2.70	15.6	-41.6	15.9	4	0
2367	21 35.2	-08 45	0.532	2.70	14.2	-42.2	17.1	5	1
2368	21 36.0	-20 38	0.561	2.70	359.0	-47.3	17.5	6	1
2369	21 36.5	-19 00	0.557	2.71	1.3	-46.8	17.0	5	1
2370*	21 36.8	-20 08	0.560	2.71	359.8	-47.3	17.1	5	0
2371	21 36.9	-24 52	0.572	2.71	353.0	-48.7	17.1	5	1
2372*	21 37.2	-20 38	0.561	2.71	359.2	-47.5	16.5	5	0
2373	21 37.3	00 25	0.511	2.71	24.5	-37.6	17.5	6	1
2374	21 37.6	-08 06	0.531	2.72	15.3	-42.4	17.1	5	1
2375	21 37.9	-19 49	0.559	2.72	.4	-47 4	17.1	5	1
2376	21 38.1	-10 07	0.535	2.72	13.0	-43.5	17.1	5	1
2377	21 38.2	-10 43	0.537	2.72	12.3	-43.8	16.9	5	2
2378*	21 39.2	-20 40	0.560	2.73	359.3	-48.0	16.5	5	0
2379*	21 40.0	00 05	0.512	2.74	24.7	-38.3	17.1	5	0
2380	21 42.8	-05 24	0.524	2.76	19.3	-42.0	17.7	6	1
2381	21 43.6	01 37	0.508	2.77	27.0	-38.1	17.1	5	1
2382	21 44.1	-16 20	0.549	2.77	6.0	-47.5	16.0	4	1
2383	21 44.1	-21 53	0.562	2.77	358.1	-49.5	16.9	5	1
2384	21 44.2	-20 14	0.558	2.77	.5	-49 0	15.9	4	1
2385	21 44.9	-24 13	0.568	2.78	354.7	-50.3	17.1	5	1
2386*	21 45.2	24 28	0.456	2.78	46.6	-22.6	17.6	6	1
2387*	21 45.7	82 27	-0.417	2.78	84.3	22.2	17.0	5	2
2388*	21 46.4	07 34	0.496	2.79	33.2	-34.8	16.5	5	0
2389	21 46.5	-04 39	0.522	2.79	20.9	-42.4	17.4	6	2
2390*	21 46.7	17 00	0.475	2.79	41.2	-28.4	17.6	6	1
2391*	21 46.7	-15 56	0.547	2.79	6.9	-47.9	17.2	5	0
2392	21 46.9	-00 03	0.512	2.79	25.9	-39.8	17.7	6	1
2393	21 47.3	-04 02	0.521	2.80	21.7	-42.2	17.7	6	1
2394	21 47.6	-19 55	0.556	2.80	1.4	-49.6	17.1	5	1
2395*	21 48.1	08 05	0.495	2.80	34.0	-34.8	17.1	5	1
2396*	21 48.6	11 49	0.487	2.81	37.4	-32.4	17.5	6	1
2397	21 48.8	00 40	0.511	2.81	27.0	-39.7	17.9	6	3
2398*	21 48.9	05 51	0.500	2.81	32.1	-36.4	17.1	5	0
2399	21 49.9	-08 29	0.530	2.82	17.0	-45.2	15.6	3	1
2400	21 50.0	-12 04	0.537	2.82	12.5	-46.9	16.5	5	1

No.	R. A. (1855)	Decl.	Precession R. A. (1900)	Precession Decl.	l	b	Mag.	Dist.	Rich.
2401	21 50.8	-20 48	0.557	2.82	.5	-50 6	16.5	5	1
2402*	21 50.9	-10 28	0.534	2.82	14.7	-46.4	16.5	5	0
2403*	21 51.0	-18 54	0.553	2.83	3.3	-50.0	17.1	5	0
2404*	21 51.5	-15 07	0.544	2.83	8.7	-48.6	17.8	6	0
2405*	21 51.6	-18 32	0.552	2.83	3.9	-50.0	17.1	5	0
2406*	21 51.9	10 36	0.490	2.83	37.0	-33.8	17.7	6	1
2407	21 53.9	06 42	0.498	2.85	33.9	-36.8	17.1	5	1
2408*	21 54.0	05 29	0.501	2.85	32.8	-37.6	17.1	5	0
2409*	21 54.1	20 16	0.469	2.85	45.2	-27.2	16.8	5	2
2410	21 54.3	-10 36	0.534	2.85	15.2	-47.2	16.0	4	1
2411	21 54.9	-09 14	0.531	2.86	17.0	-46.6	17.5	6	1
2412*	21 56.1	-22 09	0.559	2.86	359.0	-52.2	15.9	4	0
2413*	21 57.0	10 37	0.491	2.87	38.1	-34.7	17.4	6	0
2414*	21 57.5	08 07	0.496	2.87	36.0	-36.5	17.1	5	0
2415*	21 57.8	-06 18	0.525	2.88	21.1	-45.6	15.9	4	0
2416	21 57.8	-25 55	0.567	2.88	353.2	-53.5	17.5	6	1
2417*	21 59.2	-25 08	0.565	2.89	354.6	-53.7	17.1	5	0
2418	22 00.8	-26 54	0.568	2.90	351.8	-54.4	17.5	6	1
2419*	22 02.4	17 06	0.478	2.91	44.5	-30.8	16.9	5	1
2420	22 02.6	-12 54	0.537	2.91	13.6	-50.1	16.8	5	2
2421*	22 02.9	-11 24	0.534	2.91	15.7	-49.4	16.8	5	0
2422	22 03.3	05 39	0.501	2.92	35.0	-39.2	17.7	6	1
2423	22 03.4	05 04	0.502	2.92	34.4	-39.7	17.7	6	1
2424*	22 05.8	12 21	0.489	2.93	41.4	-34.9	17.4	6	1
2425	22 06.3	05 14	0.502	2.94	35.2	-40.1	17.7	6	1
2426	22 06.7	-11 06	0.533	2.94	16.8	-50.1	16.8	5	2
2427*	22 07.4	-24 35	0.560	2.95	356.2	-55.3	17.7	6	0
2428	22 08.6	-10 05	0.531	2.95	18.5	-49.9	17.2	5	1
2429	22 09.9	08 21	0.497	2.96	38.9	-38.5	17.7	6	2
2430*	22 10.6	-10 01	0.530	2.97	19.0	-50.3	17.6	6	0
2431	22 10.8	08 13	0.497	2.97	39.0	-38.8	17.7	6	2
2432	22 10.8	06 44	0.500	2.97	37.7	-39.8	17.7	6	1
2433*	22 11.4	13 18	0.488	2.97	43.5	-35.1	17.1	5	0
2434	22 11.5	-14 57	0.539	2.97	12.3	-52.9	17.0	5	1
2435	22 11.8	08 24	0.497	2.98	39.4	-38.8	17.7	6	1
2436	22 13.0	-03 32	0.518	2.98	27.6	-47.1	16.9	5	1
2437*	22 13.7	12 22	0.490	2.99	43.2	-36.2	17.5	6	0
2438	22 14.1	-16 19	0.541	2.99	10.7	-54.1	17.2	5	1
2439	22 15.1	-00 10	0.512	3.00	31.8	-45.3	17.5	6	1
2440*	22 16.4	-02 20	0.516	3.01	29.8	-47.0	16.0	4	0
2441	22 18.2	-04 01	0.519	3.02	28.2	-48.4	17.2	5	1
2442	22 18.2	-07 19	0.524	3.02	24.2	-50.4	17.2	5	1
2443*	22 19.1	16 37	0.484	3.02	47.8	-33.8	16.5	5	2
2444	22 19.5	-24 35	0.555	3.03	357.4	-58.0	17.9	6	1
2445*	22 20.0	25 06	0.468	3.03	53.8	-27.1	17.8	6	1
2446	22 22.2	-05 57	0.522	3.04	26.9	-50.4	17.2	5	1
2447	22 23.2	03 20	0.507	3.05	37.4	-44.4	17.7	6	1
2448*	22 24.1	-09 12	0.527	3.05	23.1	-52.7	16.0	4	0
2449*	22 25.3	14 09	0.490	3.06	47.3	-36.6	17.1	5	0
2450	22 25.4	-09 48	0.527	3.06	22.5	-53.3	18.0	6	1
2451*	22 25.9	02 40	0.508	3.06	37.4	-45.4	17.7	6	0
2452	22 26.1	-09 33	0.527	3.06	23.0	-53.3	18.0	6	1
2453*	22 26.3	15 51	0.487	3.07	48.8	-35.4	17.1	5	0
2454	22 26.9	05 03	0.504	3.07	40.0	-43.8	17.1	5	2
2455	22 27.1	-14 27	0.535	3.07	16.0	-56.0	17.2	5	1
2456	22 27.3	-16 03	0.537	3.07	13.5	-56.8	17.2	5	1
2457	22 28.4	00 44	0.511	3.08	36.1	-47.2	16.0	4	1
2458*	22 28.6	17 47	0.484	3.08	50.8	-34.2	16.9	5	0
2459*	22 28.8	-16 25	0.537	3.08	13.2	-57.3	16.0	4	0
2460	22 30.6	17 11	0.486	3.09	50.8	-35.0	16.9	5	1
2461	22 30.9	-21 51	0.546	3.09	3.9	-59.8	17.1	5	1
2462*	22 31.3	-18 07	0.539	3.09	10.8	-58.6	16.2	4	0
2463*	22 31.4	02 58	0.508	3.09	39.1	-46.1	17.7	6	0
2464	22 31.7	-04 43	0.519	3.10	30.7	-51.4	17.8	6	2
2465	22 32.0	-06 30	0.521	3.10	28.6	-52.6	17.8	6	1
2466*	22 32.6	-21 40	0.545	3.10	4.5	-60.1	17.7	6	0
2467*	22 32.8	05 19	0.504	3.10	41.7	-44.6	17.1	5	0
2468	22 33.2	07 28	0.501	3.10	43.8	-43.0	17.7	6	1
2469	22 33.3	11 31	0.495	3.10	47.2	-39.9	17.1	5	1
2470	22 33.5	16 30	0.488	3.11	51.0	-35.9	17.1	5	1
2471	22 34.5	06 31	0.503	3.11	43.3	-44.0	17.7	6	2
2472	22 34.8	16 47	0.488	3.11	51.6	-35.9	17.9	6	1
2473	22 34.8	-14 18	0.533	3.11	17.9	-57.6	17.6	6	2
2474	22 35.2	-20 58	0.543	3.12	6.2	-60.5	17.3	6	2
2475	22 35.3	06 43	0.503	3.12	43.7	-43.9	17.9	6	1
2476	22 35.9	13 02	0.494	3.12	49.1	-39.1	17.5	6	2
2477*	22 36.2	-17 53	0.538	3.12	12.1	-59.5	16.9	5	0
2478	22 36.8	-18 28	0.538	3.12	11.2	-59.9	17.3	6	1
2479*	22 38.0	16 27	0.489	3.13	52.1	-36.6	16.5	5	0
2480	22 38.3	-18 27	0.538	3.13	11.5	-60.2	16.9	5	1

No.	R.A. (1855)	Decl.	Precession R.A. (1900)	Precession Decl.	l	b	Mag.	Dist.	Rich.
2481	22 38.9	-22 25	0.544	3.13	3.9	-61.7	17.5	6	1
2482	22 39.6	-03 47	0.517	3.14	34.0	-52.3	17.8	6	2
2483	22 40.0	04 14	0.506	3.14	42.7	-46.6	17.9	6	1
2484	22 40.8	00 39	0.511	3.14	39.3	-49.4	18.0	6	1
2485*	22 40.8	-16 53	0.535	3.14	14.8	-60.1	17.2	5	0
2486*	22 41.6	16 24	0.490	3.15	52.9	-37.1	17.1	5	0
2487*	22 41.6	-21 44	0.542	3.15	5.7	-62.1	17.5	6	0
2488	22 41.6	-24 20	0.546	3.15	.3	-62 8	17.5	6	2
2489	22 41.7	-06 12	0.520	3.15	31.5	-54.3	18.0	6	1
2490	22 41.8	-04 34	0.518	3.15	33.6	-53.2	17.2	5	1
2491*	22 42.4	18 07	0.488	3.15	54.3	-35.8	17.5	6	0
2492*	22 42.7	-20 02	0.539	3.15	9.3	-61.8	16.5	5	0
2493*	22 42.8	-26 49	0.549	3.15	355.0	-63.6	17.1	5	0
2494	22 43.1	15 45	0.491	3.15	52.9	-37.9	17.4	6	1
2495*	22 43.2	10 08	0.499	3.16	48.7	-42.5	16.5	5	0
2496	22 43.2	-17 11	0.535	3.16	14.8	-60.7	17.2	5	2
2497*	22 43.4	-20 42	0.540	3.16	8.1	-62.2	17.4	6	0
2498	22 44.8	13 34	0.495	3.16	51.8	-39.9	17.9	6	1
2499	22 45.2	-26 45	0.548	3.16	355.4	-64.1	17.1	5	1
2500	22 45.9	-26 15	0.547	3.17	356.6	-64.2	16.9	5	1
2501	22 46.8	14 42	0.494	3.17	53.1	-39.2	17.9	6	1
2502	22 47.3	-17 20	0.534	3.17	15.5	-61.7	16.6	5	1
2503*	22 47.9	28 42	0.474	3.18	61.9	-27.3	16.4	4	0
2504*	22 48.5	-15 42	0.531	3.18	18.7	-61.2	17.2	5	0
2505	22 49.0	-01 19	0.514	3.18	39.5	-52.2	17.6	6	1
2506	22 49.4	12 34	0.497	3.18	52.2	-41.4	17.1	5	1
2507	22 49.4	04 44	0.506	3.18	45.8	-47.7	17.6	6	2
2508	22 50.1	13 43	0.496	3.19	53.3	-40.5	17.5	6	1
2509	22 50.1	-22 31	0.540	3.19	5.4	-64.2	17.1	5	1
2510	22 50.8	-00 20	0.512	3.19	41.2	-51.8	17.8	6	1
2511*	22 51.4	-08 24	0.522	3.19	31.3	-57.6	16.0	4	0
2512	22 52.3	09 20	0.501	3.20	50.6	-44.4	17.1	5	1
2513*	22 52.4	25 29	0.481	3.20	61.2	-30.6	17.9	6	1
2514	22 52.5	-23 59	0.541	3.20	2.5	-65.2	17.6	6	1
2515*	22 52.8	30 17	0.475	3.20	63.8	-26.4	17.6	6	3
2516	22 52.8	17 45	0.492	3.20	56.7	-37.4	17.1	5	1
2517*	22 52.9	09 52	0.501	3.20	51.2	-44.1	17.5	6	0
2518	22 53.0	-24 57	0.542	3.20	.3	-65 5	17.2	5	1
2519*	22 53.3	-15 52	0.530	3.20	19.7	-62.2	17.2	5	0
2520	22 53.5	13 14	0.497	3.20	53.8	-41.3	17.7	6	1
2521	22 54.5	-22 46	0.538	3.21	5.6	-65.3	16.9	5	2
2522	22 54.7	13 17	0.497	3.21	54.2	-41.5	17.7	6	1
2523	22 55.9	-17 57	0.532	3.21	16.3	-63.8	17.0	5	1
2524	22 56.0	16 58	0.493	3.21	57.0	-38.5	16.5	5	1
2525*	22 56.0	-11 22	0.524	3.21	28.2	-60.3	16.0	4	0
2526	22 56.3	-24 49	0.540	3.21	1.0	-66.2	17.4	6	1
2527	22 57.4	-26 06	0.541	3.22	358.0	-66.7	17.7	6	1
2528*	22 57.9	-22 11	0.536	3.22	7.5	-65.9	16.8	5	0
2529	22 58.7	-14 02	0.527	3.22	24.5	-62.4	17.2	5	2
2530	22 58.9	18 50	0.492	3.22	59.0	-37.2	17.1	5	1
2531	22 59.2	-22 28	0.536	3.22	7.1	-66.2	17.1	5	1
2532*	22 59.6	27 44	0.482	3.23	64.0	-29.3	17.5	6	1
2533	22 59.6	-16 00	0.529	3.23	21.1	-63.6	17.2	5	1
2534	22 59.8	-23 27	0.537	3.23	4.8	-66.7	17.5	6	2
2535*	23 00.0	39 53	0.464	3.23	69.7	-18.3	16.9	5	1
2536	23 00.0	-23 13	0.537	3.23	5.4	-66.6	17.5	6	2
2537	23 00.8	-02 58	0.515	3.23	41.3	-55.4	18.0	6	1
2538	23 00.9	-20 40	0.533	3.23	11.6	-66.0	16.5	5	1
2539	23 01.0	-22 16	0.535	3.23	7.9	-66.6	16.9	5	1
2540	23 01.7	-22 57	0.536	3.23	6.4	-66.9	17.1	5	1
2541	23 02.3	-23 45	0.536	3.24	4.5	-67.3	17.1	5	2
2542	23 02.3	-25 13	0.538	3.24	.8	-67 6	17.1	5	1
2543	23 02.4	-15 42	0.528	3.24	22.5	-64.0	17.2	5	1
2544*	23 02.7	-11 36	0.523	3.24	29.9	-61.7	17.2	5	0
2545*	23 02.8	04 37	0.508	3.24	49.7	-49.8	17.6	6	0
2546	23 03.0	-23 27	0.536	3.24	5.3	-67.4	17.1	5	2
2547	23 03.1	-21 55	0.534	3.24	9.1	-66.9	16.9	5	2
2548	23 03.6	-21 13	0.533	3.24	10.9	-66.8	16.9	5	1
2549	23 03.7	-13 36	0.525	3.24	26.8	-63.1	17.0	5	1
2550	23 03.8	-22 32	0.535	3.24	7.8	-67.3	16.9	5	2
2551	23 04.0	07 06	0.505	3.24	52.2	-47.9	17.5	6	1
2552	23 04.1	02 49	0.509	3.24	48.5	-51.4	18.0	6	2
2553	23 04.6	-25 44	0.538	3.24	359.7	-68.2	17.3	6	1
2554	23 04.7	-22 16	0.534	3.24	8.6	-67.4	16.9	5	3
2555	23 05.0	-23 00	0.535	3.25	6.8	-67.7	16.9	5	1
2556	23 05.3	-22 25	0.534	3.25	8.3	-67.5	16.9	5	1
2557	23 05.4	-17 46	0.529	3.25	19.1	-65.7	17.2	5	1
2558*	23 05.5	09 32	0.503	3.25	54.6	-46.0	17.1	5	0
2559	23 05.5	-14 29	0.526	3.25	25.7	-64.0	17.0	5	1
2560	23 05.6	-16 46	0.528	3.25	21.3	-65.2	17.5	6	2

