

Introduction.

This research may be considered a continuation of the account of a preliminary research on the ordinary or open clusters given by Professor C. V. L. Charlier in *Medd. från Lunds Observatorium*, Serie II, No. 19. In the work just mentioned Charlier treats also of the globular clusters; these are left out of account in this research.

The observation material is taken exclusively from the Franklin-Adams charts in the possession of the Lund Observatory; as is well known, the original plates of these charts have been examined as to the star clusters by P. J. Melotte, and the results of this examination have been published in: »A catalogue of star clusters shown on Franklin-Adams Chart Plates» (M. A. S. Vol. LX, 1915).

Melotte divides the star clusters into the following four classes:

- I. Globular clusters (highly concentrated).
- II. Loose clusters having a regular and well defined outline.
- III. Loose clusters often consisting of a small number of stars and having an outline more or less irregular and not so sharply defined as in the former case. A direct estimation of the diameters of these clusters may involve great errors. Of course, it is often very difficult to decide to which class (II or III) a star cluster should be referred.
- IV. Coarse clusters: these form only a small number, and comprise the Pleiades, the Hyades and a few other groups.

It is the classes II and III that are the object of this research. In Melotte's Catalogue are included 146 clusters belonging to the classes II and III. Many of these clusters contain stars so faint that, according to Melotte's account, they cannot be distinctly seen on the Franklin-Adams Plates whose limiting magnitude lies between the sixteenth and seventeenth magnitudes. On the charts the limiting magnitude lies at about the 15th magnitude and therefore the above-mentioned star clusters are not visible there, and have had to be excluded in my research. The rest, about 130, are visible on the charts, and form the object of this research. Among these are about ten which are not included either in N. G. C. or in Charlier's Memoir. In Melotte's Catalogue, on the other hand, are not to be found N. G. C. 1817 and N. G. C. 6623, which have been taken up and described by me.

Moreover, I have treated M-e 102, (not in N. G. C.) classed by Melotte as IV, but which, in my opinion, ought to be referred to Melotte's class II. The total number of clusters given by me in Table II amounts to 152. I have divided them into four types: T I: regular and distinctly condensed; T II: regular and not distinctly condensed; T III: irregular and distinctly condensed; T IV: irregular and not distinctly condensed.

When I began this research, it was my intention to examine the star clusters exclusively from a statistic point of view with regard to the number of stars, the size of the apparent diameters and, if possible, with a computation of their distances. When, however, my work, which was begun in the autumn of 1918, had been going on for some time, the Henry Draper Catalogue came into the possession of the Lund Observatory (the volumes containing stars with $\alpha = 20^h - 24^h$ are, however, still missing). By this I got an excellent opportunity of extending my research and a good material for determining the distances of the star clusters. My not having had access to the latest volumes of D. C. is of but little consequence. Only about 15 star clusters are affected by this and by far the greatest part of these contain so faint stars that none of them are included in D. C.

I have thought it appropriate to give, in the introduction, a summary of the contents of the different chapters:

Chapter I: gives an account of the method of determining the apparent diameters of the star clusters, the number of stars in each cluster and the mean magnitudes of the stars.

Chapter II: gives a complete derivation of Kapteyn's formula for the mean magnitude of a group of stars, situated at the same distance, to which formula I have given a form suitable for numeric calculation.

Chapter III: gives a complete account of the appearance of the star clusters, their coordinates, their positions on F. A. C. and the star density of the surroundings, the quality of the images on the charts, the types of the clusters, the apparent diameters, the number of stars visible on the charts and belonging to the clusters, and tables containing the stars whose magnitudes I have been able to correct (δ positive); further tables of the stars lying within the clusters and included in D. C., and the distribution of D. C.-stars in the surroundings of the resp. star clusters.

Chapter IV: gives an account of the determination of the distances of the star clusters where this was possible, correlation calculations and at last some general conclusions.

Abbreviations.

Abbreviations of works consulted.

- A. J. = Astronomical Journal.
 Ap. J. = Astrophysical Journal.
 A. N. = Astronomische Nachrichten.
 H. A. = Annals of the Astronomical Observatory of Harvard College.
 D. C. = The Draper Catalogue (H. A. 91—97).
 L. M. I. = Meddelande från Lunds Astronomiska Observatorium, Serie I.
 L. M. II = Meddelande från Lunds Astronomiska Observatorium, Serie II.
 N. G. C. = New General Catalogue of Dreyer.
 I. C. = Index Catalogue of Dreyer.
 M-e. = Melotte's Catalogue in M. A. S. Vol. LX, 1915.
 M. = Messier.
 F. A. C. = The Franklin-Adams Charts.
 M. A. S. = Memoirs of Royal Astronomical Society.

Other Abbreviations.

- α, δ = Equatorial coordinates.
 l, b = Galactic, longitude and latitude.
 d = Apparent diameter, expressed in arc-minutes.
 π = Parallax » » seconds
 r = Distance » » siriometer.
 a = » from the centre on F. A. C., expressed in mm.
 $\bar{n}$ = Mean star density in the environs of the star clusters (The area = 31.46 square-minutes).
 n = Number of stars in a cluster.
 I = Images on the F. A. C.
 T = Type of a cluster.
 m = The photometric magnitude (apparent).
 m' = » photographic » (»).
 M = Absolute magnitude.
 Sp. = Spectral-type (Harvard).
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Chapter I.

A. On the determination of the apparent diameters of the star clusters.

The first object I have set before myself has been to obtain surer values of the apparent diameters of at least the star clusters which, according to f. inst. Melotte's estimation, are greater than $10'$ — $12'$. A direct estimation makes the values very uncertain, as a star cluster always more or less gradually passes into its surrounding. The determinations hitherto made accordingly have, to a large extent, been dependent on the observer's arbitrary conception. To avoid this arbitrariness I have adopted the method proposed by Charlier in L. M. II: 19, a method which I will now describe and illustrate by some concrete cases.

In counting the stars, I have used the apparatus employed at the star counts made during the last few years at the Lund Observatory under the superintendence of Charlier. The field of view in the glass of the apparatus contains a large square divided into nine smaller ones, the sides of which latter correspond to 5.6 on F. A. C. At the beginning of the count, the centre of the cluster is placed in the centre of the field of view, that is to say in the central square.

Then I have counted the stars (and stated their magnitudes in relation to an artificial scale — placed in the field of view —) in each small square. For a great part of the star clusters the diameter is smaller than $3 \times 5.6 = 16.8$, and the cluster accordingly situated within the large square. In a great number of cases I have therefore considered it sufficient, in order to get the density of stars in the surroundings of the cluster, to read the number of the stars in the (large) squares immediately surrounding the central square. From these counts in the surrounding squares I have been able to determine the mean number of stars in a small square, which I have subtracted from the number of stars in each small square within the large central square. In the cases where the least suspicion could arise that the cluster might extend ever so little beyond the large central square, I have not made use of the immediately surrounding eight squares¹ in order to obtain the density in the surroundings of the clusters, but determined this from squares lying

¹ These will now, of course, be partly included in the cluster.

farther out. Thus I get the number of stars in each small square belonging to the cluster. The distribution may be somewhat dissymmetrical, but I have always computed the dispersion in the direction of the declination and at right angles to it (σ_x and σ_y). The diameter of the cluster may be appreciated at 5—6 times the dispersion. I have then computed the mean value (d) of the diameters in δ and α .

B. Determination of the number and the mean apparent ph. magnitudes of the stars belonging to a cluster.

My next aim was the determination of the mean apparent magnitudes of the stars in the clusters, which determination at the same time gives me the number of stars belonging to them and visible on F. A. C. From the counts I have made use of to get the number of stars in each small square in the neighbourhood of the cluster I can easily get the mean number of stars of every magnitude for each square. I then form the sums of the numbers of stars of every magnitude lying within the field occupied by the cluster in each special case. From these sums I subtract the numbers of stars¹ of a surrounding area which corresponds to the area of the cluster. The sums of these remainders give the number of stars belonging to the cluster. Then it is an obvious matter how to compute the mean magnitude. Examples illustrating how the counts were executed are given below:

N. G. C. 2090. M. 37 (M-e 38).

By a preliminary investigation I found at once that the cluster is lying within the 9 central great-squares (I—IX). Thus, to the environs I reckoned the surrounding 21 great squares and counted the stars within 30 great-squares and read off their magnitudes.

			$\delta \uparrow$		
	21	22	23	24	25
	20	VII	VIII	IX	10
$\alpha \leftarrow$	19	VI	I	II	11
	18	V	IV	III	12
	17	16	15	14	13

The great-squares.