			Precession						
No.	R. A. (1855)	Decl.	R. A. (1900)	Decl.	l	b	Mag.	Dist.	Rich.
2561*	23 06.4	13 58	0.499	3.25	58.0	-42.3	17.5	6	0
2562*	23 06.6	31 39	0.480	3.25	67.4	-26.4	17.4	6	1
2563*	23 06.8	-15 04	0.526	3.25	25.0	-64.6	17.2	5	0
2564*	23 07.5	13 19	0.500	3.25	57.8	-43.0	17.1	5	0
2565*	23 08.2	-21 55	0.532	3.26	10.2	-68.0	16.9	5	0
2566	23 08.3	-21 11	0.531	3.26	12.0	-67.8	16.9	5	1
2567*	23 08.8	-06 57	0.518	3.26	39.0	-59.7	18.0	6	0
2568*	23 09.3	-23 00	0.533	3.26	7.6	-68.6	16.9	5	0
2569	23 10.3	-13 40	0.524	3.26	28.8	-64.5	16.6	5	1
2570	23 10.7	01 11	0.511	3.26	49.1	-53.7	17.5	6	1
2571	23 11.1	-03 04	0.515	3.27	44.8	-57.2	17.6	6	1
2572*	23 11.2	17 57	0.497	3.27	61.7	-39.3	15.3	3	0
2573	23 11.8	-03 15	0.515	3.27	44.8	-57.4	17.6	6	1
2574	23 11.9	01 47	0.511	3.27	50.1	-53.4	17.8	6	1
2575	23 12.2	-22 53	0.531	3.27	8.5	-69.2	17.9	6	2
2576	23 12.3	-23 19	0.532	3.27	7.4	-69.4	17.5	6	2
2577	23 13.1	-23 46	0.532	3.27	6.3	-69.7	17.5	6	1
2578	23 13.3	-05 20	0.516	3.27	42.8	-59.3	17.6	6	1
2579	23 13.5	-22 22	0.531	3.27	10.1	-69.3	17.1	5	1
2580	23 14.0	-24 02	0.532	3.27	5.7	-69.9	17.1	5	1
2581	23 14.2	-17 46	0.526	3.27	21.7	-67.5	17.6	6	1
2582	23 14.4	02 09	0.511	3.28	51.3	-53.5	17.6	6	1
2583	23 14.6	-21 14	0.529	3.28	13.4	-69.1	17.1	5	1
2584*	23 14.9	26 46	0.490	3.28	67.2	-31.6	17.1	5	0
2585	23 15.1	-27 03	0.534	3.28	357.0	-70.8	17.5	6	2
2586*	23 15.8	-21 14	0.529	3.28	13.7	-69.4	17.1	5	0
2587	23 15.9	-23 13	0.530	3.28	8.3	-70.1	17.2	5	2
2588	23 16.4	08 22	0.506	3.28	57.1	-48.4	17.8	6	1
2589*	23 16.7	16 02	0.500	3.28	62.2	-41.6	15.3	3	0
2590	23 16.9	01 18	0.511	3.28	51.4	-54.5	17.5	6	1
2591	23 16.9	-00 30	0.512	3.28	49.7	-56.0	17.6	6	1
2592*	23 17.1	17 21	0.499	3.28	63.1	-40.5	16.5	5	0
2593*	23 17.2	13 51	0.502	3.28	61.1	-43.6	15.1	3	0
2594	23 17.2	07 17	0.507	3.28	56.6	-49.4	17.8	6	1
2595*	23 17.3	-21 20	0.528	3.28	13.8	-69.8	17.2	5	0
2596*	23 17.4	-24 13	0.531	3.28	5.8	-70.7	17.1	5	0
2597*	23 17.8	-12 55	0.521	3.28	32.9	-65.4	16.6	5	0
2598*	23 18.5	27 02	0.492	3.29	68.1	-31.7	17.1	5	1
2599	23 19.0	-24 35	0.530	3.29	5.0	-71.2	17.1	5	1
2600	23 19.1	-23 13	0.529	3.29	9.0	-70.8	17.1	5	1
2601	23 19.1	-25 14	0.531	3.29	3.0	-71.3	17.7	6	1
2602	23 19.5	20 31	0.497	3.29	65.4	-37.8	17.7	6	1
2603*	23 20.3	-26 09	0.531	3.29	.3	-71 8	17.7	6	0
2604*	23 20.9	-23 20	0.528	3.29	9.1	-71.2	17.1	5	0
2605	23 21.4	-24 10	0.529	3.29	6.7	-71.6	17.1	5	1
2606	23 22.0	-22 01	0.527	3.30	13.2	-71.0	17.1	5	1
2607*	23 22.4	10 30	0.505	3.30	60.6	-47.2	17.6	6	0
2608	23 22.9	-22 28	0.527	3.30	12.1	-71.4	17.1	5	1
2609	23 22.9	-26 54	0.530	3.30	358.2	-72.5	17.4	6	1
2610	23 23.1	16 29	0.502	3.30	64.3	-41.8	17.6	6	3
2611	23 23.2	19 50	0.499	3.30	66.1	-38.8	17.2	5	1
2612	23 23.3	-19 27	0.525	3.30	20.6	-70.2	17.7	6	2
2613	23 23.7	-13 45	0.521	3.30	33.6	-67.1	17.2	5	2
2614	23 25.3	-22 23	0.526	3.30	13.0	-71.9	17.5	6	1
2615	23 25.4	-24 22	0.527	3.30	6.8	-72.5	17.7	6	2
2616	23 25.9	04 49	0.509	3.30	57.7	-52.6	17.2	5	2
2617	23 26.0	08 41	0.507	3.30	60.6	-49.2	17.0	5	2
2618*	23 26.6	22 13	0.499	3.31	68.1	-36.8	15.9	4	0
2619*	23 26.7	21 11	0.500	3.31	67.7	-37.8	16.5	5	0
2620	23 26.8	06 07	0.509	3.31	59.0	-51.6	17.8	6	2
2621	23 27.1	19 06	0.501	3.31	66.8	-39.8	17.9	6	1
2622*	23 27.7	26 38	0.496	3.31	70.3	-32.8	15.9	4	0
2623	23 27.7	04 49	0.509	3.31	58.4	-52.9	17.2	5	3
2624	23 28.3	04 49	0.509	3.31	58.6	-52.9	18.0	6	2
2625*	23 29.0	19 44	0.501	3.31	67.6	-39.4	15.6	3	0
2626*	23 29.2	20 22	0.501	3.31	68.0	-38.8	15.2	3	0
2627	23 29.4	23 07	0.499	3.31	69.3	-36.2	17.1	5	1
2628	23 29.4	-24 58	0.526	3.31	5.6	-73.6	17.7	6	2
2629	23 30.1	-23 44	0.525	3.31	9.9	-73.4	17.5	6	2
2630*	23 30.2	15 02	0.504	3.31	65.7	-43.8	15.2	3	0
2631	23 30.2	-00 30	0.512	3.31	54.8	-57.8	18.0	6	3
2632	23 30.3	-10 02	0.517	3.31	43.0	-65.6	17.8	6	3
2633	23 30.8	12 24	0.506	3.31	64.5	-46.3	17.6	6	2
2634*	23 31.1	26 14	0.498	3.31	71.0	-33.4	13.8	1	1
2635	23 31.1	-14 11	0.519	3.31	35.9	-68.7	17.3	6	2
2636	23 31.3	-10 22	0.517	3.31	43.0	-66.0	17.8	6	2
2637	23 31.8	20 40	0.502	3.32	68.9	-38.7	16.6	5	1
2638	23 33.0	-12 31	0.518	3.32	40.0	-67.9	17.2	5	2
2639	23 33.1	09 43	0.508	3.32	63.7	-49.0	17.7	6	2
2640	23 33.2	18 52	0.503	3.32	68.5	-40.5	16.7	5	1

No.	R. A. (1855)	Decl.	Precession R. A. (1900)	Precession Decl.	l	b	Mag.	Dist.	Rich.
2641	23 33.3	-25 39	0.525	3.32	3.9	-74.6	17.7	6	2
2642*	23 33.4	-11 35	0.517	3.32	41.9	-67.2	16.8	5	0
2643	23 33.7	19 39	0.503	3.32	69.0	-39.8	17.7	6	1
2644	23 33.7	-00 43	0.512	3.32	56.0	-58.4	16.6	5	1
2645	23 33.9	-09 51	0.517	3.32	45.0	-66.0	18.0	6	4
2646	23 33.9	-10 49	0.517	3.32	43.4	-66.7	17.6	6	3
2647*	23 34.0	25 00	0.500	3.32	71.2	-34.8	17.1	5	0
2648	23 34.1	-15 17	0.519	3.32	35.0	-70.0	17.6	6	1
2649	23 34.2	23 53	0.501	3.32	70.9	-35.9	16.9	5	1
2650*	23 34.3	25 16	0.500	3.32	71.4	-34.5	17.1	5	1
2651	23 34.6	20 16	0.503	3.32	69.5	-39.3	16.9	5	2
2652	23 35.8	-11 11	0.517	3.32	43.7	-67.3	17.7	6	3
2653	23 36.4	13 25	0.507	3.32	66.8	-45.9	17.7	6	1
2654	23 36.8	-08 12	0.515	3.32	48.8	-65.1	17.2	5	2
2655	23 36.9	-22 41	0.521	3.32	15.4	-74.5	17.1	5	2
2656*	23 37.4	-04 55	0.514	3.32	53.2	-62.5	16.2	4	0
2657	23 37.5	08 21	0.509	3.33	64.4	-50.7	14.9	3	1
2658	23 37.5	-13 07	0.517	3.33	41.1	-69.0	17.4	6	3
2659	23 37.6	-16 17	0.518	3.33	34.4	-71.3	17.0	5	1
2660*	23 37.7	-26 47	0.523	3.33	.2	-75 7	16.4	4	0
2661	23 39.2	-11 14	0.516	3.33	45.3	-67.9	17.8	6	3
2662	23 42.1	15 37	0.507	3.33	69.7	-44.3	17.5	6	1
2663	23 42.2	-25 32	0.520	3.33	6.0	-76.5	17.5	6	2
2664	23 42.7	-04 26	0.513	3.33	56.3	-62.8	17.7	6	2
2665*	23 43.3	05 19	0.511	3.33	64.7	-54.0	15.8	4	0
2666*	23 43.6	26 21	0.504	3.33	74.2	-34.1	13.8	1	0
2667	23 44.3	-26 49	0.520	3.33	.9	-77 2	17.9	6	3
2668	23 44.8	13 15	0.508	3.33	69.5	-46.7	17.1	5	2
2669	23 45.4	02 23	0.511	3.33	63.5	-57.0	17.8	6	1
2670	23 46.7	-11 13	0.515	3.34	49.3	-69.0	15.7	4	3
2671	23 47.6	04 37	0.511	3.34	65.9	-55.1	16.8	5	2
2672	23 47.8	25 39	0.506	3.34	75.1	-35.0	17.1	5	1
2673	23 47.8	01 08	0.512	3.34	63.6	-58.3	18.0	6	1
2674	23 48.1	00 57	0.512	3.34	63.6	-58.5	17.9	6	2
2675	23 48.2	10 38	0.510	3.34	69.5	-49.5	16.4	4	1
2676*	23 48.3	05 15	0.511	3.34	66.6	-54.6	16.8	5	0
2677*	23 48.5	33 34	0.505	3.34	77.5	-27.4	17.5	6	1
2678*	23 48.5	10 52	0.510	3.34	69.7	-49.3	16.9	5	0
2679	23 49.0	-21 11	0.516	3.34	25.8	-76.3	17.7	6	2
2680	23 49.0	-21 51	0.516	3.34	23.3	-76.7	17.7	6	2
2681	23 49.9	-25 09	0.517	3.34	9.7	-78.1	17.9	6	1
2682	23 50.0	-21 22	0.516	3.34	25.6	-76.6	17.5	6	1
2683*	23 50.1	-26 22	0.517	3.34	3.9	-78.4	16.9	5	0
2684	23 50.7	-11 20	0.514	3.34	51.4	-69.7	17.6	6	2
2685	23 51.0	-25 13	0.516	3.34	9.7	-78.4	17.9	6	1
2686	23 51.9	-21 37	0.515	3.34	25.7	-77.1	16.9	5	1
2687*	23 52.7	31 22	0.508	3.34	77.9	-29.7	16.7	5	1
2688	23 52.7	15 02	0.510	3.34	72.9	-45.6	17.5	6	3
2689	23 52.7	-16 33	0.514	3.34	42.1	-74.1	18.0	6	2
2690*	23 52.9	-25 57	0.515	3.34	6.6	-79.0	17.2	5	0
2691*	23 53.9	-03 54	0.513	3.34	62.3	-63.6	16.6	5	0
2692	23 54.6	11 15	0.511	3.34	72.1	-49.4	17.8	6	1
2693	23 54.7	-20 22	0.514	3.34	32.0	-77.0	17.5	6	1
2694	23 55.1	07 38	0.511	3.34	70.6	-52.9	17.0	5	3
2695	23 55.3	17 57	0.511	3.34	74.8	-42.9	17.7	6	2
2696*	23 55.9	00 06	0.512	3.34	66.5	-60.1	16.9	5	0
2697	23 55.9	-06 55	0.513	3.34	60.3	-66.5	17.2	5	2
2698	23 56.0	03 50	0.512	3.34	68.9	-56.5	17.0	5	2
2699	23 56.3	-16 05	0.513	3.34	45.6	-74.3	17.6	6	1
2700	23 56.4	01 16	0.512	3.34	67.5	-59.0	16.0	4	1
2701	23 56.8	-10 24	0.513	3.34	56.5	-69.7	17.8	6	1
2702*	23 57.4	30 36	0.511	3.34	78.9	-30.7	17.1	5	0
2703*	23 57.9	15 18	0.511	3.34	74.8	-45.7	17.1	5	0
2704	23 58.1	-12 41	0.513	3.34	53.7	-71.8	17.7	6	2
2705	23 58.5	15 00	0.512	3.34	74.9	-46.0	17.1	5	1
2706	23 58.6	10 20	0.512	3.34	73.2	-50.5	17.2	5	1
2707	23 58.9	-11 13	0.512	3.34	56.6	-70.7	17.6	6	1
2708	23 59.1	-17 44	0.512	3.34	43.3	-76.0	17.4	6	2
2709	23 59.2	-10 47	0.512	3.34	57.4	-70.3	17.2	5	1
2710	23 59.2	-16 11	0.512	3.34	47.4	-74.8	17.2	5	1
2711	23 59.5	24 18	0.512	3.34	77.9	-37.0	17.5	6	1
2712	23 59.5	-18 53	0.512	3.34	40.2	-76.9	17.5	6	1