¹ of the respective magnitudes

Total number of stars in the area of the cl.

m' Square	9	10	11	12	13	14	>14.5	Σ
I			1	2	19	76	138	236
II					2	20	54	76
III	1	1			5	17	30	54
IV	1				3	12	40	56
V		2		2	2	16	38	60
VI					1	15	59	75
VII				1	2	11	51	65
VIII					2	19	42	63
IX	1			1	3	6	42	53
S	3	3	1	6	39	192	494	738

The numbers S_1 may be reduced to the area within which the cl. is situated with security, i. e. in this case the nine great central-squares. Thus we multiply S_1 with $^{3/7}$ we get the following series S_2 .

m'	10	11	12	13	14	>14.5
S_2	3	6	8	16	58	314

Number of stars in the environs.

m' Square	9	10	11	12	13	14	>14.5	Σ
10			1		3	5	34	43
11				2	2	11	21	36
12			1		1	6	27	35
13			1	5	3	4	31	44
14				3	3	9	35	50
15					1	7	32	40
16					1	4	31	36
17					2	7	42	51
18					1	10	42	53
19		1			1	5	43	50
20					1	5	32	38
21		1	1	1	3	6	27	39
22			1	2	3	14	37	57
23			1		2	6	39	48
24			3	1	3	7	22	36
25		2	1		1	5	40	49
26						4	39	43
27		1	1	2		3	39	46
28				2	3	5	46	56
29			1		1	7	32	41
30		1	1		2	5	41	50
S_1		6	13	18	37	135	732	941

$\bar{n} = 5.0$

These numbers S_2 are to be subtracted from the numbers S in the area, and we get the numbers R .

m'	9	10	11	12	13	14	>14.5	Σ
R	[3]	0	0	0	23	134	180	337

The correction of the magnitudes of this chart is calculated to — 1.7 magn. Thus we get the following series of numbers of stars within this cluster:

m'	11	12	13	>13.5
n_c	20	103	149	65

Calculation of the diameter of M. 37 (N. G. C. 2099).

A.

			5	6	4			
			5	9	7			
			6	10	10			
8	5	15	16	25	19	9	4	6
7	7	14	30	60	30	13	9	7
6	6	7	17	26	17	11	8	7
			6	13	8			
			5	6	10			
			3	3	2			

B.

 $+y$

					1			
					4			
					5			
					20			
$+x$	2	2	9	25	55	25	8	4
					21			
					8			
					2			
					0			

x	F	$x \cdot F$	$x^2 \cdot F$
— 4	2	— 8	+ 32
— 3	4	— 12	36
— 2	8	— 16	32
— 1	25	— 25	25
0	55	0	0
+ 1	25	+ 25	25
+ 2	9	+ 18	36
+ 3	2	+ 6	18
+ 4	2	+ 8	32
Σ	132	— 4	+ 236

$$b = -0.03$$

$$\sigma_x = \sqrt{\frac{236}{132} - b^2}$$

$$\sigma_x = 1.34 = 7'.50$$

$$d_x = 37'.5 - 45'.0$$

y	F	$y \cdot F$	$y^2 \cdot F$
- 3	2	- 6	+ 18
- 2	8	16	32
- 1	21	21	21
0	55	0	0
+ 1	20	+ 20	20
+ 2	5	10	20
+ 3	4	12	36
+ 4	1	4	16
Σ	116	+ 3	+ 163

$$b = \pm 0.03$$

$$\sigma_y = \sqrt{\frac{163}{116} - b^2}$$

$$\sigma_y = 1.19 = 6'.66$$

$$d_y = 33'.3 - 40'.0$$

$$d = 35' - 43'.$$

A contains the number of stars in the small squares within the great squares I, II, IV, VI, VIII.

The mean number of stars ($\bar{n}$) in a small square in the environs is, in this case 5.0, which number is to be subtracted from the middle-rows. So I get numbers in B., which are to be used for the calculation of the dispersion in x and y .

Præsepe. *N. G. C. 2632*. M. 44 (M-e 88).

By a preliminary investigation I found at once that the diameter is about 2° and that the cl. is lying within the 81 central great squares (I—81). Thus to the environs I reckoned the surrounding 40 great-squares and counted the stars within 121 great-squares and read off their magnitudes.

Total number of stars in the area of the cl.

m'	8	9	10	11	12	13	14	>14.5	Σ
I	2	5	0	3	3	3	4	13	33
II—IX	3	10	7	14	12	17	25	67	155
10—25	2	6	12	13	13	23	46	164	279
26—49	1	4	7	7	16	30	58	240	363
50—81	1	5	12	15	31	41	80	288	473
S	9	30	38	52	75	114	213	772	1303

The numbers S_1 may be reduced to the area within which the cl. is situated with security, i. e. in this case the 81 great central-squares. Thus we multiply S_1 with $81/40$. We get the following series S_2 .

m'	8	9	10	11	12	13	14	>14.5
S_2	2	12	18	38	61	97	190	711

Number of stars in the environs.

m'	8	9	10	11	12	13	14	>14.5	Σ
82—91			1	5	8	10	26	96	146
92—101		1	3	7	10	14	21	85	141
102—111	1	4	2	3	6	10	22	84	132
112—121		1	3	4	6	14	25	86	139
S_1	1	6	9	19	30	48	94	351	558

These numbers S_2 are to be subtracted from the numbers S in the cluster-area, and we get the numbers R .

m'	8	9	10	11	12	13	14	>14.5
R	7	18	20	14	14	17	23	61

The correction of the magnitudes of this chart is calculated to -1.1 magn. Thus we get the following series of number of stars.

m'	6	7	8	9	10	11	12	13	>13.5
n_c	1	7	19	19	14	15	17	23	59

Chapter II.

Deduction of the formula for the determination of the distance (r) to a cluster (the mean value of the apparent magnitude of the stars being known).

This formula was first given by Kapteyn (in Mt. Wilson Contr. 82, 1914). As in several cases I have found in the Henry Draper Catalogue numerous stars of the same spectral type belonging to a cluster, it is easily understood that here may possibly be an occasion to make use of Kapteyn's formula. I have thought it suitable to deduce the formula in two ways, the first of which leads to the same form as that of Kapteyn. The other way leads to a formula which is more suitable for numerical calculations.

First method: If we assume that the distance r is the same for all stars in the cluster, the frequency function of the apparent magnitude gets the same form and the same dispersion as the frequency function of the absolute magnitude.

For the frequency function in the absolute magnitude we suppose the normal form to be

$$\varphi(M) = C \cdot e^{-\frac{(M - M_0)^2}{2\sigma^2}} \quad (1)$$

Then the frequency function of the apparent magnitude gets the following form:

$$\varphi(m) = C \cdot e^{-\frac{(m - m_0)^2}{2\sigma^2}} \quad (2)$$

A well known formula gives us:

$$M = m - 5 \log r \quad (3)$$

This formula postulates that M is defined as the star's apparent magnitude, if the star is at the unit distance (one siriometer).

The formula (2) is now:

$$\varphi(m) = C \cdot e^{-\frac{(m - 5 \log r - M_0)^2}{2\sigma^2}} \quad (3')$$

We consequently obtain the following equation for determining the mean value of the apparent magnitude (m) of stars brighter than m_1 :

$$\bar{m} = \frac{\int_{-\infty}^{m_1} m \cdot e^{-\frac{(m - 5 \log r - M_0)^2}{2\sigma^2}} \cdot dm}{\int_{-\infty}^{m_1} e^{-\frac{(m - 5 \log r - M_0)^2}{2\sigma^2}} \cdot dm}. \quad (A)$$

We put:

$$m = (m - 5 \log r - M_0) + (5 \log r + M_0).$$

Equ. (A) then takes the following form:

$$\begin{aligned} \bar{m} = & \frac{\int_{-\infty}^{m_1} (m - 5 \log r - M_0) \cdot e^{-\frac{(m - 5 \log r - M_0)^2}{2\sigma^2}} \cdot dm}{\int_{-\infty}^{m_1} e^{-\frac{(m - 5 \log r - M_0)^2}{2\sigma^2}} \cdot dm} + \\ & + \frac{\int_{-\infty}^{m_1} (5 \log r + M_0) \cdot e^{-\frac{(m - 5 \log r - M_0)^2}{2\sigma^2}} \cdot dm}{\int_{-\infty}^{m_1} e^{-\frac{(m - 5 \log r - M_0)^2}{2\sigma^2}} \cdot dm}. \end{aligned}$$

The second term in $\bar{m}$ evidently becomes:

$$5 \log r + M_0$$

To obtain the value of the first term we observe that:

$$\frac{d \left(e^{-\frac{(m - 5 \log r - M_0)^2}{2\sigma^2}} \right)}{dm} = - \frac{m - 5 \log r - M_0}{\sigma^2} \cdot e^{-\frac{(m - 5 \log r - M_0)^2}{2\sigma^2}}.$$

Thus we obtain:

$$\bar{m} = - \frac{\sigma^2 \cdot \int_{-\infty}^{m_1} e^{-\frac{(m - 5 \log r - M_0)^2}{2\sigma^2}} \cdot dm}{\int_{-\infty}^{m_1} e^{-\frac{(m - 5 \log r - M_0)^2}{2\sigma^2}} \cdot dm} + 5 \log r + M_0 \quad (A')$$

or at last:

$$\bar{m} = 5 \log r + M_0 - \frac{\sigma^2 \cdot e^{-\frac{(m_1 - 5 \log r - M_0)^2}{2\sigma^2}}}{\int_{-\infty}^{m_1} e^{-\frac{(m - 5 \log r - M_0)^2}{2\sigma^2}} \cdot dm}. \quad (B)$$

We introduce (like Kapteyn) the following indications:

$$z = + \frac{m - 5 \log r - M_0}{\sigma \sqrt{2}} \text{ and } P = \frac{m_1 - 5 \log r - M_0}{\sigma \cdot \sqrt{2}}$$

for which reason $m = m_1$ gives $z = P$.

We then get:

$$dz = \frac{1}{\sigma \cdot \sqrt{2}} \cdot dm.$$

Formula (B) now takes the following form:

$$\bar{m} = 5 \log r + M_0 - \frac{\sigma}{\sqrt{2}} \cdot \frac{e^{-P^2}}{\int_{-\infty}^P e^{-z^2} \cdot dz}. \quad (C)$$

or, if we want a form more suitable for numerical calculations:

$$m_1 - \bar{m} = m_1 - 5 \log r - M_0 + \frac{\sigma}{\sqrt{2}} \cdot \frac{e^{-P^2}}{\int_{-\infty}^P e^{-z^2} \cdot dz}, \quad (C')$$

We now put:

$$\frac{m_1 - \bar{m}}{\sigma \cdot \sqrt{2}} = F(P).$$

Then, at last, we get:

$$F(P) = P + \frac{1}{2} \cdot \frac{f(P)}{Q(P)}. \quad (D)$$

where $f(P)$ is the function of probability.

As for $Q(P) = \int_{-\infty}^P e^{-z^2} \cdot dz$ we divide it in the following manner:

$$Q(P) = \int_{-\infty}^0 e^{-z^2} \cdot dz + \int_0^P e^{-z^2} \cdot dz = \frac{1}{2} \cdot \sqrt{\pi} + \int_0^P e^{-z^2} \cdot dz,$$

where the second term is the known integral of probability.

Second method:

We can also proceed in the following manner:

We put:

$$p(x) = \frac{e^{-\frac{x^2}{2}}}{\sqrt{2\pi}} \quad (4)$$

Then we have:

$$\bar{m} = \frac{\int_{-\infty}^{m_1} m \cdot p \left(\frac{m - 5 \log r - M_0}{\sigma} \right) dm}{\int_{-\infty}^{m_1} p \left(\frac{m - 5 \log r - M_0}{\sigma} \right) \cdot dm}. \quad (a)$$

Further we put:

$$x = \frac{m - 5 \log r - M_0}{\sigma}$$

and

$$x_1 = \frac{m_1 - 5 \log r - M_0}{\sigma}$$

and then $dm = \sigma \cdot dx$.

The formula (a) now gets the following form:

$$\bar{m} = \frac{\int_{-\infty}^{x_1} (5 \log r + M_0 + \sigma \cdot x) \cdot p(x) \cdot \sigma \cdot dx}{\int_{-\infty}^{x_1} p(x) \cdot \sigma \cdot dx} \quad (b)$$

σ disappears.

But:

$$\begin{aligned} \int_{-\infty}^{x_1} x \cdot p(x) \cdot dx &= \int_{-\infty}^{x_1} x \cdot \frac{e^{-\frac{x^2}{2}}}{\sqrt{2\pi}} \cdot dx = -\frac{1}{\sqrt{2\pi}} \cdot \int_{-\infty}^{x_1} d \left(e^{-\frac{x^2}{2}} \right) = \\ &= -\frac{1}{\sqrt{2\pi}} \left[e^{-\frac{x^2}{2}} \right]_{-\infty}^{x_1} = -\frac{1}{\sqrt{2\pi}} \cdot e^{-\frac{x_1^2}{2}} = -p(x_1). \end{aligned}$$

We denote:

$$\int_{-\infty}^{x_1} p(x) dx = Q(x_1).$$

Then (b) at last takes the following form:

$$\bar{m} = 5 \log r + M_0 + \frac{\sigma \cdot \int_{-\infty}^{x_1} x \cdot p(x) \cdot dx}{\int_{-\infty}^{x_1} p(x) \cdot dx}$$

or:

$$\bar{m} = 5 \log r + M_0 - \frac{\sigma \cdot p(x_1)}{Q(x_1)}. \quad (c)$$

From this we get:

$$m_1 - \bar{m} = m_1 - 5 \log r - M_0 + \frac{\sigma \cdot p(x_1)}{Q(x_1)}$$

or:

$$\frac{m_1 - \bar{m}}{\sigma} = \frac{m_1 - 5 \log r - M_0}{\sigma} + \frac{p(x_1)}{Q(x_1)}$$

or:

$$\frac{m_1 - \bar{m}}{\sigma} = x_1 + \frac{p(x_1)}{Q(x_1)} = F(x_1). \quad (d)$$

We are now able to tabulate the values of $F(x)$ with x as argument.

If we compare formula (D) with formula (d), the former gives $\frac{m_1 - \bar{m}}{\sigma \cdot \sqrt{2}}$; the latter $\frac{m_1 - \bar{m}}{\sigma}$.

I intend hereafter to use the formula (d).

Let us now examine a little more closely the formula (d):

$$\frac{m_1 - \bar{m}}{\sigma} = F(x_1) = x_1 + \frac{p(x_1)}{Q(x_1)}.$$

We will suppose that m_1 , $\bar{m}$ and σ for a certain cluster are known. Then the value of $F(x_1)$ is also given. In Tab. I we find the corresponding value of x_1 . But the equation:

$$x_1 = \frac{m_1 - 5 \log r - M_0}{\sigma}$$

will at last give us the value of r , if the value of M_0 is also known.

Remark: Tab. I has been computed with the help of Sheppard's Tables.

Chapter III.

In this chapter is given an account as complete as possible of 152 open clusters. This is based on F. A. C. and D. C. In the tables to the left are given the Plate-number of the cluster, α and δ , Galactic square; the number of F. A. C., where the star cluster is to be found, the distance (a) of the image from the centre of the chart, the mean density ($\bar{n}$ = the number of stars in a small square whose area is 31.56 square-minutes), the quality of the image [division into three classes: I: very good; II: good; III: bad (deformed)]; the Type (see the Introduction!); the number (n) of stars, belonging to the cluster and visible on the chart and the number of stars of the different Spectral-classes, included in D. C. * (n_B , n_A , etc.); the apparent diameters (d): for the large clusters determined by the limits 5 σ and 6 σ ; for the smaller determined through direct estimation, which is indicated by the sign [].

Further I have given a short description of each cluster, in doing which I have endeavoured to indicate the peculiarities that may be found in the appearance of the clusters, in the distribution of the stars, etc. In many cases the accounts also contain a Tab. A of the stars which, being situated within the area of the cluster, are included in D. C. Thus I have noted from D. C. the stars, situated within a square, the side of which is = the diameter of the cluster (in the cases where the diameter of the cluster is determined by to limits I have chosen the lower one as the side of the square). Then, in order to decide which stars should be excluded, I have at the same time noted the D. C. stars in an area 15 times as large as that of the cluster and formed the tab. B for the stars situated outside the cluster in this large area. In every fifteen stars of a certain type, for inst. A 0, I have, as a rule, excluded *one* star of the same type within the cluster area. In doing so I have, of course, taken into consideration, the number of stars of the different magnitudes in the environs (as is seen from N. 69, N. G. C. 2516, where I give a special table for B 9 and A 0, and from the table of N. G. C. 3532 for B 8, B 9, A 0 and A 2, which follows below). Accordingly, I have sometimes modi-

* To the A: stars I have referred B 8—A 5.

fied the excluding of one star in every fifteen. In Tab. B I have thought it unnecessary to separate for inst. $G\ 0$, $G\ 2$, etc., when there are no G -stars in the cluster area.

Lastly we have Tab. C, containing stars, which, according to the computations, belong to the cluster with corrected magnitudes (m').

The estimated magnitudes have been reduced to photographic magnitudes in the international system with help of a series of corrections, deduced by Mr. John Ohlsson.

These corrections have been obtained by estimating the chart magnitudes in the artificial scale for the Standard Stars which are to be found in 1: Standards of magnitudes for the Astrographic Catalogue (in H. A. Vol. 85, N:o 1); 2: The North Polar Sequence (in H. A. Vol. 71, N:o 3); 3: Harvard Standard Regions (in H. A. 71, N:o 4); 4: Durchmusterung of Selected Areas between $\delta=0$ and $\delta=+90^\circ$ (H. A. Vol. 101) and the comparison stars, which have been used at Harvard in determining the magnitudes of certain variables and novæ (in H. A. Vol. 84, N:o 1, 3, 5).

For each area points have been plotted having abscissas equal to the estimated magnitudes and ordinates equal to the differences, found by subtracting the estimated magnitudes from the Harvard-magnitudes. A smooth curve was drawn through these points. From these curves the corrections have been deduced which are to be added to the estimated magnitudes to get the magnitudes in the Harvard Scale. As the corrections of the resp. magnitudes are generally almost equal in a certain point of a chart, I have been able to use the same correction for the different magnitudes. Where the corrections were found to be unequal in different places of F. A. C. I have always used the corrections of such points as were nearest to the cluster.