The second and third columns give the right ascension and declination. The equatorial co-ordinates are given for the equinox of 1855, the epoch of the *Bonner Durchmusterung*. It was decided to list 1855 positions because, then, clusters can be immediately located on the *BD* charts, from which, in turn, they can be identified easily on the National Geographic Society–Palomar Observatory *Sky Atlas* prints, or on other photographic sky atlases. It should be noted, however, that clusters south of $\delta = -23^{\circ}$ must be located on the *Cordoba Durchmusterung* charts, which are for the equinox of 1875. It was not feasible to tabulate positions for two equinoxes; therefore, before the southern clusters can be located on the *CD* charts, their positions must be precessed from 1855 to 1875.

Columns four and five contain ten-year precession rates computed for the equinox 1900. The precessions in right ascension and declination are, respectively, given in minutes of time and minutes of arc, and to sufficient accuracy that one-hundred-year precessions can be rounded off accurately to $\frac{1}{10}$ minute of time and 1 minute of arc.

Columns six and seven give the galactic co-ordinates computed for the galactic pole (1900) $\alpha = 12^{\mathrm{h}}44^{\mathrm{m}}.0$, and $\delta = +27^{\circ}30'$.

The eighth column gives the magnitude of the tenth brightest cluster member, estimated by the step-scale technique and corrected for the effects of atmospheric extinction and general galactic obscuration. Some numbers in the last place occur more frequently than others, owing to step-scale "rounding-off" errors.

The last two columns list, respectively for each cluster, the distance and richness classifications, which are defined in Section II*h*.

III. THE DISTRIBUTION OF THE CLUSTERS

a) Selection of Statistical Sample

From the catalogue of rich clusters (Table 6) those clusters were selected that meet the criteria for inclusion in a statistical sample as outlined in detail in Section II*b*. To summarize, these criteria are as follows:

1. The cluster must contain at least fifty members, not more than 2 mag. fainter than the third brightest member.
2. These fifty members must be included within a radius on the plate of $4.6 \times 10^{5}/cd\lambda/\lambda$ mm from the center of the cluster (c in km/sec).
3. The cluster must have a red shift (as estimated from the magnitude of its tenth brightest member) in the range from 6000 to 60000 km/sec.
4. The cluster must not be near the galactic equator; specifically, its galactic latitude must be in the range indicated in Table 1.

A total of 1682 clusters was found in Table 6 which meet the foregoing criteria, and these clusters were used in the statistical analysis described below.

b) Distribution of Clusters According to Richness

The distribution of the 1682 clusters according to their richness classifications is tabulated in Table 7. The data indicate that the number, $N(n)$, of clusters of n members each (not more than 2 mag. fainter than the third brightest member) increases rapidly as n decreases, log $N(n)$ being approximately inversely proportional to n. Furthermore, during the course of the plate inspections, many thousands of clusters and groups of galaxies were recognized which were not catalogued because they obviously were not sufficiently rich to insure their essentially complete identification. Thus neither the statistical sample of clusters nor a subjective impression indicates a maximum in the $N(n)$ versus n relation.

c) Distribution of Clusters According to Distance

The distribution of clusters in depth can be assumed here to be equivalent to the distribution of clusters according to the magnitudes of their tenth brightest members,

$n(m)$. Since, because of step-scale errors, magnitude estimates are not significant to a tenth, the magnitudes are classified for the purpose of this investigation. Thus $n(m)$ is meant to indicate the number of clusters whose tenth brightest members lie in a magnitude class m. In Table 8 the distribution of clusters with magnitude class is given, if the magnitude classes are taken as the distance groups defined in Table 5. Also given in Table 8 is the computed mean magnitude of the clusters within each distance group and the value of $z = d\lambda/\lambda$ corresponding to each mean magnitude, as determined from the curve in Figure 4.

The logarithm of the integrated distribution function $N(m)$ versus m is illustrated in the histogram in Figure 5. The dashed line has the slope 0.6, which would be the slope of $\log N(m)$ versus m if the cluster distribution were uniform in depth, if the tenth brightest members of all clusters were of the same absolute magnitude, and if there were no red shift (Hubble 1937). The crosses superimposed on the histogram in Figure 5 indicate the computed mean magnitudes for the clusters within each distance group.

TABLE 7

DISTRIBUTION ACCORDING TO RICHNESS CLASSIFICATION

Richness-Group No.	No. of Clusters $N(n)$	Logarithm of Number $\log N(n)$
1	1224	3.088
2	383	2.583
3	68	1.832
4	6	0.778
5	1	0.000
Total	1682	3.226

TABLE 8

DISTRIBUTION OF CLUSTERS WITH DISTANCE GROUP

Distance Group	No. of Clusters $n(m)$	Integrated Distribution Function $N(m)$	$\log N(m)$	Computed Mean Magnitude	$z=d\lambda/\lambda$
1	9	9	0.954	13.76	0.027
2	2	11	1.0414	14.40	.038
3	33	44	1.6435	15.36	.067
4	60	104	2.0170	15.96	.090
5	657	761	2.8814	17.02	.140
6	921	1682	3.2258	17.64	.180
1–4	104	....	2.0170	15.54	0.072

Because of red-shift and recession effects, a departure of the observed distribution from the $\log N(m) = 0.6m$ relation is to be expected, even if there were no systematic errors in counts or magnitudes. The exact interpretation of the departure depends upon the particular cosmological model assumed (Bondi 1952; Robertson 1955). Thus the cosmological significance of the $\log N(m)$ versus m relation justifies its detailed investigation.

Unfortunately, there is a possibility of a systematic magnitude scale error that would bias the $N(m)$ versus m relation. It should be noted, however, that there is a one-to-one

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correlation between estimated magnitude and red shift, given by Figure 4 (and Table 8), from which red shifts can be interpolated from estimated magnitudes. Therefore, the scale of magnitudes used here serves only as a step scale between clusters of known and unknown red shift, and the red-shift estimates obtained for the catalogue clusters are free from systematic errors, although, of course, statistical scatter will be present. The $N(m)$ versus m relation is thus converted (with Table 8) to a relation between $N(z)$ and z. Log $N(z)$ versus z is plotted in Figure 6.

It is of interest to investigate the $N(z)$ versus z relation predicted by various cosmological models. At an instant of "cosmic time," t, the "cosmic distance," $r(t)$, between two points in space (say, a distant cluster and the observer) is given by

$$r(t) = R(t)\, u\ , \tag{9}$$

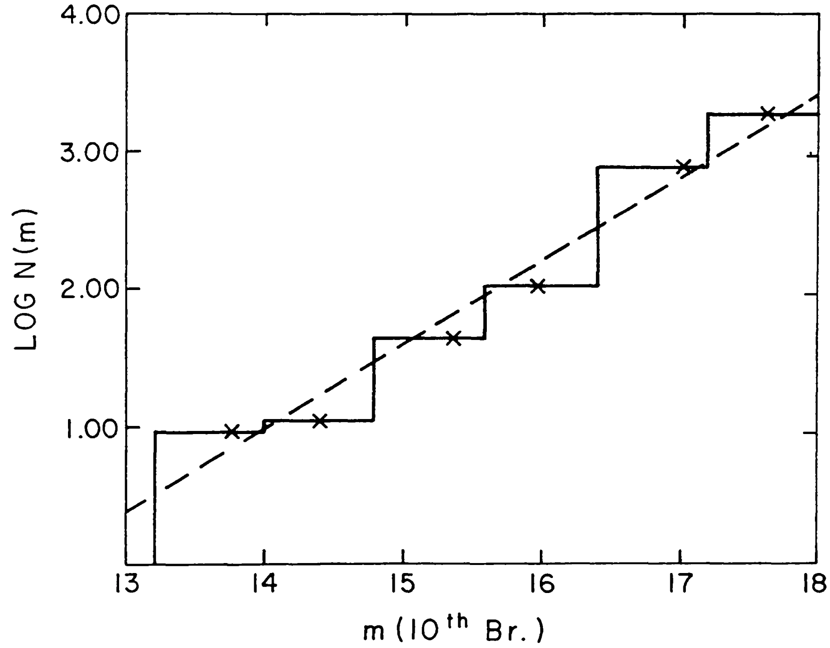

FIG. 5.—The number of clusters, $N(m)$, brighter than magnitude m. The magnitudes are classified according to Table 5. The cross on each step of the histogram indicates the mean magnitude of the clusters within the corresponding class.

where u is a dimensionless parameter distance between two points in space which is constant for all values of t (for example, u expands with the co-moving space co-ordinates of an expanding universe) and $R(t)$ is a factor which gives the "scale" of the universe at time t. Owing to the finite velocity of light, $r(t)$ is not observable, for a galaxy observed at the present time, t_0, is seen by light which left it at a former time, t. If the co-ordinates of the galaxy in u-space are constant, the relation between the observed and emitted wave lengths of light is given by (Robertson 1955)

$$1 + z = \frac{R(t_0)}{R(t)}\ . \tag{10}$$

Let $\Delta = t_0 - t$. Upon expanding $R(t)$ in a Taylor series, one obtains

$$R(t) = R_0\left(1 - \Delta\frac{\dot{R}_0}{R_0} + \tfrac{1}{2}\Delta^2\frac{\ddot{R}_0}{R_0} + \dots\right), \tag{11}$$

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from which the following familiar expression is obtained:

$$z = \Delta H_0 + (\Delta H_0)^2 (1 + \tfrac{1}{2} q_0) + O(\Delta^3) , \tag{12}$$

where $H_0 \equiv \dot{R}_0/R_0$ is Hubble's constant, and $q \equiv -R_0\ddot{R}_0/\dot{R}_0^2$, and the subcript denotes the time t_0.

The parameter distance to the galaxy is given by

$$u = c \int_0^{\Delta} \frac{dx}{R(t_0 - x)} . \tag{13}$$

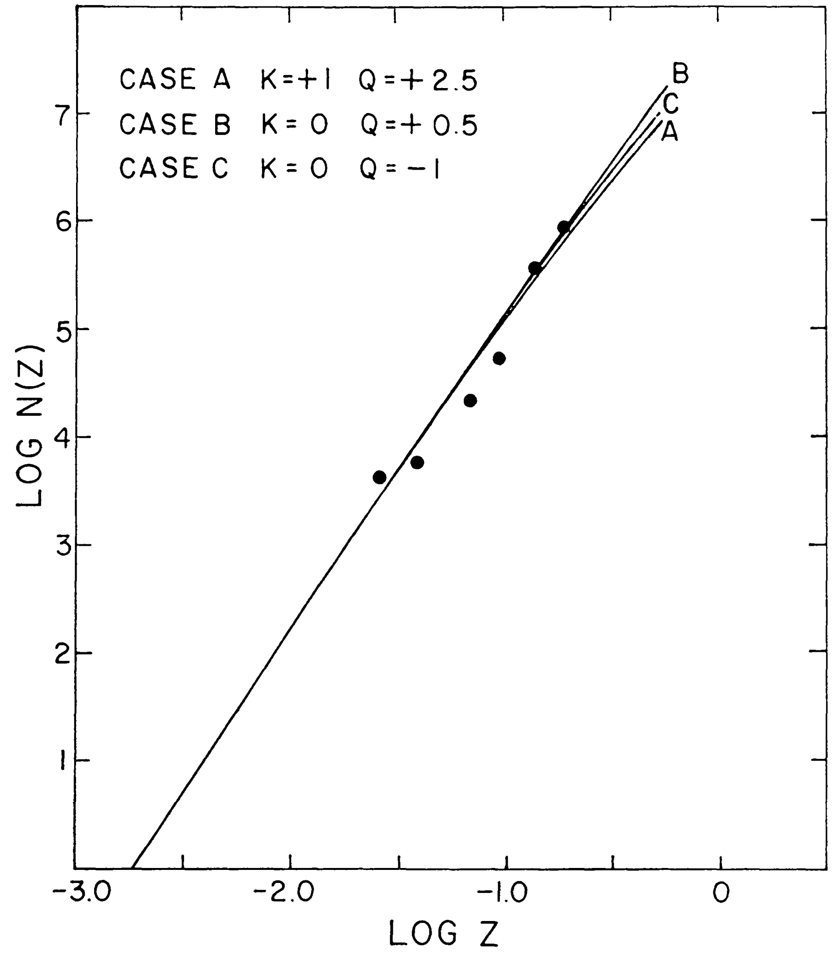

FIG. 6.—The number of clusters, $N(z)$, with red shift less than z. The curves A, B, and C are the theoretical relations predicted by three different cosmological models. The points are the observations of the cluster investigation.

Upon expanding and integrating, equation (13) becomes

$$u = cR_0^{-1} [\Delta + \tfrac{1}{2} H_0 \Delta^2 + \tfrac{1}{3} (1 + \tfrac{1}{2} q_0) (H_0^2 \Delta^3) + O(\Delta^4)] . \tag{14}$$

The volume of space to a distance u is

$$V = 4\pi \int_0^u \sigma^2 (u) \, du , \tag{15}$$

where $\sigma(u) = \sin u$, u, or $\sinh u$, depending upon whether the Riemannian curvature of space, k, is 1, 0, or -1. The number of clusters, $N(u)$, included in this volume is evidently

$$N(u) = 4\pi \int_0^u n(t)\, \sigma^2(u)\, du\,, \tag{16}$$

where $n(t)$ is the numerical density of clusters in u-space. The cosmological principle, implicitly assumed in the models considered here, requires that $n(t)$ be independent of u.