After the corrections were applied, I have graphically reduced the numbers to whole magnitudes. In Tab. C $m'=9$ signifies that the magnitude of a star lies between $m'=8,5$ and $m'=9,5$.

Remark: As the material at our disposal was insufficient, corrections for the charts with δ negative could not be deduced.

N. G. C. 3532.

Table, containing the stars, found in D. C. and situated inside and outside the cl. and showing how certain stars have been excluded from the cl. [] indicates the excluding.

Inside		Outside		Inside		Outside		Inside		Outside	
B 8				A 0				A 0			
<i>n</i>	<i>m</i>	<i>n</i>	<i>m</i>	<i>n</i>	<i>m</i>	<i>n</i>	<i>m</i>	<i>n</i>	<i>m</i>	<i>n</i>	<i>m</i>
1	8.0	3	7.9—8.1	1	8.9	9	8.9	1	10.0		
»	8.3	6	8.2—8.5	»	8.9			»	[10.0]		
»	8.8	5	8.6—8.8	»	8.9			»	10.2	1	10.1
»	8.9	15	8.9—9.2	»	8.9			»	10.2	4	10.2
»	[9.0]	10	9.4—10.0	»	[8.9]			»	10.2		
»	[9.7]			»	9.1	6	9.0	»	10.2		
				»	9.1	10	9.1	»	10.3	2	10.3
				»	9.1			»	10.3		
				»	9.1			A 2			
				»	9.1			»	8.4	1	8.4
»	8.2	2	8.3	»	9.1			»	8.5	1	8.5
»	8.5	3	8.4	»	[9.1]			»	8.6	2	8.6
»	8.5	1	8.5	»	9.2	1	9.2	»	8.6		
»	8.6			»	9.2			»	8.6		
»	8.7	3	8.7	»	9.2			»	8.7	2	8.7
»	8.7	1	8.8	»	9.2			»	8.7		
»	8.8	1	8.8	»	9.4	12	9.4	»	8.7		
»	8.9	6	8.9	»	9.4			»	8.7		
»	[8.9]			»	9.4			»	[8.7]		
»	9.1	7	9.1	»	[9.4]			»	8.8	1	8.8
»	9.1	3	9.4	»	9.5			»	8.8	1	8.9
»	[9.1]	1	9.5	»	9.5	7	9.5	»	9.0	2	9.0
»	9.5	1	9.6	»	9.5	2	9.6	»	9.0		
»	9.7	3	9.7	»	[9.5]			»	9.0		
»	[9.7]	2	9.8	»	9.7	17	9.7	»	9.1	1	9.1
»		3	10.0	»	9.7			»	9.3	2	9.3
				»	9.7			»	9.3		
				»	9.7			»	9.3		
				»	9.7			»	9.3		
				»	9.7			»	9.4	2	9.4
				»	[9.7]	1	9.8	»	9.6	4	9.6
»	8.2	1	8.2	»	9.9	1	9.9	»	9.8	1	9.7
»	8.2	4	8.3	»	10.0	16	10.0	»	9.9	1	9.8
»	[8.4]	4	8.4	»	10.0			»	9.9	11	9.9
»	8.5	4	8.5	»	10.0			»	9.9		
»	8.6	3	8.6	»	10.0			»	9.9		
»	8.7	2	8.7	»	10.0			»	[9.9]		
»	8.7			»	10.0			»	10.1	1	10.1
»	8.7			»	10.0			»	10.2	3	10.2
»	8.8	4	8.8	»	10.0			»	10.2		
»	8.8			»	10.0			»	10.2		

N. G. C. 188 (M-e 2).

This cl. is not distinctly shown on the chart.

1.

$$\alpha = 0^h 35.^m 1$$

$$\delta = +84^\circ 47'$$

GC_3 F. A. C. 206

2.

Pl. 1.

$$\alpha = 1^h 9.^m 4$$

$$\delta = +58^\circ 17'$$

GD_4

F. A. C. 183

$$\bar{n} = 4.6 \quad a = 46$$

I II T III

$$d = [6] \quad n = 24$$

N. G. C. 436 (M-e 6).

Contains a comparatively small number of faint stars, rather irregularly dispersed; some are lying very close together. Differs distinctly from the environs. No stars in D. C.

TAB. C ($c = -1.0$).

m'	11	12	13	> 13.5
n	1	2	5	16

N. G. C. 457 (M-e 7).

Contains a tolerable number of middle-bright stars, strongly condensed. The form rather circular; yet a couple of offshoots.

3.

Pl. 1.

$$\alpha = 1^h 12.^m 8$$

$$\delta = +57^\circ 48'$$

GD_4

F. A. C. 183

$$\bar{n} = 4.1 \quad a = 47$$

I II T III

$$d = 17-20$$

$$n = 50 \quad n_B = 1?$$

TAB. A.

α	δ	m	m'	Sp.
$1^h 13.^m 6$ 13.8	$+57^\circ 40'$ 42	7.9 5.25	7.8 5.67	[B 5] [F 5 p]

TAB. B.

n	Sp.
1	B 1
1	A 2
1	F 5
1	Mb

TAB. C. ($c = -1.0$).

m'	10	11	12	13	> 13.5
n	5	5	7	9	24

N. G. C. 581 M. 103 (M-e 8).

Circular, well defined. 3' from the centre, diametrically opposed, lie two stars, very bright in comparison with the other stars of this cl. Both of them are noted in D. C.

4.

Pl. 1.

$$\alpha = 1^h 26.^m 6$$

$$\delta = +60^\circ 11'$$

GD_4

F. A. C. 183

$$\bar{n} = 6.5$$

$$a = 5$$

I II T I

$$d = [7] \quad n = 46$$

$$n_B = 1? \quad n_F = 1?$$

TAB. A.

α	δ	m	m'	Sp.
$1^h 26.^m 6$ 27.1	$+60^\circ 10'$ 7	7.26 8.21	7.09 8.49	B 3 F 0

TAB. B.

n	Sp.
1	K 2

TAB. C ($c = -1.0$).

m'	7	8	9	10	11	12	13	> 13.5
n	1	1	0	1	1	4	8	30

N. G. C. 654 (M-e 9).

Very well separated from the environs. Is one of the best specimens of clusters with a small number of stars. No stars in D. C.

5.
Pl. 1.
 $\alpha = 1^h 37^m 2$
 $\delta = + 61^\circ 23'$
 GC_4
F. A. C. 183
 $\bar{n} = 4.1$ $a = 23$
II T I
 $d = [6]$ $n = 21$

TAB. C ($c = -1.0$).

m'	11	12	13	> 13.5
n	1	4	7	9

N. G. C. 659 (M-e 10).

Contains only a small number of faint stars, and is not clearly separated from the environs. No stars in D. C.

6.
Pl. 1.
 $\alpha = 1^h 37^m 4$
 $\delta = + 60^\circ 12'$
 GD_4
F. A. C. 183
 $\bar{n} = 5.3$ $a = 15$
II T III
 $d = [6]$ $n = 22$

TAB. C ($c = -1.0$).

m'	11	12	13	> 13.5
n	1	3	4	14

N. G. C. 663 (M-e 11).

Very well defined and fairly regular in form. Contains two rather dense accumulations of stars, separated by a thin region ($2' - 3'$ wide). Besides, there appear a couple of offshoots with fairly bright stars. No stars in D. C.

7.
Pl. 1.
 $\alpha = 1^h 39^m 2$
 $\delta = + 60^\circ 44'$
 GD_4
F. A. C. 183
 $\bar{n} = 5.1$ $a = 20$
II T III
 $d = 18-22$
 $n = 82$

TAB. C. ($c = -1.0$).

m'	9	10	11	12	13	> 13.5
n	1	3	6	7	8	57

N. G. C. 752 (M-e 12).

A large cl., very thin even at the centre. No perceptible condensation. Fairly regular form. At the centre are to be found many stars which lie by twos very close together. Not well separated from the surroundings.

8.
Pl. 2.
 $\alpha = 1^h 51^m 8$
 $\delta = + 37^\circ 11'$
 GD_4
F. A. C. 165
 $\bar{n} = 2.4$ $a = 145$
II T III
 $d = 53-64$
 $n = 103$ $n_A = 1$
 $n_G = 2$ $n_K = 3$

TAB. A.

α	δ	m	m'	Sp.
$1^h 53^m .0$	$+ 37^\circ 12'$	8.1	8.2	A 2
49.9	22	8.2	9.0	G 5
50.8	33	9.2	9.8	G
50.8	32	9.3	9.9	F
50.2	36 46	5.82	6.82	K 0
51.7	37 11	8.2	9.2	"
50.0	36 47	6.06	7.13	K 2

TAB. B.

n	Sp.
7	A 0
2	A 2
3	A 5
11	F
4	G 0
5	G 5
3	K 0
2	M

TAB. C (c = -1.1).

m'	7	8	9	10	11	12	13	> 13.5
n	2	3	9	30	16	6	17	20

N. G. C. 869 (M-e 13).

9.
Pl. 2.
 $\alpha = 2^h 12^m 00^s$
 $\delta = +56^\circ 41'$
 GD_4
F. A. C. 183
 $\bar{n} = 3.0$ $a = 95$
I II T III
 $d = 42-51$
 $n = 274$
 $n_B = 10$ $n_A = 4$
 $n_K = 1$

Very strong condensation, so that the stars at the centre are difficult to distinguish on the chart. Presents another dense crowd of stars outside the centre. Between N. G. C. 869 and 884, which form a double-cluster in Perseus, there is an almost starless belt, 3' wide.