In the evolving or "exploding" cosmologies for the cosmological constant $\Lambda = 0$, the field equations of general relativity demand a relation between H_0, q_0, and R_0, viz. (Hoyle and Sandage 1956),

$$H_0^2(2q_0 - 1) = \frac{k c^2}{R_0^2}\,. \tag{17}$$

If the clusters are permanent objects, $dn(t) = 0$, and, from equations (14), (16), and (17), we obtain

$$N(\Delta) = \frac{4\pi n c^3}{3R_0^3} \Delta^3 \left[1 + \tfrac{3}{2}(H_0\Delta) + (H_0\Delta)^2 \left(\tfrac{39}{20} + \tfrac{1}{10} q_0\right)\right]. \tag{18}$$

On the other hand, in the steady-state cosmology, $k = 0$ and $q_0 = -1$ (Hoyle and Sandage 1956); then

$$N(\Delta) = 4\pi \int_0^{\Delta} n(t_0 - x)\, u^2(t_0 - x)\, du(t_0 - x)\,. \tag{19}$$

The steady state requires that $R(t)$ be of the form

$$R(t) = \text{Constant} \times e^{Ht} \tag{20}$$

and that the numerical space density of matter be constant. Thus

$$\frac{n(t_0 - x)}{n(t_0)} = \frac{R^3(t_0 - x)}{R^3(t_0)} = e^{-3H_0 x} = 1 - 3H_0 x + \tfrac{9}{2}(H_0 x)^2 - \ldots\,. \tag{21}$$

Substituting equations (14) and (21) in equation (19) and integrating yields

$$N(\Delta) = \frac{4\pi}{3} \frac{c^3}{R_0^3} n(t_0) \Delta^3 \left[1 - \tfrac{3}{4} H_0\Delta + \tfrac{7}{20}(H_0\Delta)^2\right]. \tag{22}$$

With equations (12), (18), and (22), we now consider three cases:

Case A.—Exploding model, $k = +1$, $q = 2.5$, value adopted by Sandage (Humason *et al.* 1956):

$$\begin{aligned} N(\Delta) &= \text{Constant}\ \Delta^3 \left[1 + \tfrac{3}{2}(\Delta H_0) + \tfrac{11}{5}(\Delta H_0)^2\right], \\ z(\Delta) &= \Delta H_0 + 2.25(\Delta H_0)^2\,. \end{aligned} \tag{23A}$$

Case B.—Einstein–de Sitter model, $k = 0$, $q = \tfrac{1}{2}$:

$$\begin{aligned} N(\Delta) &= \text{Constant}\ \Delta^3 \left[1 + \tfrac{3}{2}(\Delta H_0) + 2(\Delta H_0)^2\right], \\ z(\Delta) &= \Delta H_0 + \tfrac{5}{4}(\Delta H_0)^2\,. \end{aligned} \tag{23B}$$

Case C.—Steady-state model, $k = 0, q = -1$:

$$N(\Delta) = \text{Constant } \Delta^3 \left[1 - \tfrac{3}{4}(\Delta H_0) + \tfrac{7}{20}(\Delta H_0)^2\right], \qquad z(\Delta) = \Delta H_0 + \tfrac{1}{2}(\Delta H_0)^2 . \tag{23C}$$

Log $N(z)$ versus z for each of the three cases A, B, and C has been computed from the three sets of parametric equations (23), and the three derived relations are shown in Figure 6.

The use of the $N(z)$ versus z relation as a test for cosmological models has the advantage over various other theoretical relations (e.g., $N[m]$ versus m, and z versus m) that both N and z can be determined in a manner free from the systematic errors that plague determinations of magnitudes. It is unfortunate, however, that highly sensitive observations are required to distinguish between the various models.

It is seen that the present observations are not sufficiently sensitive to distinguish between the three cases. The effects of galactic obscuration and possible second-order clustering (see Secs. III*d* and *e*) would further reduce one's confidence in the significance of the results, even if a particular model were indicated.

What can be concluded from the analysis is that, to the precision of the present data, no significant departure from a uniform cluster distribution in depth is indicated by the counts of clusters of various red shifts.

d) Effect of Galactic Obscuration

The surface distribution of all clusters in the catalogue (Table 6) that belong in distance groups 1–6 inclusive and richness groups 1–5 inclusive is displayed in Figure 7. A dotted line irregularly outlining the Milky Way indicates the region of the sky in which clusters are not included in the statistical sample. The solid line indicates the circle of declination $\delta = -27°$, below which the Palomar sky survey does not reach.

The effects of galactic obscuration are apparent in Figure 7. The gradual thinning of clusters as lower galactic latitudes are approached is the expected result of general galactic obscuration. In addition, the significant shortage of clusters in the north galactic hemisphere around galactic longitude 300° may indicate the presence of considerable galactic obscuration up to latitude 60°. In the same region Shane and Wirtanen (1954) have obtained low galaxy counts, and various radio surveys (Pawsey and Bracewell 1955) have revealed relatively high background radio brightness. Both observations suggest the presence of interstellar material. An investigation by Poveda (1956) of the correlation between the distributions of stars and galaxies on the Lick plates suggests that any such obscuration is probably relatively uniform.

The variation of the areal density of cluster centers with galactic latitude is displayed in Table 9. The logarithms of the numbers of cluster centers per square degree are entered in the table. The effect of galactic obscuration is to hide distant clusters to an increasing degree as the line of sight approaches the galactic equator. In no field north of $b = +40°$ or south of $b = -40°$ was the obscuration apparent from the appearance of the survey plate.

If appropriate magnitude corrections have been made for the effect of galactic obscuration, only the clusters belonging to distance group 6 will show thinning out at lower latitudes, because the corrections applied (to clusters in the statistical sample) were never greater than 0.7 mag. and hence only group 6 would be dimmed beyond the limiting magnitude of the sample. If the numbers of clusters per square degree in other distance groups should exhibit a latitude effect, the indication would be that the magnitude corrections (based on Hubble's galaxy counts) were not satisfactory. In Table 10 is shown the variation of the number of clusters per square degree belonging to distance groups 1–5 with galactic latitude, both galactic hemispheres being combined. No sig-

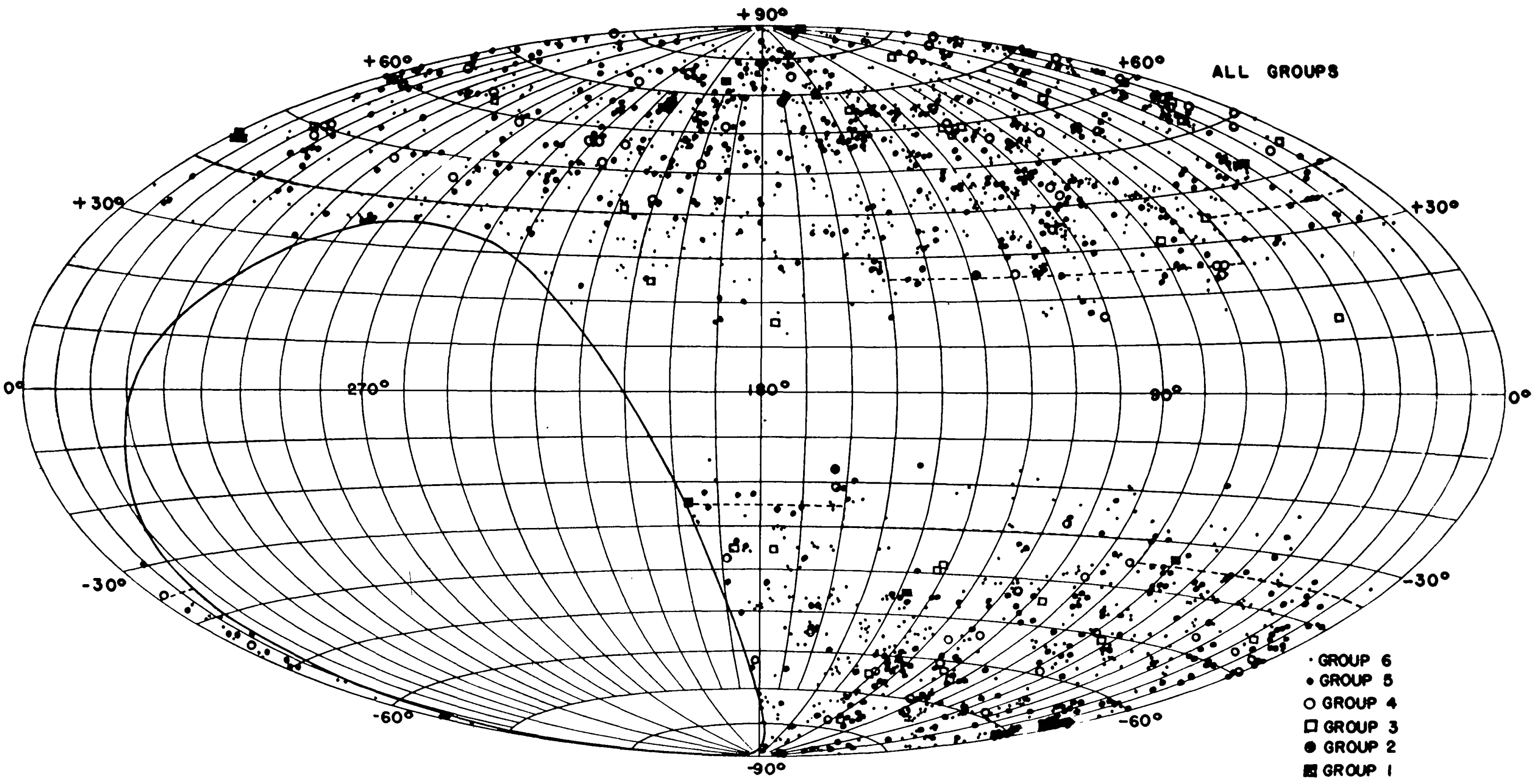

FIG. 7.—The distribution in galactic co-ordinates of the catalogued clusters in richness groups 1–5 and distance groups 1–6, inclusive. The plot is on an Aitoff equal-area projection.

nificant systematic latitude effect is evident; hence it is concluded that, within the accuracy of the present data, the correction for obscuration (eq. [8]) was satisfactory in the mean for the whole sky.

To investigate quantitatively the variation of the surface density of cluster centers of different groups with galactic longitude, counts were made of the numbers of cluster centers of distance groups 5 and 6 north of $b = +40°$ and south of $b = -40°$ and in strips of galactic longitude 20° wide. The results are illustrated in Figure 8. The effect of obscuration on faint clusters in the region around longitude 300° is very apparent.

TABLE 9

DENSITY OF CLUSTER CENTERS VERSUS GALACTIC LATITUDE AND DISTANCE GROUP

(Logarithm of Number per Square Degree)

b	DISTANCE GROUP				
	1 and 2	3	4	5	6
+80° to +90°	−2.50	−∞	−∞	−1.38	−0.87
+70 +80	−2.67	−2.67	−2.13	−1.21	−1.15
+60 +70	−2.88	−2.48	−2.34	−1.15	−1.13
+50 +60	−∞	−2.36	−2.08	−1.27	−1.26
+40 +50	−2.71	−2.93	−2.50	−1.46	−1.28
−40° to −50°	−3.11	−2.80	−2.33	−1.42	−1.20
−50 −60	−∞	−3.01	−2.41	−1.50	−1.15
−60 −70	−∞	−2.40	−2.28	−1.09	−1.17
−70 −80	−∞	−2.67	−2.37	−1.22	−0.90
−80 −90	−∞	−2.20	−∞	−1.24	−1.12

TABLE 10

NUMBERS OF CLUSTERS PER SQUARE DEGREE BELONGING TO DISTANCE GROUPS 1–5

b	No. per Squaie Degree	log No. per Square Degree	b	No. per Square Degree	log No. per Square Degree
±80°–±90°	0.1087	−0.964	±50°–±60°	0.1029	−0.988
±70 –±80	.1399	− .854	±40 –±50	0.081	−1.0065
±60 –±70	0.1704	−0.768			

To obtain an estimate of the amount of apparent obscuration in the longitude zone around 300° as compared with the less obscured areas of the sky, the distribution function $n(m)$ was determined separately for clusters in the longitude ranges 100°–180° and 260°–340° and, in both cases, north of $b = +40°$. Log $n(m)$ versus m (m being the mean magnitude of a distance group, given in Table 8) is plotted for both longitude zones in Figure 9. The solid and dotted lines are the least-squares fits of the lines $\log n(m) = \text{Constant} + 0.6m$ to the sets of plotted points corresponding to longitude 100°–180° and to longitudes 260°–340°, respectively. The two lines are displaced with respect to each other by about 0.6 mag. Although the numbers involved are too small to place much statistical significance in this value, the data do suggest galactic obscuration around longitude 300° and extending well north of latitude +40° of the order of a few tenths of a magnitude (in the photored) more than in comparable latitudes in the opposite hemisphere.

e) Surface Distribution of Clusters

Figure 7 shows the surface distribution of cluster centers of all groups used in the statistical sample. The plot is in galactic co-ordinates on an Aitoff equal-area projection of the sphere. It is noted that there are certain areas of the sky comparatively sparse in clusters, an effect that may, in general, be attributed to galactic obscuration. In addi-

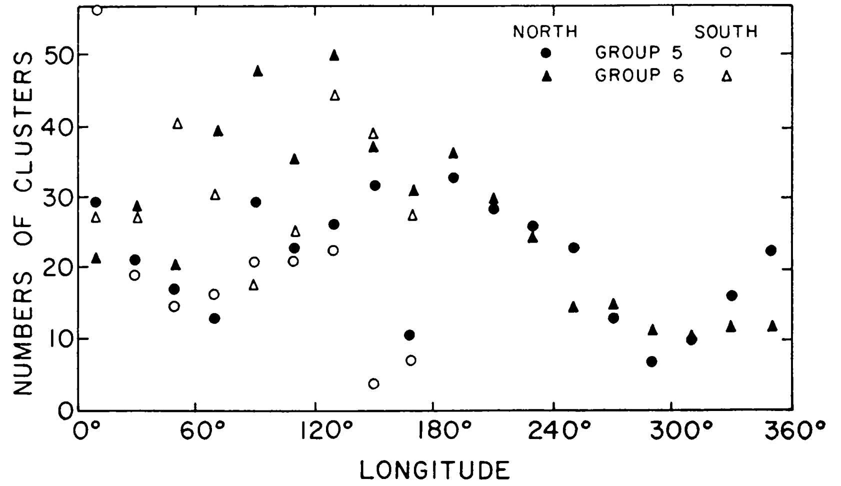

FIG. 8.—Counts of clusters in 20° strips of galactic longitude with $|b| \geq 40°$

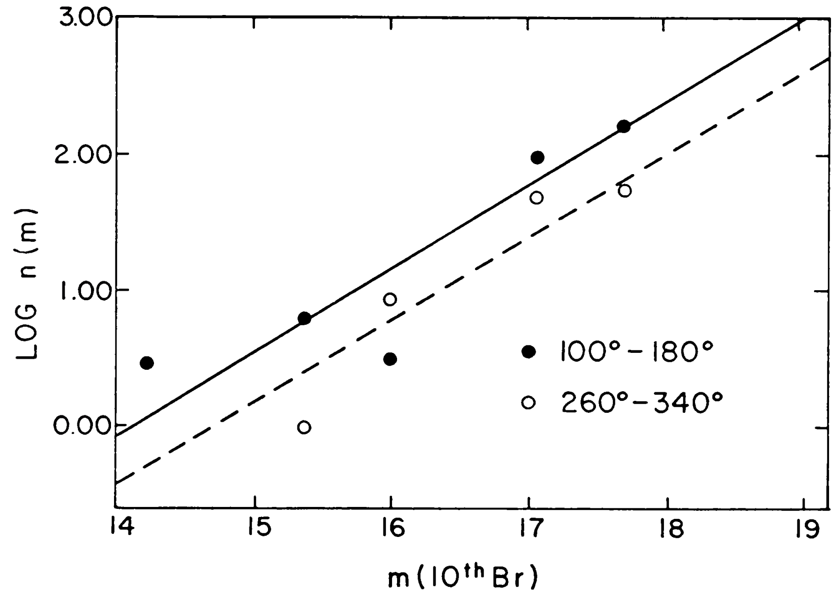

FIG. 9.—The effect of galactic obscuration around longitude 300° north of latitude 40°. Plotted are the logarithms of counts of clusters in each distance class for two regions of galactic longitude. Also shown is the least-squares fit of the line of slope 0.6 to each set of plotted points.

tion, however, there appears to be a relatively small-scale clumpiness in the distribution of clusters, which suggests that the clusters themselves may be clustered.

Shane and Wirtanen (1954) have indicated several clouds of clusters of galaxies that appear to be second-order clusters on the Lick plates. On the other hand, Zwicky, who has investigated the distribution of clusters in certain areas in the sky, has also discussed the possibility of second-order clustering of galaxies. His conclusions have been stated (1957):

> Restricting our analysis to those fields which do not contain any large nearby clusters of galaxies, we find that the centers of the distant clusters are distributed *entirely at random*. There is therefore *no evidence whatsoever for any systematic clustering of clusters*. . . . There exist of course accumulations of clusters of galaxies such as that in Pisces-Perseus or the grouping of half a dozen clusters near the cluster in Corona Borealis and its close companion. The frequency of such condensations is, however, of the order of magnitude to be expected for accidental condensations in a random field of non-interacting objects.

It is appropriate, therefore, to investigate the actual distribution of clusters in the present sample. The procedure adopted was to superpose a rectangular grid over the Aitoff plot (Fig. 7) and to count the number of cluster centers in square grid cells in order to determine the frequency distribution $N(t)$ of cells containing t clusters each.

A possible source of error in the technique warrants discussion. Owing to the nature of the Aitoff projection, the area of the sky included in each grid cell is the same. However, although areas are preserved in the projection, linear dimensions are not. A cell near the center of the chart will cover a more or less square area in the sky, but near the edge of the chart a square cell covers an elongated area of the sky. In the extreme cases, the elongation is a factor of approximately 2. If the distribution of cluster centers were strictly random, the shape of the cells would make no difference in the counted frequency distribution. On the other hand, Neyman, Scott, and Shane (1954) have investigated the matter with galaxy counts on the 20-inch astrographic plates made at the Lick Observatory and have found that the details of a non-random distribution do depend upon the shape of the cells.

In the present investigation, however, the shape of the cells will not affect the results in a substantial way. The elongation of the cells is appreciable only in a relatively small fraction of the sky, and in the worst cases it reaches a factor of only 2. Neyman, Scott, and Shane find that the frequency distribution of galaxies on the Lick plates is not seriously affected by this moderate amount of cell elongation and that, furthermore, the frequency distribution is changed in the sense of appearing *more random* with elongated cells. One can understand the result for the case where the "clumps" of galaxies appear to have circular symmetry on the plates. Then elongated cells would tend to include galaxies from a larger number of such clumps, and the non-uniformities in the distribution would be slightly smoothed out. In the case under consideration, of clusters of galaxies, if the distribution is completely random, the cell shapes do not matter; if the distribution is non-random, the non-randomness will be underestimated by the inclusion of some elongated cells. Thus any estimate of the degree of non-randomness will be a conservative one.

The Aitoff charts used were projected from a sphere 10 cm in radius. The cell size used for the counts on Figure 7 was $\frac{1}{4}$-inch squared, which corresponds to 13.2 square degrees in the sky. The counted frequency distribution is given in Table 11. Also given is the Poisson distribution,

$$P(t) = \frac{e^{-m} m^{t}}{t!}, \tag{24}$$

which would be expected for a random distribution of non-interacting objects. Here the mean number, m, of clusters per cell was computed from the sample. The middle entries in Table 11 give the frequency distribution of clusters over the entire part of the sky covered by the statistical sample, that is, where the cluster identification was considered complete. However, owing to the obvious presence of obscuration up to at least $b = +60°$, the cluster distribution was also determined for the part of the sky north of latitude $+60°$ and south of $-60°$. The corresponding observed and Poisson frequency distributions are also given in Table 11.

It is now necessary to compute the probability that cluster centers are really randomly distributed, that is, the probability that the observed frequencies would be obtained in a random sampling from a population with the specified theoretical frequencies of a Poisson distribution.

The statistic χ^2 (chi-squared), defined by

$$\chi^2 = \sum_{i=1}^{k} \frac{(o_i - e_i)^2}{e_i}, \tag{25}$$

TABLE 11

Observed and Poisson Frequency Distributions

t	n (t)			
	Entire Sample Area		$\|b\| \geq 60°$	
	Observed	Poisson	Observed	Poisson
0	415	273	90	53
1	301	395	97	101
2	209	286	65	96
3	111	138	41	61
4	65	50	30	29
5	27	14	14	11
6	17	3	6	3
7	11	1	6	0
>7	5	1	5	0
No. cells (n)	1161	....	354	....
No. clusters (N)	1680	....	672	....
Mean No. clusters per cell (m)	1.446	....	1.898	....

is widely used for testing the compatibility of k pairs of observed and theoretical frequencies, where o_i and e_i are the observed and theoretical frequencies, and

$$\sum_i o_i = \sum_i e_i = n ,$$

the total population. If the o_i are always obtained from a random sampling from a population with specified theoretical frequencies, e_i, it can be shown (e.g., Hoel 1947) that, for large samples, a close approximation to the distribution function χ^2 is given by

$$f(\chi^2) = \frac{1}{2^{\nu/2}\Gamma(\nu/2)} (\chi^2)^{(\nu-2)/2} e^{-\chi^2/2}, \tag{26}$$

where ν is the number of degrees of freedom; ν is equal to the number of pairs, k, of frequencies to be compared, diminished by the number of independent linear restrictions placed upon the observed frequencies o_i. In the present problem there are $k-2$ degrees of freedom.[2] Theoretical investigations (Gumbel 1943) indicate that equation (26) is a satisfactory approximation to the distribution function of χ^2 when k and all of the e_i are equal to or greater than 5. If k is less than 5, e_i should be somewhat larger.

The probability that the observed distribution of clusters is random is approximately the probability that a value of χ^2 equal to, or larger than, the value computed from equation (25) will be obtained from a random sampling from a population with a Poisson distribution, that is,

$$P(\chi^2) = \int_{\chi^2}^{\infty} f(x)\, dx . \tag{27}$$

The results of the test for randomness are summarized in Table 12. They indicate that, whether one considers the entire area of the sample or just the galactic polar caps, the observed distribution of cluster centers is highly significantly non-random.

From the definition of χ^2 (eq. [25]) it is seen that, for a particular frequency distribution, χ^2 is approximately proportional to the number of cells counted. Thus the value of $P(\chi^2)$ obtained for the entire sample area (10^{-61}) is more significant than that obtained for the galactic polar caps (10^{-12}) only because of the larger sample size and not necessarily because of any difference between the natures of the distributions in the two sample areas.

TABLE 12

PROBABILITY THAT OBSERVED CLUSTER DISTRIBUTION IS RANDOM

Area of Sky	χ^2	Degrees of Freedom	$P(\chi^2)$
Entire area.............	295.7	5	10^{-61}
$\lvert b\rvert \geq 60°$..............	63.2	4	10^{-12}

The nature of the frequency distribution of cluster centers may depend strongly upon the size of the cells in which clusters are counted. For example, if the cells are made sufficiently small (and therefore numerous), the observed distribution can always be made to approach a random one. In the limiting case, there would be just 1682 cells containing one cluster center each, and an infinite number of cells containing no clusters. This would be exactly the Poisson frequency distribution for the case $n = 1682$, with m approaching zero. On the other hand, as the size of the cells is increased until they are large compared with the scale of the "clumpiness" of the distribution, the irregularities tend to become smoothed out, and again the frequency distribution begins to appear random. If there exists a preferred size of the "clumps" of clusters, one would expect a maximum departure from randomness to occur for a cell size in some way related to the mean size of the clumps.

To determine whether such a mean size for the clumps exists, it was desirable to repeat the counts, using various cell sizes. However, in the event that the clumpiness in the observed distribution of clusters is a consequence of a physical parameter in the distribution, such a parameter might be expected to impose a preferred linear dimension on the cluster clumps. In particular, such a linear dimension might be related to the mean diameter of second-order clusters of galaxies, if they exist. Therefore, in subsequent investigations of the cluster distribution, the clusters were sorted into distance groups, and each distance group was studied separately. Figures 10, 11, and 12 exhibit, respectively, the distributions of clusters in groups 1–4, 5, and 6. The original plots are on Aitoff

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[2] The first restriction is that only $k - 1$ of the pairs of frequencies are independent. The second is that the mean of the Poisson distribution is estimated from the sample.

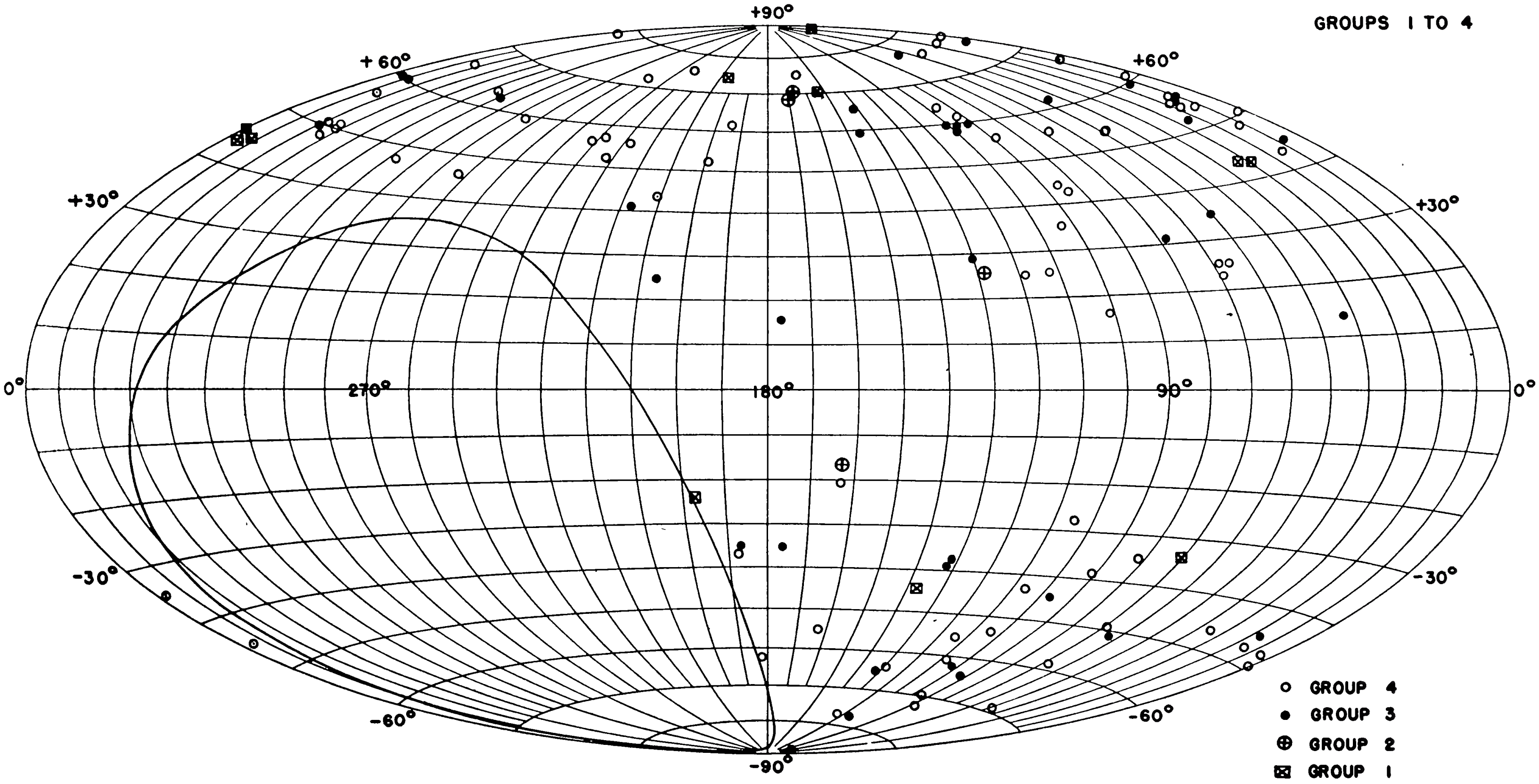

FIG. 10.—The distribution in galactic co-ordinates of clusters of distance groups 1–4 and richness groups 1–5, inclusive

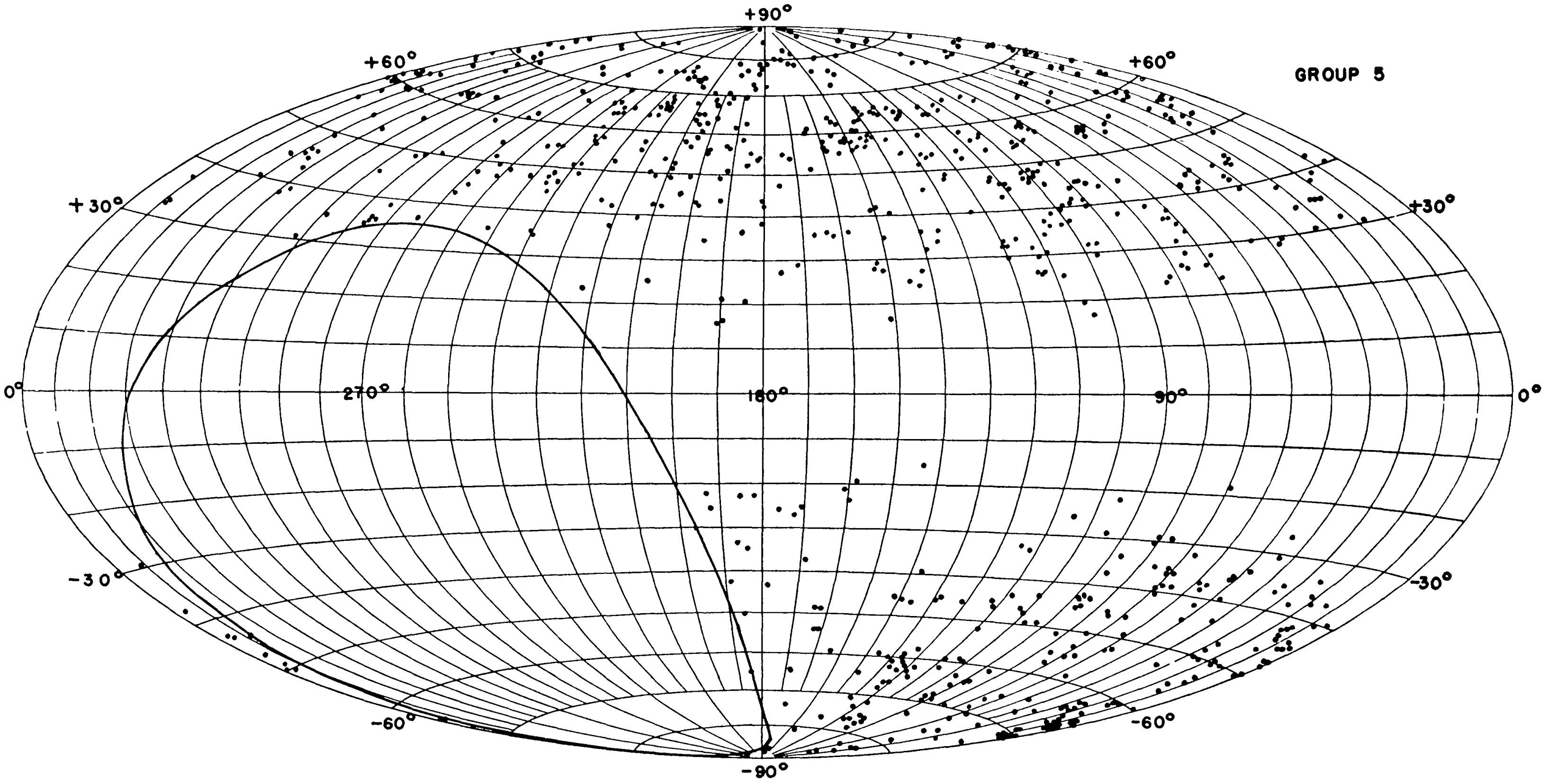

FIG. 11.—The distribution in galactic co-ordinates of clusters of distance group 5 and richness groups 1–5, inclusive