TAB. A.

α	δ	m	m'	Sp.	α	δ	m	m'	Sp.
$2^h 12.^m 1$	$+56^\circ 40'$	6.66	6.42	$B 0$	$2^h 10.^m 3$	$+56^\circ 26'$	9.0	8.9	$B 5$
12.2	43	6.66	6.42	,	10.2	19	8.9	8.9	$B 8$
9.9	36	6.42	6.20	$B 1p$	11.7	18	9.5	9.5	,
9.8	34	7.21	6.99	$B 1$	12.4	41	9.4	9.2	B
11.4	33	8.7	8.5	$B 2$	12.8	52	8.0	8.0	$A 0$
10.8	33	8.8	8.6	,	10.4	54	8.2	8.2	[,]
11.4	45	8.6	8.5	$B 5$	11.1	57	2	9.5	[,]
13.2	39	8.6	8.5	,	12.6	3	9.7	9.8	$A 3$
					13.4	56 32	8.2	9.4	$K 5$

TAB. B.

n	Sp.	n	Sp.
4	B 0	10	A 2
3	B 1	11	A 3
4	B 2	2	A
6	B 3	15	F
1	B 5	12	G
7	B 8	11	K 0
12	B 9	17	K 2
6	B	5	K 5
35	A 0	1	O e

TAB. C (c. = -1.0).

m'	6	7	8	9	10	11	12	13	> 13.5
n	3	1	8	31	34	40	34	43	80

N. G. C. 884 (M-e 14).

The densest accumulation of the stars lies somewhat eccentrically. The form more regular than N. G. C. 869. Besides, a fairly equal distribution of the stars.

10.

Pl. 2.

$\alpha = 2^h 15^m 4$

$\delta = +56^\circ 39'$

GD_4

F. A. C. 183

$\bar{n} = 3.0 \ a = 102$

I II T I

$d = 46-55$

$n = 270$

$n_B = 6 \ n_A = 8$

$n_G = 1 \ n_M = 2$

$n_K = 3$

TAB. A.

α	δ	m	m'	Sp.	α	δ	m	m'	Sp.
$2^h 15^m 2$	$+56^\circ 49'$	9.0	8.8	B 0	$2^h 17^m 5$	$+56^\circ 46'$	9.7	9.7	A 0
14.8	27	8.5	8.3	B 2	19.3	27	9.7	9.7	[A 0]
14.1	25	8.9	8.7	B 3	14.8	47	6.54	6.60	[A 2] p
13.8	28	9.5	9.4	B 5	18.8	57 3	8.6	8.7	,
15.9	56	6.95	6.90	B 8 p	16.5	56 26	9.4	10.0	G 0
16.9	55	9.0	9.0	,	17.7	36	9.5	10.7	K 5
18.4	44	9.2	9.2	,	13.9	42	var.	var.	,
19.2	37	8.7	8.7	B 9	16.3	46	,	,	,
15.6	38	9.2	9.2	[B 9]	18.3	57 0	8.5	9.9	Ma
14.9	42	8.6	8.4	B	15.3	56 39	var.	var.	,
14.7	56	9.4	9.2	, p					
19.2	47	7.42	7.42	A 0					
15.8	47	7.46	7.46	[A 0]					
18.7	52	8.8	8.8	,					

TAB. B.

n Sp.
The same as that of N. G. C. 869

TAB. C ($c = -1.0$).

m'	6	7	8	9	10	11	12	13	> 13.5
n	1	2	3	25	43	26	31	49	90

Melotte 15 (Not in N. G. C.).

An irregular but well defined cl. Most of the stars are lying close together at the centre from which several offshoots branch off in irregular form.

11.

Pl. 3.

$\alpha = 2^h 25^m 2$

$\delta = +61^\circ 0'$

GC_4

F. A. C. 183

$\bar{n} = 1.9 \ a = 101$

I II T III

$d = 23-27$

$n = 42 \ n_B = 3$

TAB. A.

α	δ	m	m'	Sp.
$2^h 25^m 1$	$+61^\circ 1'$	7.82	7.58	B
25.2	60 56	8.0	7.8	,
25.7	61 5	8.4	8.2	,

TAB. B.

n	Sp.
1	B 8
2	A
2	F
1	G

TAB. C ($c = -1.0$).

m'	8	9	10	11	12	13	> 13.5
n	3	4	5	9	4	5	12

N. G. C. 1027 (M-e 16).

Irregular and thin without perceivable condensation. Passes imperceptibly into the surroundings. In D. C. no stars included.

12.

Pl. 1.

$$\alpha = 2^h 35.^m 0$$

$$\delta = + 61^\circ 7'$$

 GC_4

F. A. C. 184

$$\bar{n} = 4 \quad a = 70$$

I II T IV

$$d = 18-22$$

$$n = 40$$

TAB. C (c = -1.2).

m'	9	10	11	12	13	> 13.5
n	1	3	4	7	10	15

N. G. C. 1039. M. 34 (M-e 17).

Contains a great number of bright stars. The number of the faint stars is comparatively small. The former lie close together; two of them cover each other partly. Fairly irregular form. Rather well defined.

13.

Pl. 3.

$$\alpha = 2^h 35.^m 6$$

$$\delta = + 42^\circ 21'$$

 GD_4

F. A. C. 166

$$\bar{n} = 4.6 \quad a = 41$$

I II T III

$$d = 39-47$$

$$n = 71 \quad n_A = 11$$

$$n_G = 1$$

TAB. A.

α	δ	m	m'	Sp.
$2^h 35.^m 7$	$+ 42^\circ 17'$	8.0	8.0	B 8
36.3	24	7.9	7.9	B 9
35.8	16	8.0	8.0	"
35.1	10	8.08	8.06	"
35.5	22	8.0	8.0	A 0
35.6	22	8.0	8.0	"
35.4	21	8.2	8.2	"
34.8	15	8.8	8.8	"
34.0	4	9.2	9.2	"
37.1	12	8.6	8.7	A 2
34.6	27	8.9	8.9	A
36.2	10	7.50	8.28	G 5

TAB. B.

n	Sp.
1	B 8
2	B 9
8	A 0
2	A 2
2	A 3
1	A
4	F
1	G 0
3	G 5
8	K

TAB. C (c = -1.1).

m'	8	9	10	11	12	13	> 13.5
n	8	6	8	14	18	15	2

14.

Pl. 1.

$$\alpha = 3^h 7.^m 8$$

$$\delta = + 46^\circ 52'$$

 GD_4

F. A. C. 166

$$\bar{n} = 6.5 \quad a = 71$$

I II T I

$$d = [7] \quad n = 55$$

N. G. C. 1245 (M-e 18 *).

A small and dense, well defined and condensed cl. which contains exclusively faint stars. No stars in D. C.

TAB. C (c = -1.1).

m'	12	13	> 13.5
n	2	10	43

* Melotte has confused the descriptions and the diameters of *N. G. C.* 1039 and 1245.

15.

Pl. 1.

$$\alpha = 3^h 25^m 25.5$$

$$\delta = +36^\circ 59'$$

 GD_5

F. A. C. 144

$$\bar{n} = 1.3 \quad a = 145$$

I III T II

$$d = 21-25$$

$$n = 32 \quad n_A = 1$$

$$n_F = 1$$

N. G. C. 1342 (M-e 21).

According to Melotte this cl. should not be well defined. On the contrary, the cl. detaches itself very distinctly from the environs. Contains numerous rather bright stars. No condensation; the stars equally dispersed.

TAB. A.

α	δ	m	m'	Sp.
$3^h 25^m 25.5$	$+36^\circ 59'$	8.8	8.9	A 2
	37 9	8.3	8.6	F 0

TAB. B.

n	Sp.	n	Sp.
1	B 9	1	F 5
1	A 0	2	G
1	A 2	2	K

TAB. C ($c = -1.3$).

m'	8	9	10	11	12	13	> 13.5
n	1	2	7	8	6	4	4

16.

Pl. 4.

$$\alpha = 4^h 7^m 8$$

$$\delta = +50^\circ 59'$$

 GC_4

F. A. C. 167

$$\bar{n} = 2.8^* \quad a = 89$$

I II T III

$$d = 31-38$$

$$n = 35 \quad n_A = 2$$

N. G. C. 1528 (M-e 23).

A very plain but irregular cl. with several offshoots from the centre. The stars inequally dispersed; several dense groups are to be observed.

TAB. A.

α	δ	m	m'	Sp.
$4^h 7^m 8$	$+50^\circ 59'$	8.9	9.0	A 2
	51 7	8.7	8.7	A

TAB. B.

n	Sp.	n	Sp.
1	B 3	2	F
3	A 0	2	G
1	A 2	6	K
2	A		

TAB. C ($c = -0.3$).

m'	9	10	11	12	13	> 13.5
n	2	5	10	6	5	7

I. C. 361 (M-e 24).

Is not distinctly shown on the chart. Only a shading is visible.

17.

$$\alpha = 4^h 10^m 7$$

$$\delta = +58^\circ 3'$$

 GC_4

F. A. C. 185.

N. G. C. 1647 (M-e 26).

A large, very thin cl., distinctly separated from the environs and probably containing exclusively bright stars. No condensation and rather equal dispersion. The brightest star is situated near the centre.

18.

Pl. 4.

$$\alpha = 4^h 40^m 2$$

$$\delta = +18^\circ 53'$$

GD_5

F. A. C. 121

 $\bar{n} = 4.4$ $a = 87$

II T III

 $d = 48-58$ $n = 68$ $n_A = 3$ $n_K = 2$

TAB. A.

α	δ	m	m'	Sp.
$4^h 39.^m 7$	$+ 19^\circ 8'$	8.4	8.4	B 9
41.1	18 31	9.3	9.3	"
41.0	54	8.4	8.4	A 0
40.4	33	6.13	7.13	K 0
40.2	37	7.8	8.8	"

TAB. B.

n	Sp.	n	Sp.
2	A	9	G
7	A 0	5	K 0
1	A 2	1	K 2
1	A 3	1	M
5	F		

TAB. C ($c = -0.9$).

m'	7	8	9	10	11	12	13	> 13.5
n	1	2	8	8	7	10	7	25

N. G. C. 1664 (M-e 27).

19.

Pl. 5.

 $\alpha = 4^h 43.^m 9$ $\delta = + 43^\circ 31'$ GC_5

F. A. C. 168

 $\bar{n} = 4.4$ $a = 95$

II T III

 $d = 25-30$ $n = 64$ $n_B = 1$ $n_A = 1$

TAB. A.

α	δ	m	m'	Sp.
$4^h 44.^m 4$	$+ 43^\circ 24'$	7.37	7.25	B 5
43.8	19	8.9	8.9	A 0

TAB. B.

n	Sp.	n	Sp.
1	B 9	1	F 0
2	A 0	5	G
1	A 5	3	K
2	A		

TAB. C ($c = -0.9$).

m'	8	9	10	11	12	13	> 13.5
n	2	3	4	9	12	9	25

N. G. C. 1746 (M-e 28).

20.

Pl. 5.

 $\alpha = 4^h 57.^m 6$ $\delta = + 23^\circ 40'$ GD_5

F. A. C. 145

 $\bar{n} = 1.9$ $a = 94$

II T II

 $d = 49-59$ $n = 95$ $n_B = 1$ $n_A = 1$ $n_K = 5$

TAB. A.

α	δ	m	m'	Sp.
$4^h 56.^m 2$	$+ 23^\circ 53'$	8.6	8.5	B 5
57.2	40	8.8	8.9	A 2
59.1	40	8.0	9.0	K 0
57.7	57	8.5	9.5	"
58.5	31	8.6	9.6	"
58.7	47	8.6	9.6	"
58.3	23	8.0	9.2	K 5

TAB. B.

n	Sp.
1	B 3
2	B 5
1	B 8
4	B 9
6	A 0
1	A 5
3	A
5	F
5	G 5

TAB. C (c = -1.1).

m'	9	10	11	12	13	> 13.5
n	8	7	8	9	23	40

N. G. C. 1807 (M-e 29).

A thin, irregular, distinct cl. Clusters with faint stars are usually more dense and concentrated than this one. Two bright stars lying in the cl., belong probably to the Taurus-cluster.

21.

Pl. 6.

$\alpha = 5^h 4^m 9$

$\delta = +16^\circ 24'$

GD_6

F. A. C. 121

$\bar{n} = 4.0$ $a = 29$

II T III

$d = 18-21$

$n = 92$ $n_A = 2$

$n_G = 2$ $n_K = 1$

TAB. A.

α	δ	m	m'	Sp.
$5^h 4^m 7$	$+16^\circ 22'$	10.4	10.5	A 2
4.3	15	10.4	10.4	A
5.0	22	9.0	9.8	G 5
5.0	29	9.2	10.0	,
5.1	19	8.3	9.3	K 0

TAB. B.

n	Sp.	n	Sp.
1	B 8	2	F
2	A 0	1	G 0
2	A 2	1	G 5
1	A 3	1	K 0
1	A 5	1	K 2

TAB. C (c = -1.1).

m'	9	10	11	12	13	> 13.5
n	1	5	6	8	20	52

N. G. C. 1817 (Not noted by Melotte).

Forms with N. G. C. 1807 a double-cluster, and has the same appearance as this one; the diameter is, however, almost twice as large as that of 1807. Melotte has quite overlooked this cl.

22.

Pl. 6.

$\alpha = 5^h 6^m 3$

$\delta = +16^\circ 34'$

GD_6

F. A. C. 121

$\bar{n} = 4.0$ $a = 35$

III T III

$d = 30-36$

$n = 144$

$n_A = 2$ $n_G = 1$

TAB. A.

α	δ	m	m'	Sp.
$5^h 5^m 4$	$+16^\circ 28'$	9.7	9.7	A 0
6.4	34	9.7	9.8	A 2
6.1	38	8.7	9.5	G 5

TAB. B.

n	Sp.	n	Sp.
1	B	1	G 0
4	A 0	5	G 5
2	A 2	1	K 0
1	A 3	6	K 2
2	A 5	1	K 5
7	T		

TAB. C (c = -1.1).

m'	9	10	11	12	13	> 13.5
n	1	5	5	16	29	88

N. G. C. 1857 (M-e 32).

A small, very thin cl. containing a few faint stars. The two brightest stars lying in the cl. do certainly not belong to it; in the vicinity are numerous bright stars.

23.

Pl. 2.

$$\alpha = 5^h 13.^m 2$$

$$\delta = +39^\circ 14'$$

 GC_5

F. A. C. 168

$$\bar{n} = 4.7 \quad a = 85$$

II TI

$$d = [8] \quad n = 28$$

TAB. A.

α	δ	m	m'	Sp.
$5^h 13.^m 0$ 13.2	$+39^\circ 16'$ 14	9.4 7.84	9.4 9.02	[A] [K 5]

TAB. B.

n	Sp.
1	A 0
3	F'
1	K 5

TAB. C ($c = -0.9$).

m'	11	12	13	> 13.5
n	1	2	5	20

N. G. C. 1893 (M-e 33).

May be counted as one of the most irregular cls. Rather thin. Not condensed and imperceptibly passing into the environs.

24.

Pl. 2.

$$\alpha = 5^h 19.^m 2$$

$$\delta = +33^\circ 18'$$

 GD_5

F. A. C. 145

$$\bar{n} = 3.6 \quad a = 7.4$$

II TIV

$$d = 22-26$$

$$n = 34 \quad n_G = 1$$

TAB. A.

α	δ	m	m'	Sp.
$5^h 19.^m 0$	$+33^\circ 17'$	9.5	10.1	G

TAB. B.

n	Sp.	n	Sp.
5	B	2	G 5
6	A	2	K
2	F		

TAB. C ($c = -1.1$).

m'	9	10	11	12	13	> 13.5
n	1	1	3	9	8	12

25.

Pl. 6.

$$\alpha = 5^h 21.^m 4$$

$$\delta = +35^\circ 14'$$

 GC_5

F. A. C. 145

$$\bar{n} = 2.0 \quad a = 105$$

II TI

$$d = [6] \quad n = 20$$

N. G. C. 1907 (M-e 35).

A small cl. containing a few faint stars lying very condensed. Forms a pair with M. 38 (N. G. C. 1912). No stars in D. C.

TAB. C ($c = -1.1$).

m'	12	13	> 13.5
n	1	7	12

N. G. C. 1912. M. 38 (M-e 36).

A large, condensed cl., well defined.

26.

Pl. 6.

$$\alpha = 5^h 22.^m 0$$

$$\delta = +35^\circ 45'$$

GC_5

F. A. C. 145

$$\bar{n} = 2.8 \quad a = 111$$

II T I

$$d = 40-47$$

$$n = 215 \quad n_A = 2$$

$$n_G = 1$$

TAB. A.

α	δ	m	m'	Sp.
$5^h 23.^m 2$	$+35^\circ 53'$	8.7	8.7	<i>B 8</i>
23.3	38	9.5	9.5	<i>A</i>
22.7	49	8.6	9.4	<i>G 5</i>

TAB. B.

n	Sp.	n	Sp.	n	Sp.
2	<i>B 0</i>	1	<i>Bp</i>	4	<i>F</i>
1	<i>B 1</i>	6	<i>A 0</i>	1	<i>G 0</i>
2	<i>B 5</i>	3	<i>A 2</i>	1	<i>G 5</i>
3	<i>B 8</i>	1	<i>A 5</i>	11	<i>K</i>
2	<i>B</i>				

TAB. C ($c = -1.1$).

m'	8	9	10	11	12	13	> 13.5
n	1	2	7	11	24	45	125

N. G. C. 1960. M. 36 (M-e 37).

An almost circular cl. with very distinct condensation. The faint stars which are very few in number are mostly situated in the exterior parts. No stars in D. C.