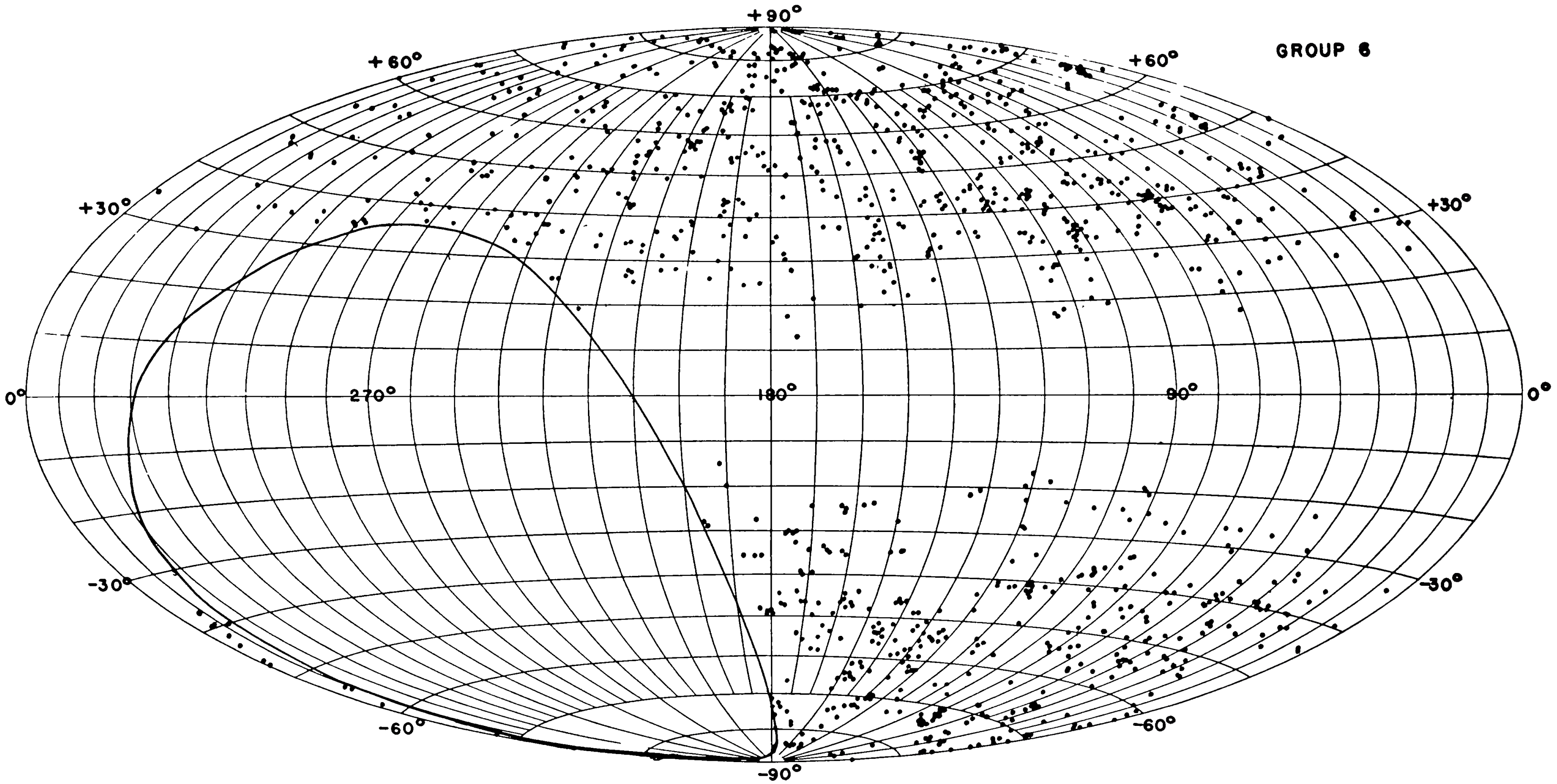

FIG. 12.—The distribution in galactic co-ordinates of clusters of distance group 6 and richness groups 1–5, inclusive

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charts similar to Figure 7, and counts were made in square grid cells of various sizes superimposed on the charts, as in the previous case.

As before, the probability was computed that each observed distribution could be a random sampling from a population distributed with a Poisson law with the integrated χ^2 distribution function (eq. [27]). For distance groups 5 and 6 the distribution was investigated over the whole area of the sample and also over the regions $|b| \geq 60°$. The group 1–4 combination, however, contained too small a sample to obtain a meaningful distribution function in the galactic polar caps alone. The results are summarized in Tables 13 and 14, and frequency distributions for representative cell sizes are exhibited in the histograms in Figures 13–17.

The validity of equation (26) for values of χ^2 that imply probabilities as small as those in Table 13 may be questioned. Nevertheless, these values of χ^2 are unquestionably significant, and, for a given number of degrees of freedom, the larger values of χ^2 certainly indicate a poorer fit to a Poisson distribution, that is, a larger deviation from randomness. Thus the $P(\chi^2)$'s computed from equation (27) are measures of the differences between the observed distributions and random ones, whether or not values of $P(\chi^2)$ of 10^{-30}–10^{-40} are accurate probabilities.

TABLE 13

LOG P (χ^2) FOR THE ENTIRE AREA OF THE SAMPLE

Group	Cell Size							
	0.500 Cm	0.635 Cm	1.000 Cm	1.270 Cm	1.500 Cm	1.905 Cm	2.000 Cm	2.500 Cm
	8.2 Sq. Deg.	13.2 Sq. Deg.	32.8 Sq. Deg.	52.8 Sq. Deg.	73.8 Sq. Deg.	119 Sq. Deg.	131 Sq. Deg.	205 Sq. Deg.
6	−32.0	−37.1	−38.7	−34.2	−27.8	−13.6	−10.1	....
5	−17.8	−28.3	−20.5	−23.6	−27.4	−11.7	−10.4	....
1–4	....	....	− 1.15	....	− 1.30	....	− 0.672	− 0.347

TABLE 14

LOG P (χ^2) FOR THE AREAS $|b| \geq 60°$

Group	Cell Size						
	0.500 Cm	0.635 Cm	1.000 Cm	1.270 Cm	1.500 Cm	1.905 Cm	2.000 Cm
	8.2 Sq. Deg.	13.2 Sq. Deg.	32.8 Sq. Deg.	52.8 Sq. Deg.	73.8 Sq. Deg.	119 Sq. Deg.	131 Sq. Deg.
6	−8.2	−15.0	−8.7	−2.4	−2.4	−2.2	−2.1
5	−4.7	− 6.8	−6.3	−8.4	−4.1	−0.4	−2.1

The data in Tables 13 and 14 are plotted in Figures 18 and 19. It is seen that there is a minimum probability of randomness for a certain cell size for each distance group. The minimum is especially well defined for group 6 and also for the combined groups 1–4, although, because of the small sample size, the non-randomness in the distribution of the nearer groups is only slightly significant (about at the 5 per cent level). If the minima are interpreted as corresponding to values of a parameter that describes the angular scale of the clumpiness, the scale of the clumpiness is seen to vary with distance group.

In Table 15 are listed the cell sizes corresponding to the minima indicated in Figures 18 and 19 and also the red shift corresponding to each distance group (from Table 8).

The reciprocals of the cell sizes corresponding to maximum non-randomness for each group can be compared to the red shift for that group. Except for the point corresponding to groups 1–4, which is the least reliable because of the smaller sample size, it is apparent that the cell sizes for maximum non-randomness are approximately inversely proportional to the distances of the groups. The result is the expected one if it is assumed that the clumps of clusters tend to have more or less the same size everywhere in space. In other words, the linear diameter of the cells for maximum non-randomness at the mean distance of clusters of group 5 is the same as the corresponding diameter for group 6 and (for $H = 180$ km/sec × 10^6 pc) is about 24×10^6 pc. The result suggests the possibility of second-order clustering, that is, clusters of clusters of galaxies. A visual inspection of Figures 7, 10, 11, and 12 leads, less objectively, to the same conclusion.

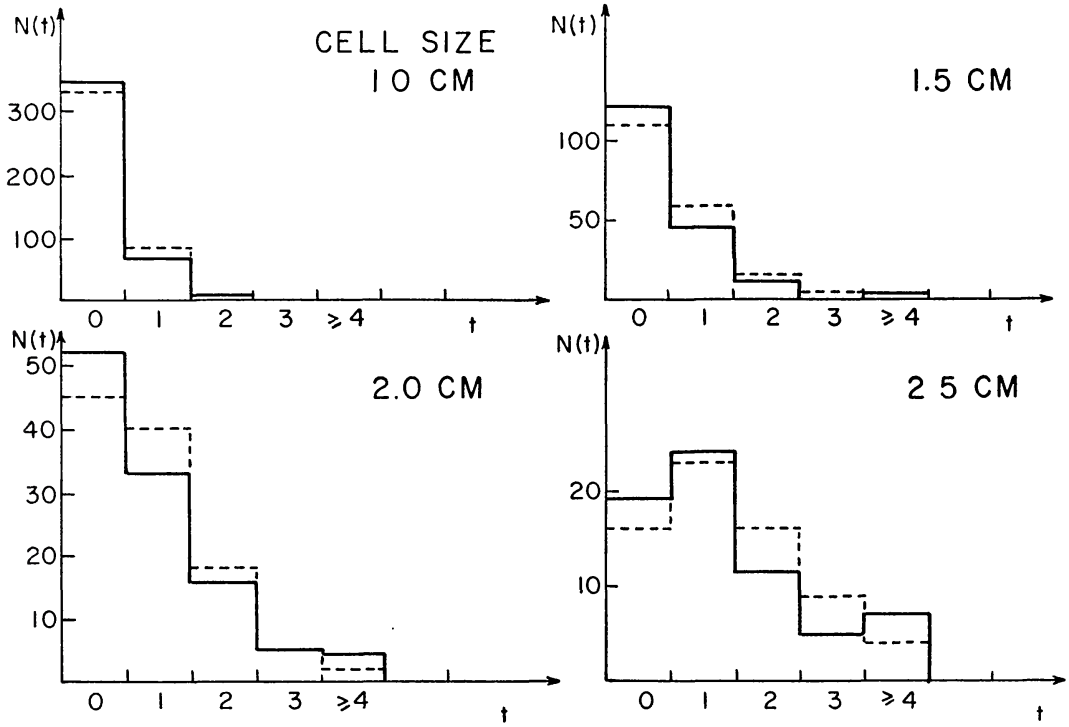

FIG. 13.—Observed (*solid lines*) and Poisson (*dotted lines*) frequency distributions for various cell sizes of clusters in distance groups 1–4 over entire sample area.

The observed non-random distribution of clusters cannot be accounted for by the assumption of either galactic or intergalactic obscuration. Of course, galactic obscuration contributes to the lack of randomness in the apparent cluster distribution. In the galactic polar caps ($|b| \geq 60°$) the effect of such obscuration would be expected to be small. However, even in the region outside the polar caps, the deviation from randomness in the distribution is not of the nature to be expected from the effects of obscuration. If, for example, the apparent clumps of clusters of group 5 were really portions of a random distribution of clusters seen through holes in either galactic or intergalactic absorbing material, one would also expect to find clusters of group 6 appearing through those same holes, but certainly not between them. However, inspection of Figure 7 shows many apparent groupings of clusters in group 6 in regions comparatively sparse in group 5 clusters, and conversely. If transparent regions in an absorbing medium permitted the

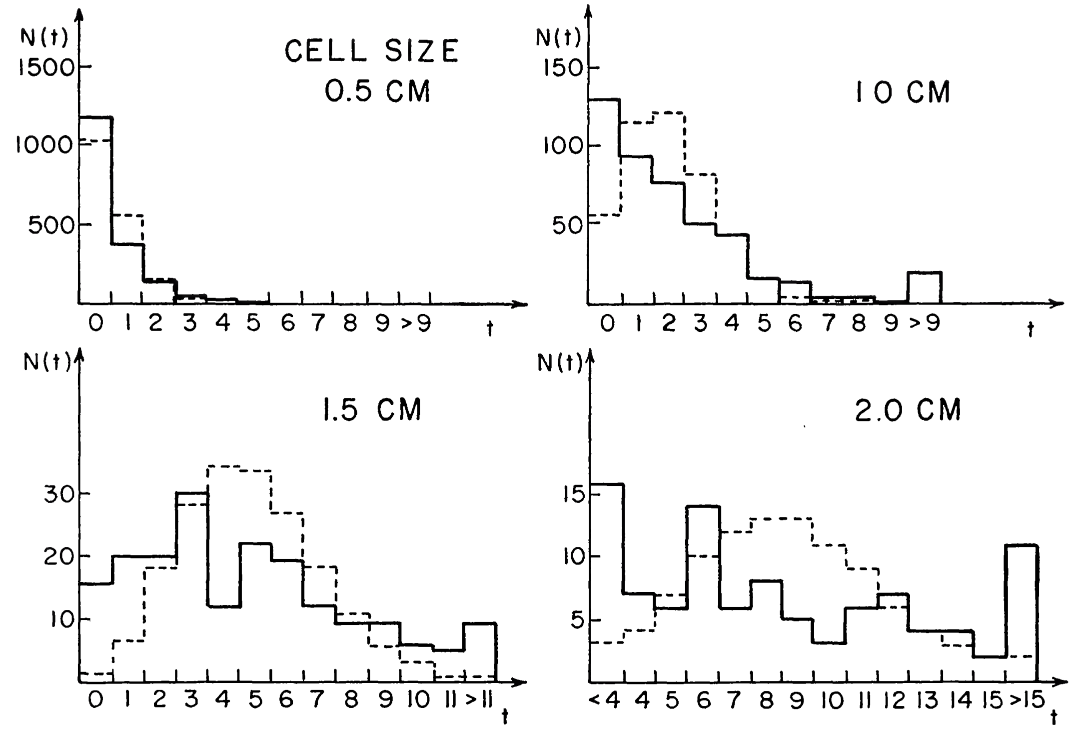

FIG. 14.—Observed (*solid lines*) and Poisson (*dotted lines*) frequency distributions for various cell sizes of clusters in distance group 5 over entire sample area.

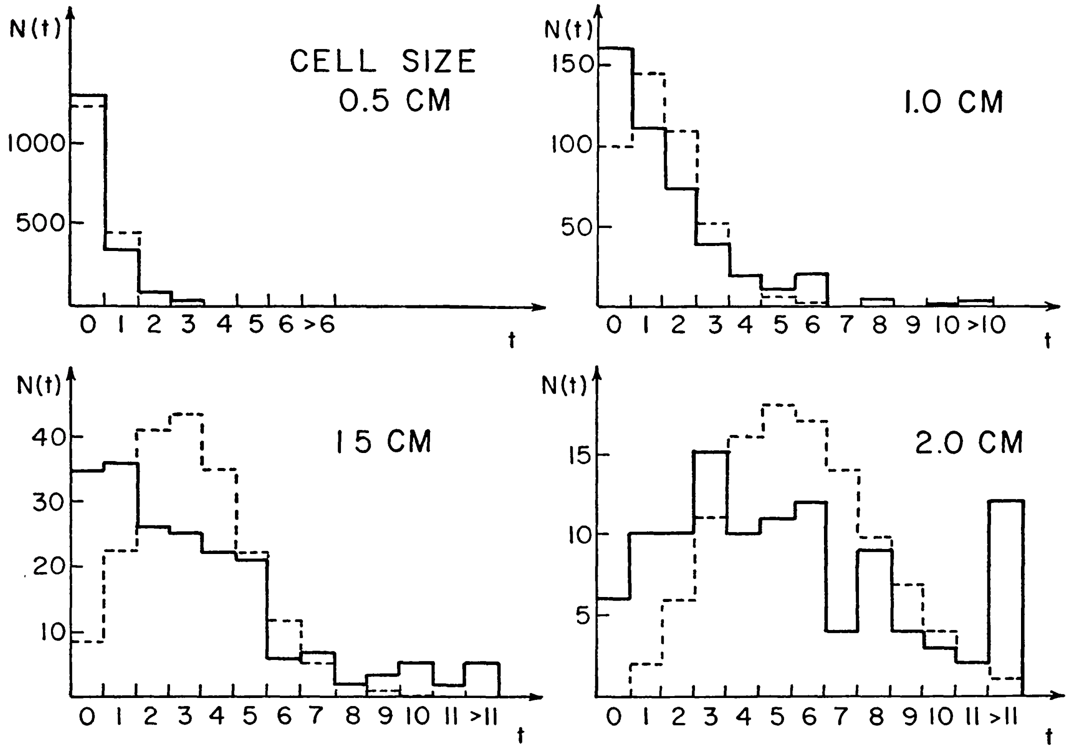

FIG. 15.—Observed (*solid lines*) and Poisson (*dotted lines*) frequency distributions for various cell sizes of clusters in distance group 6 over entire sample area.

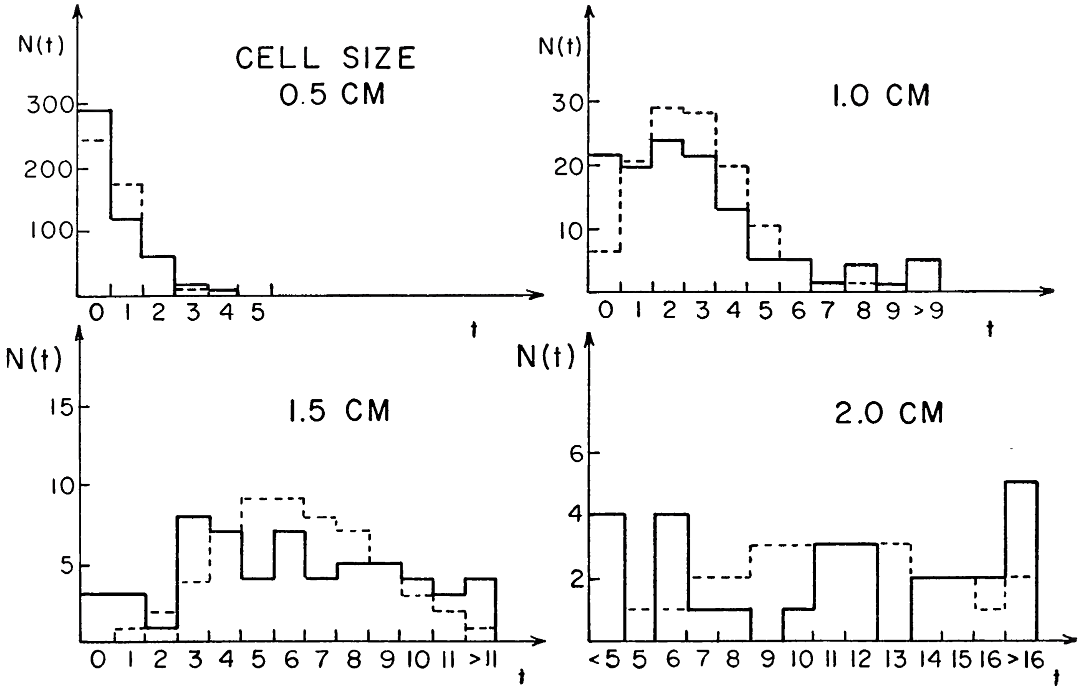

FIG. 16.—Observed (*solid lines*) and Poisson (*dotted lines*) frequency distributions for various cell sizes of clusters in distance group 5 in galactic polar caps.

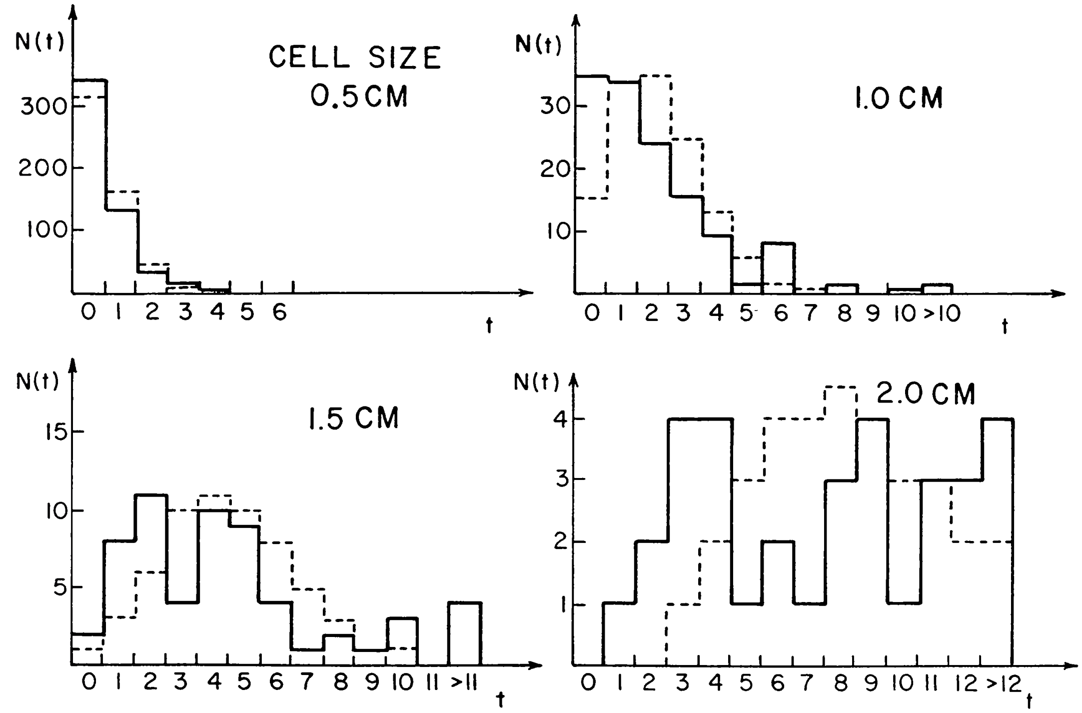

FIG. 17.—Observed (*solid lines*) and Poisson (*dotted lines*) frequency distributions for various cell sizes of clusters in distance group 6 in galactic polar caps.

observation of distant clusters but nearer clusters were absent, again a clumpy distribution of nearer clusters would be implied. Furthermore, the nearly linear dependence of the cell sizes giving the most non-random frequency distribution upon the distance of clusters may probably be considered significant evidence for a physical clumpiness in the cluster distribution.

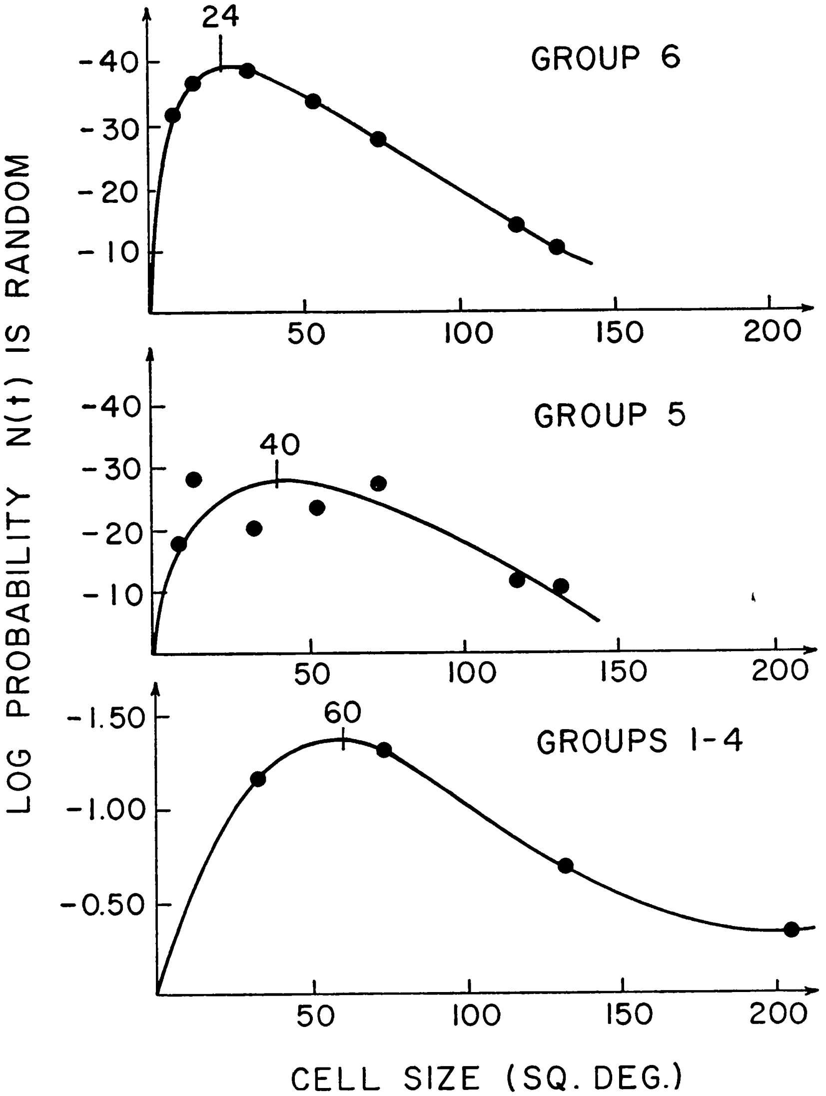

FIG. 18.—Probabilities that the observed frequency distributions of clusters among cells of various sizes would be obtained in random samplings from populations distributed with a Poisson law (entire sample area).

The foregoing argument is not intended as disproof of the existence of intergalactic obscuration. Such obscuration may well be present, particularly, as Zwicky suggests (1953), within certain rich clusters. The conclusion here is simply that the assumption of dark material in intergalactic space is not sufficient to account for the observed non-random distribution of cluster centers and, therefore, that the observed clumpiness may indicate a real tendency toward second-order clustering of galaxies.

It is of interest to compare either Figure 7 or Figure 10 with Figures 12–16 in Shane and Wirtanen's paper (1954), in which they identify six clouds of galaxies that they suspect to be second-order clusters. In three of the cases the Shane-Wirtanen clouds (Nos. 4, 5, and 6) correspond to apparent groupings of two or more clusters in the present catalogue. Two of their other examples (Nos. 2 and 3) correspond to a single cluster in this catalogue. The other Shane-Wirtanen clusters in the six clouds apparently are not rich enough for inclusion in the statistical sample of this paper.

It is of further interest to note that, according to Mills and Slee (1957), the "Sydney Preliminary Survey of 3.5 Meter Cosmic Radio Sources" indicates a clustering tendency of radio sources. Although not definitely established, the authors consider it probable that

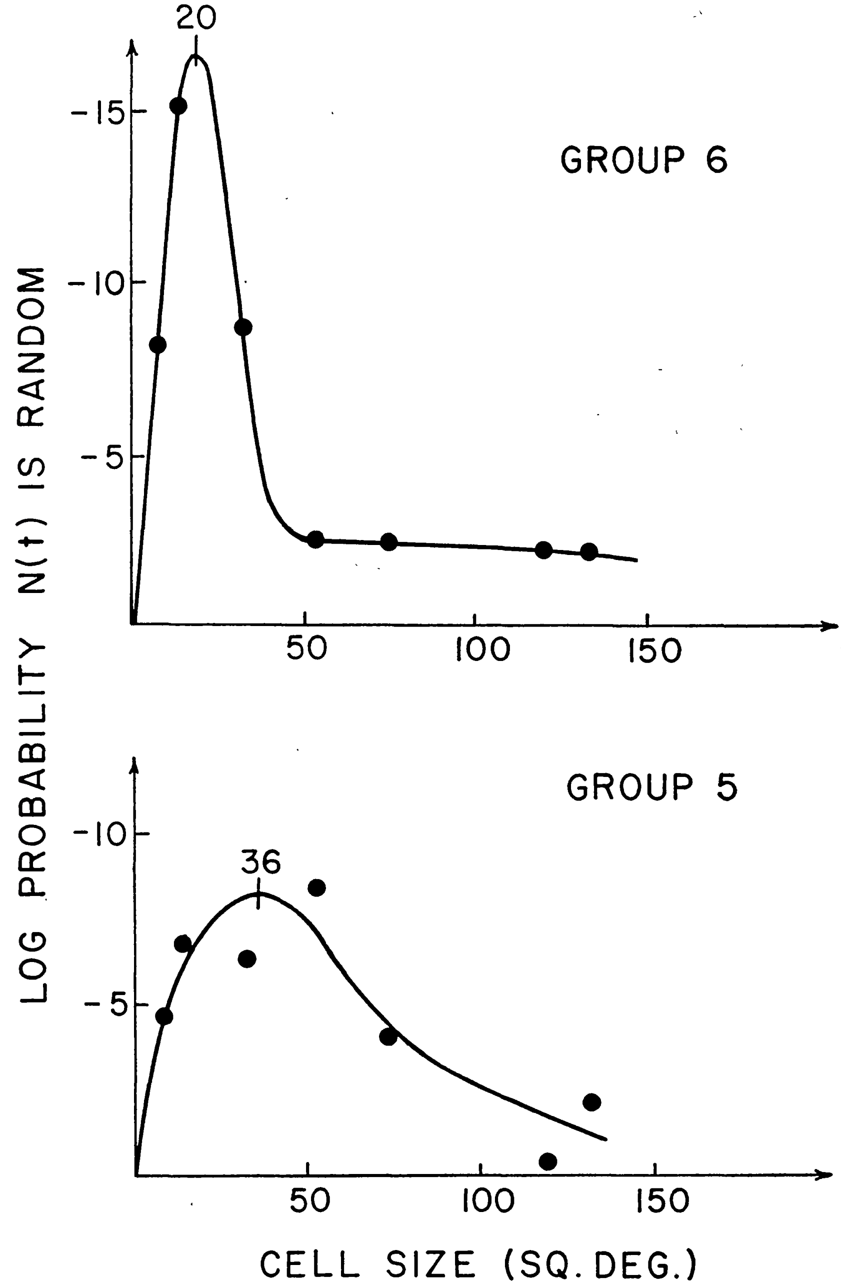

FIG. 19.—Probabilities that the observed frequency distributions of clusters among cells of various sizes would be obtained in random samplings from populations distributed with a Poisson law (galactic polar caps).

most of their sources are extragalactic. If colliding galaxies (such as the Cygnus A source) are the principal origins of extragalactic radio sources, the sources must indicate clusters of galaxies, for only within clusters would collisions occur frequently. The apparent clustering of radio sources on the Sydney survey is too loose to be caused by numerous collisions in individual clusters. Hence, if future research confirms the extragalactic nature of the sources and if the clustering tendency is real, it may be supporting evidence for second-order clustering of galaxies.