27.

Pl. 3.

$$\alpha = 5^h 29.^m 5$$

$$\delta = +34^\circ 4'$$

GC_5

F. A. C. 145

$$\bar{n} = 4 \quad a = 114$$

II T I

$$d = 22-27$$

$$n = 88$$

TAB. C ($c = -1.1$).

m'	9	10	11	12	13	> 13.5
n	2	8	9	13	21	35

N. G. C. 2099. M. 37 (M-e 38).

A dense, very regular, well condensed cl. with numerous faint stars. The majority of the bright stars lies near the centre. No stars in D. C.

28.

Pl. 7.

$$\alpha = 5^h 45.^m 8$$

$$\delta = +32^\circ 31'$$

GC_5

F. A. C. 146

$$\bar{n} = 4.4 \quad a = 64.5$$

II T I

$$d = 34-41$$

$$n = 337$$

TAB. A.

α	δ	m	m'	Sp.
$5^h 47.^m 0$	$+32^\circ 16'$	9.0	9.0	<i>[B 9]</i>
45.7	31	<i>Cl.</i>	<i>Cl.</i>	<i>Con.</i>

TAB. B.

n	Sp.	n	Sp.
5	<i>B 9</i>	1	<i>G</i>
7	<i>A</i>	2	<i>K</i>
3	<i>F</i>	1	<i>Ma</i>

TAB. C ($c = -1.8$).

m'	11	12	13	> 13.5
n	20	103	149	65

N. G. C. 2126 (M-e 39).

29.

Pl. 3.

$\alpha = 5^h 55.^m 2$

$\delta = +49^\circ 54'$

 GC_5

F. A. C. 168

$\bar{n} = 2.2 \quad a = 116$

I II T III

$d = [6] \quad n = 25$

$n_A = 1?$

A rather thin, well defined cl. containing a small number of faint stars. It is clearly oval, contrary to other small clusters. Falls along a bright star B. D. $+48^\circ.1333$. No stars in D. C.

TAB. A.

α	δ	m	m'	Sp.
$5^h 55.^m 0$	$+49^\circ 55'$	5.98	5.98	[A 0]

TAB. B.

n	Sp.
1	B 9

TAB. C ($c = -0.9$).

m'	12	13	> 13.5
n	4	7	14

N. G. C. 2158 (M-e 40).

30.

$\alpha = 6^h 1.^m 3$

$\delta = +24^\circ 6'$

 GC_6

F. A. C. 146

Not distinctly shown on the chart. Possibly of the globular class.

N. G. C. 2168. *M. 35* (M-e 41).

31.

Pl. 7.

$\alpha = 6^h 2.^m 7$

$\delta = +24^\circ 21'$

 GC_6

F. A. C. 146

$\bar{n} = 3.1$

$a = 82$

I II T I

$d = 45-55$

$n = 215 \quad n_A = 6$

$n_G = 1$

A splendid specimen. A very large, thin and circular cl., without sharply conspicuous condensation. On the contrary, the centre seems to be rather void of stars. In the vicinity of the centre is a gathering of five or six stars which are not to be clearly distinguished. The cl. passes imperceptibly into the environs.

TAB. A.

α	δ	m	m'	Sp.
$6^h 2.^m 9$	$+24^\circ 22'$	8.6	8.6	B 8
4.4	34	9.5	9.5	B 9
3.3	35	8.6	8.6	[A 0]
3.7	14	8.5	8.6	A 2
3.6	10	10.0	10.1	,
3.8	38	9.4	9.4	A
3.2	38	10.0	10.0	,
3.2	27	8.2	8.8	G 0

TAB. B.

n	Sp.	n	Sp.
1	B 1	2	A
1	B 8	3	F
7	B 9	1	G 0
9	A 0	5	G 5
1	A 2	11	K
1	A 3	1	Ma
1	A 5		

TAB. C ($c = -1.8$).

m'	8	9	10	11	12	> 12.5
n	4	21	39	38	37	76

32.

$\alpha = 6^h 8^m 2$
 $\delta = +39^\circ 53'$
 GC_5
 F. A. C. 169

N. G. C. 2192 (M-e 42).

This cl. is not distinctly shown on the chart.

33.

Pl. 3.
 $\alpha = 6^h 8^m 2$
 $\delta = +12^\circ 50'$
 GD_6
 F. A. C. 122
 $\bar{n} = 6.4$ $a = 41$
I II T I
 $d = [6]$ $n = 51$

N. G. C. 2194 (M-e 43).

A small, circular, dense cl. containing exclusively faint stars.

No stars in D. C.

TAB. C (c = -1.4).

m'	12	13	> 13.5
n	1	8	42

34.

Pl. 3.
 $\alpha = 6^h 11^m 3$
 $\delta = -18^\circ 37'$
 GD_7
 F. A. C. 74
 $\bar{n} = 7.5$ $a = 69$
I II T I
 $d = 19-23$
 $n = 71$ $n_G = 1$
 $n_K = 1$

N. G. C. 2204 (M-e 44).

A distinct cl., circular and well condensed.

TAB. A.

α	δ	m	m'	Sp.
$6^h 11^m 1$ 11.0	$-18^\circ 35'$ 27	9.0 6.24	9.8 7.24	<i>G 5</i> <i>K 0</i>

TAB. B.

n	Sp.	n	Sp.
1 5	<i>B 9</i> <i>A</i>	3 1	<i>F</i> <i>K</i>

35.

Pl. 4.
 $\alpha = 6^h 16^m 0$
 $\delta = -7^\circ 15'$
 GD_7
 F. A. C. 74
 $\bar{n} = 7.0$ $a = 128$
I II T I
 $d = [9]$ $n = 28$

N. G. C. 2215 (M-e 45).

A very well defined cl. with equal dispersion. No stars in D. C.

36.

$\alpha = 6^h 25^m 7$
 $\delta = -31^\circ 13'$
 GD_7
 F. A. C. 50

N. G. C. 2243 (M-e 46).

Not distinctly shown on the chart. Possibly a globular cl.

37.

$\alpha = 6^h 33^m 0$
 $\delta = +10^\circ 58'$
 GC_6 F. A. C. 123

N. G. C. 2259 (M-e 48).

Not shown on the chart.

N. G. C. 2266 (M-e 50).

A small, rather dense, very distinct cl. with faint stars. No stars in D. C.

38.

Pl. 4.

$$\alpha = 6^h 37.^m 0$$

$$\delta = + 27^\circ 4'$$

GC_6

F. A. C. 147

$$\bar{n} = 4.7 \quad a = 85$$

III TI

$$d = [7] \quad n = 110$$

TAB. C (c = -0.9).

m'	11	12	13	> 13.5
n	4	9	42	55

N. G. C. 2281 (M-e 51).

A thin, peculiarly formed cl. containing mainly bright stars. Particularly faint stars are not numerous. Its outlines are very irregular. The densest part lies, contrary to the rule, in one of the outsides. Four of the brightest stars lie so close to each other that they partially cover one another. It is therefore difficult to determine their magnitudes. No stars in D. C.

39.

Pl. 8.

$$\alpha = 6^h 42.^m 3$$

$$\delta = + 41^\circ 10'$$

GC_5

F. A. C. 169

$$\bar{n} = 3.2 \quad a = 55$$

II TIII

$$d = 20-24$$

$$n = 62 \quad n_A = 3$$

TAB. A.

α	δ	m	m'	Sp.
$6^h 43.^m 0$	$+ 41^\circ 6'$	9.0	9.0	A 0
41.7	11	9.2	9.2	'
41.4	5	8.6	8.6	A

TAB. B.

n	Sp.
4	A
1	F
1	G
2	K

TAB. C (c = -0.8).

m'	9	10	11	12	13	> 13.5
n	5	5	8	5	7	32

40.

Pl. 8.

$$\alpha = 6^h 42.^m 7$$

$$\delta = - 20^\circ 38'$$

N. G. C. 2287. M. 14. (M-e 52).

A very large cl., sharply separated from the surroundings and consisting for a great part of bright stars. In the outsides the distribution of the stars is unequal.

GD_7

F. A. C. 75

$\bar{n} = 5.1$ $a = 104$

I II T II

$d = 40-48$

$n = 159$ $n_A = 16$

$n_F = 1$ $n_K = 4$

TAB. A.