A further test was made, namely, whether the mean surface density of cluster centers differs between the northern and southern galactic hemispheres. Clusters in each distance group were counted both over the entire area of the sample and within only 30° of the galactic poles. The assumption that the mean areal density of clusters is the same in both hemispheres was then checked with a χ^2 test. Table 16 gives the computed probability for each case that the assumption is correct. In no case is the probability less than 10 per cent; with a 5 per cent significance level, it is concluded that there is no significant difference in the density of cluster centers in the two galactic hemispheres. Thus there is no reason to assume that there are more clusters on one side of the galactic plane than on the other.

TABLE 15

CELL SIZES CORRESPONDING TO MINIMA OF LOG P (χ^2)

GROUP	$cd\lambda/\lambda$ $\times 10^{-3}$	CELL AREA (SQUARE DEGREES)		CELL DIAMETER (DEGREES)		1/DIAMETER (MEAN) (DEG^{-1})
		Entire Area	$\|b\| \geq 60°$	Entire Area	$\|b\| \geq 60°$	
6	51	24.3	20	4.93	4.47	0.213
5	39	40	36	6.33	6.00	.162
1–4	20.5	60	....	7.75	....	0.129

TABLE 16

PROBABILITY THAT MEAN SURFACE DENSITY OF CLUSTER CENTERS IS SAME IN NORTHERN AND SOUTHERN GALACTIC HEMISPHERES

	GROUPS			ALL GROUPS
	1–4	5	6	
Entire sample	0.2	0.1	0.6	0.1
$\|b\| \geq 60°$	....	0.6	0.4	0.9

f) The Index of Clumpiness

Zwicky (1953) has studied the empirical quantity $k(z, n)$, defined by

$$k(z, n) = \frac{S_1}{S_0}, \tag{28}$$

where S_1^2 is the sample variance of the observed distribution of n galaxies in a given solid angle divided into z equal parts or cells and S_0^2 is the variance to be expected if the n galaxies are distributed uniformly and independently among the z cells.

Neyman, Scott, and Shane (1954) have investigated an analogous quantity, which they call the "index of clumpiness," K, defined as

$$K = \frac{\sigma_1}{\sigma_0}, \tag{29}$$

where σ_1^2 is the true variance of a theoretical distribution of n galaxies among z cells, computed on the assumption of no intervening interstellar or intergalactic absorbing clouds and on the assumption that all galaxies are clustered and that σ_0^2 is the variance of the same n galaxies distributed singly, independently from one another, and with statistical uniformity. As the authors point out, K differs from Zwicky's $k\ (z, n)$ in that n is a random variable and hence $k\ (z, n)$ is subject to random fluctuations; $k\ (z, n)$ would be obtained in a random sampling from a population with a true index of clumpiness, K. More specifically, ". . . if S_1^2 and S_0^2 are conputed for many different but equal solid angles Ω in randomly selected directions, always with the same substantial number z of parts, then the average values of the S_1^2 and S_0^2 so obtained will be approximately equal of σ_1^2 and σ_0^2."

In an earlier paper by Neyman and Scott (1952), a probability-generating function is derived for the assumption that all galaxies are clustered and that the cluster centers are distributed according to a Poisson law. In the paper under discussion by Neyman, Scott, and Shane (1954), the probability-generating function is used to derive an expression for K. The authors also derive the following two theorems (numbered from their paper):

> THEOREM 3.—If the probability density . . . governing the internal structure of clusters is continuous, then, whenever the solid angle $\omega[=\Omega/z]$ in which galaxies are counted tends to zero, the index of clumpiness, K, converges to unity.
>
> THEOREM 4.—The square of the index of clumpiness, $K^2(s)$, corresponding to a rectangular solid angle $2\alpha_1 \times 2s\alpha_2$ is a nondecreasing function of s. . . .

The authors show that, if both dimensions of the solid angle are increased, K^2 will also grow.

These theorems, which are quite general, imply that, if all galaxies are clustered and if there is no obscuring interstellar or intergalactic matter, $k^2(z, n)$ will statistically be a non-decreasing function of the area of the cells in which galaxies are counted. Counts of galaxies made both by Shane and Wirtanen (Neyman, Scott, and Shane 1954) at Lick and by Zwicky (1953) give values of $k^2(z, n)$ which increase with increasing cell size, a result compatible with the assumption of complete clustering.[3]

The foregoing discussion refers to the distribution of individual galaxies. However, exactly the same theory applies to the analogous distribution of clusters of galaxies. Thus, if one considers the hypothesis that all clusters of galaxies are members of second-order clusters and that the second-order clusters are distributed according to a Poisson law, the square of the index of clumpiness, defined analogously to equation (29), will be a non-decreasing function of the area of the cells in which clusters are counted.

The statistic $k(z, n)$ defined analogously to equation (28), with the variance of the Poisson distribution S_0^2 (equal to the mean of the Poisson distribution) estimated as the mean of the sample, was computed for distance groups 5 and 6, both for the whole area of the sample and for the galactic polar caps and for the combined groups 1–4 for the whole sample area. The resulting values of $k^2(z, n)$ are given in Tables 17 and 18. The plots of $k^2(z, n)$ versus cell size are in Figures 20 and 21.

Although there is considerable scatter about a smooth curve, as expected for a sample of this size, there is no evidence of a maximum of $k^2(z, n)$ in any of the cases. Thus, on the basis of this test, the observed distribution of cluster centers is compatible with the

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[3] Zwicky (1953) originally considered the increase in $k(z, n)$ with cell size to be evidence of intergalactic obscuration. The argument of Neyman, Scott, and Shane, however, showed that there was no necessity for the hypothesis of absorbing clouds.

assumption of total clustering of clusters of galaxies. This is only a statement of compatibility and does not constitute a proof of complete second-order clustering.

IV. SUMMARY

The results of the investigation of the distribution of rich clusters of galaxies can be summarized briefly as follows:

1. The distribution function of clusters according to richness, $N(n)$, decreases rapidly as n increases. The present data indicate no maximum in $N(n)$, that is, a mean number of galaxies is not indicated for clusters with fifty members or more within 2 mag. of the third brightest cluster members.

2. The data allow no significant conclusion that the spatial density of cluster centers varies with distance.

TABLE 17

SQUARE EMPIRICAL INDEX OF CLUMPINESS FOR CLUSTERS, $k^2(z, n)$—ENTIRE SAMPLE AREA

Cell Size (Sq. Deg.)	Groups 1–4	Group 5	Group 6	Cell Size (Sq. Deg.)	Groups 1–4	Group 5	Group 6
8.2	....	1.51	1.73	73.8	1.50	3.08	3.00
13.2	....	1.45	1.78	119	....	2.21	2.89
32.8	1.38	2.54	2.64	131	1.39	3.87	3.28
52.8	....	2.41	2.10	205	1.47	....	....

TABLE 18

SQUARE EMPIRICAL INDEX OF CLUMPINESS FOR CLUSTERS $|b| \geq 60°$

Cell Size (Sq. Deg.)	Group 5	Group 6	Cell Size (Sq. Deg.)	Group 5	Group 6
8.2	1.71	1.65	73.8	2.95	2.56
13.2	1.82	1.83	119	2.01	2.27
32.8	3.18	2.36	131	3.27	2.84
52.8	2.46	2.03			

3. Galactic obscuration certainly plays a role in the observed distribution of clusters of galaxies. In particular, in addition to the strong obscuration centered on the galactic plane, there exists around galactic longitude 300° and extending in the northern galactic hemisphere to at least latitude +60° apparent galactic absorption of the order of several tenths of a magnitude (photored) greater than at corresponding latitudes around longitude 100°.

4. There is a highly significant non-random surface distribution of cluster centers. The angular scale of the clumpiness of the distribution varies roughly inversely proportionally with distance. The non-randomness cannot be accounted for by either interstellar or intergalactic obscuration, although the existence of intergalactic obscuration is not specifically disproved. The data suggest the existence of second-order clustering or clusters of clusters of galaxies.

5. There is no significant difference in the mean surface density of cluster centers between the northern and southern galactic hemispheres.

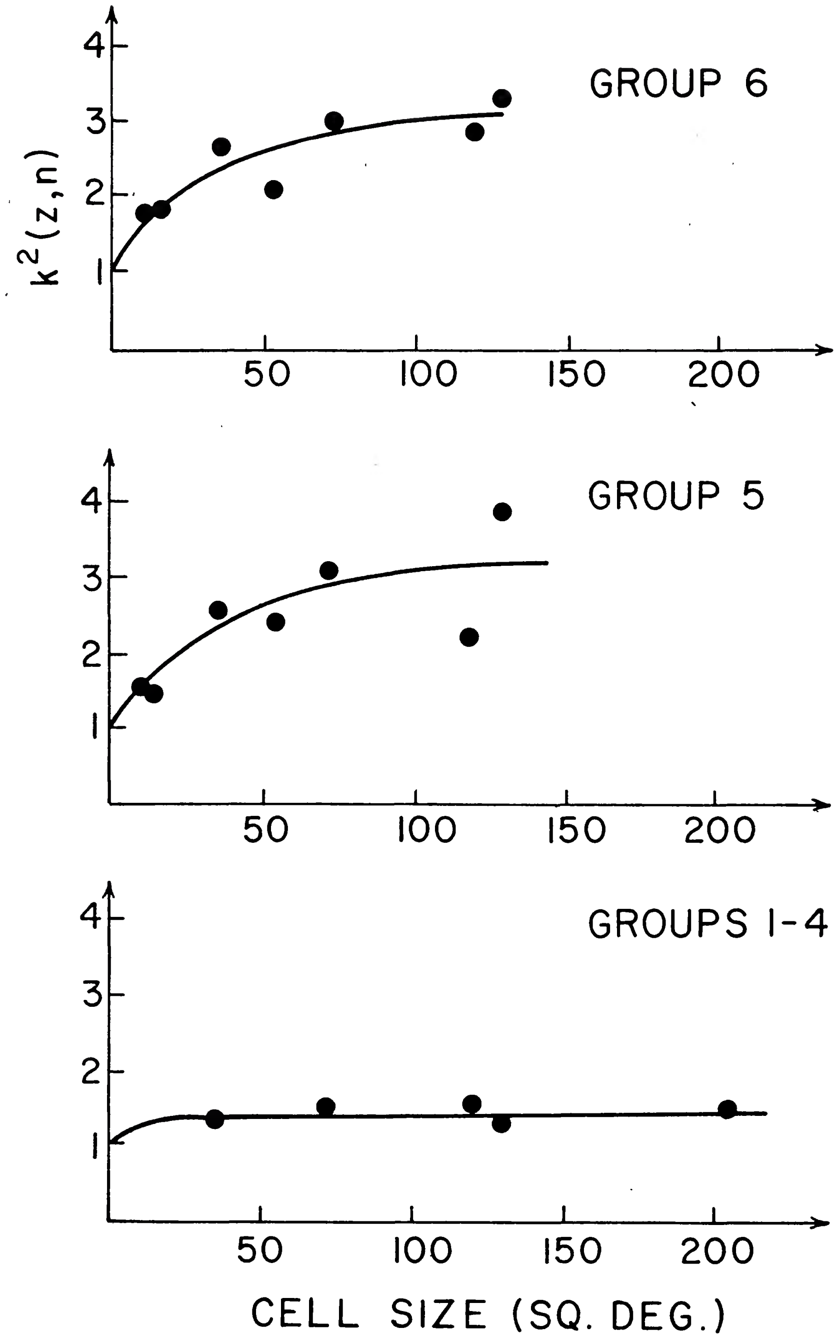

FIG. 20.—Empirical index of clumpiness, $k^2(z,n)$ as a function of cell area for clusters over the entire sample area.

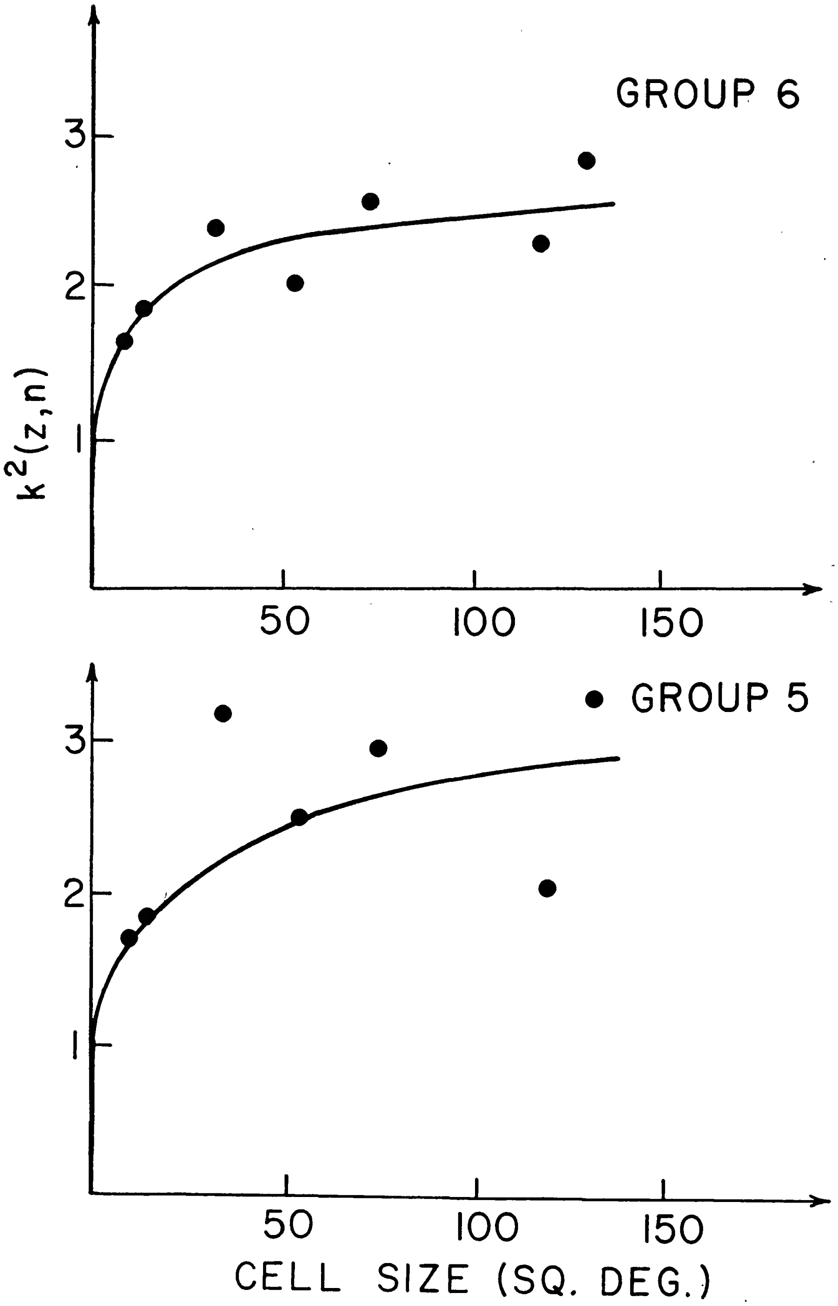

FIG. 21.—Empirical index of clumpiness, $k^2(z,n)$, as a function of cell area for clusters in the galactic polar caps.

6. The square of the index of clumpiness, defined as the ratio of the variances of the observed distribution to a purely random one, is approximately a non-decreasing function of the size of the cells in which clusters are counted, a result compatible with, although not confirming, the hypothesis that all clusters belong to second-order clusters.

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