α	δ	m	m'	Sp.
$6^h 42.^m 8$	$-20^\circ 55'$	6.00	5.3	B 8
41.8	39	8.0	7.7	A 0
41.3	35	8.3	8.8	"
41.5	46	9.0	9.7	"
41.4	35	9.1	8.0	"
41.9	39	9.1	8.3	"
41.3	25	9.4	8.8	"
42.2	37	9.6	9.1	"
42.1	35	9.8	8.8	"
42.1	44	9.8	8.8	["]
43.2	41	9.8	8.8	"
41.7	37	10.1	8.3	"
41.3	35	8.9	8.5	A
41.9	42	8.9	8.2	"
41.3	43	9.1	8.8	"
42.5	42	10.5	9.7	"
42.6	33	10.5	9.7	"
42.7	34	8.4	8.6	F 8
41.7	30	8.3	8.8	[K 0]
41.6	41	7.4	8.3	K 2
41.5	45	7.50	8.6	"
42.2	43	8.1	8.8	"
41.4	58	8.4	9.1	K 5

TAB. B.

n	Sp.
2	B 3
4	B 8
1	B 9
22	A 0
6	A 2
2	A 3
4	F 0
2	F 5
2	G 0
5	G 5
9	K 0
1	K 2
2	K 5
2	Mb
1	Mc

N. G. C. 2301 (M-e 54).

41.

Pl. 4.

$\alpha = 6^h 46.^m 6$

$\delta = +0^\circ 35'$

GC_7

F. A. C. 99

$\bar{n} = 7.9$ $a = 47$

I II T III

$d = 17-21$

$n = 54$ $n_A = 3$

$n_K = 1$

TAB. A.

α	δ	m	m'	Sp.
$6^h 46.^m 5$	$+0^\circ 29'$	8.3	8.3	A 0
46.5	32	8.7	8.7	"
46.5	27	9.3	9.3	A
47.1	35	8.9	9.9	K 0

TAB. B.

n	Sp.	n	Sp.
5	B	3	F
2	A 0	1	K 2
1	A 2	1	K 5
1	A 5		

TAB. C ($c = -1.8$).

m'	8	9	10	11	12	> 12.5
n	2	4	6	8	11	23

42.

$\alpha = 6^h 49.^m 2$

$\delta = +18^\circ 8'$

GC_6

F. A. C. 123

$\bar{n} = 8.5$ $a = 59$

I II T I

$d = [4]$ $n = 20$

N. G. C. 2304 (M-e 55).

A small, rather thin, distinct cl. with exclusively very faint stars.

TAB. C ($c = -0.9$).

m'	> 13.5
n	20

43.

$\alpha = 6^h 51.^m 2$

$\delta = -7^\circ 4'$

 GD_7

F. A. C. 99

$\bar{n} = 5.0 \quad a = 111$

II T I

$d = [3] \quad n = 22$

N. G. C. 2309 (M-e 56).

A small, dense cl. with a few faint stars. No stars in D. C.

44.

$\alpha = 6^h 57.^m 1$

$\delta = +75^\circ 23'$

 GC_4

F. A. C. 200

N. G. C. 2314 (M-e 57).

Not well shown on the chart.

45.

Pl. 9.

$\alpha = 6^h 58.^m 2$

$\delta = -8^\circ 12'$

 GC_7

F. A. C. 75

$\bar{n} = 4.7 \quad a = 100$

II T III

$d = 19-23$

$n = 150 \quad n_A = 7$

$n_K = 2$

N. G. C. 2323. M. 50 (M-e 58).

A very distinct cl. with irregular outline and a clear condensation. The bulk of the bright stars lies in the centre. The dispersion in the outsides is very unequal.

TAB. A.

α	δ	m	m'	Sp.
$6^h 58.^m 1$	$-8^\circ 2'$	8.9	8.9	B 8
58.1	10	9.0	9.0	,
58.2	12	8.4	8.4	B 9
57.9	18	9.2	9.2	,
58.7	19	9.1	9.1	A 0
59.0	7	9.8	9.8	,
58.5	22	9.1	9.1	A
59.8	18	7.41	8.41	K 0
58.0	19	7.8	8.9	K 2

TAB. B.

n	Sp.
1	B 2
4	B 8
2	B 9
5	A 0
1	A 3
3	F
1	G 5
1	K 0
1	K 5
1	Oe 5

N. G. C. 2324 (M-e 59).

A rather dense, distinct, condensed and regular cl. At the outer edge are to be found five or six bright stars which may possibly belong to the cl. The discontinuity in magnitude between these stars and the others is, however, so great that they may perhaps not be counted as belonging to the cl.

46.

Pl. 4.

$\alpha = 6^h 59.^m 0$

$\delta = +1^\circ 12'$

 GC_7

F. A. C. 99

$\bar{n} = 8.0 \quad a = 16$

II T I

$d = 13-15$

$n = 44 \quad n_A = 1$

TAB. A.

α	δ	m	m'	Sp.
$6^h 59.^m 1$	$+1^\circ 14'$	9.6	9.6	A 0

TAB. B.

n	Sp.	n	Sp.
1	B 9	1	A 3
3	A 0	2	F
1	A 2	1	G 0

TAB. C ($c = -1.8$).

m'	12	13	> 13.5
n	5	12	27

N. G. C. 2335 (M-e 60).

A not well defined cl. which contains faint stars and imperceptibly passes into the surroundings. No condensation; the outline rather irregular. No stars in D. C.

47.

Pl. 5.

$$\alpha = 7^h 1.^m 8$$

$$\delta = -9^\circ 56'$$

*GC*₇

F. A. C. 75

$$\bar{n} = 3.2 \quad a = 75$$

I II T IV

$$d = 19-23$$

$$n = 34 \quad n_A = 1$$

$$n_K = 1$$

TAB. A.

α	δ	m	m'	Sp.
$7^h 1.^m 4$	$-10^\circ 1'$	7.96	7.94	B 9
1.7	4	7.96	9.03	K 2

TAB. B.

n	Sp.	n	Sp.
1	B 0	2	F
1	B 3	1	G 5
1	B 5	5	K 0
1	B 8	1	K 2
7	A	1	K 5

N. G. C. 2345 (M-e 61).

A not well defined cl. containing mainly faint stars. No condensation. The form oval.

48.

Pl. 5.

$$\alpha = 7^h 3.^m 7$$

$$\delta = -13^\circ 1'$$

*GD*₇

F. A. C. 75

$$\bar{n} = 7.3 \quad a = 31$$

I II T I

$$d = [12] \quad n = 38$$

$$n_A = 1 \quad n_G = 1$$

TAB. A.

α	δ	m	m'	Sp.
$7^h 3.^m 6$	$-13^\circ 6'$	9.2	9.3	A 2
3.9	12 56	8.5	9.3	G 5

TAB. B.

n	Sp.
2	B 9
2	A 0
1	G 5
1	K 0

N. G. C. 2353 (M-e 62).

A very thin, irregular cl. with the condensation in one of the outsides.

49.

Pl. 6.

$$\alpha = 7^h 9.^m 8$$

$$\delta = -10^\circ 8'$$

*GC*₇

F. A. C. 75

$$\bar{n} = 5.5 \quad a = 81$$

I II T III

$$d = 26-31$$

$$n = 78$$

$$n_B = 2$$

$$n_A = 6$$

$$n_F = 1$$

$$n_K = 1$$

TAB. A.

α	δ	m	m'	Sp.
$7^h 9.^m 7$	$-10^\circ 8'$	5.99	5.77	B 1
9.1	3	9.3	9.3	B 8
9.4	16	9.5	9.5	"
9.6	2	9.5	9.5	"
9.9	2	9.2	9.2	B 9
9.2	9 58	9.5	9.5	"
10.3	10 20	10.1	10.1	[]
10.7	14	9.7	9.7	"
9.8	6	8.36	8.42	B
9.2	16	8.0	8.3	F 0
10.2	0	9.19	10.19	K 0

TAB. B.

n	Sp.
1	B 5
5	B 8
12	B 9
1	B
31	A
4	F 0
1	F 2
5	F 5
10	G
5	K 0
2	K 2
3	K 5

N. G. C. 2355 (M-e 63).

A small, dense and circular cl. with faint stars. No stars in D. C.

50.

Pl. 6.

$$\alpha = 7^h 11.^m 3$$

$$\delta = +13^\circ 57'$$

*GC*₆

F. A. C. 123

$$\bar{n} = 4.6 \quad a = 46$$

I II T I

$$d = [10] \quad n = 77$$

TAB. C ($c = -0.9$).

m'	12	13	>13.5
n	3	5	69

N. G. C. 2360 (M-e 64).

A rather regular, well condensed cl. gradually passing into the environs. Contains mainly faint stars.

51.

Pl. 6.

$$\alpha = 7^h 13.^m 2$$

$$\delta = -15^\circ 27'$$

*GD*₇

F. A. C. 75

$$\bar{n} = 10.8 \quad a = 51$$

I II *T* I

$$d = 17-20$$

$$n = 174 \quad n_B = 1$$

TAB. A.

α	δ	m	m'	Sp.
$7^h 13.^m 6$	$-15^\circ 27'$	8.7	8.5	B 2

TAB. B.

n	Sp.	n	Sp.
1 3	B 8 B 9	6 2	A G 0

N. G. C. 2362 (M-e 65).

Falls on Canis Majoris. Contains several bright stars. Differs scarcely from the surroundings, which also contain numerous bright stars. No stars in D. C.

52.

Pl. 6.

$$\alpha = 7^h 14.^m 6$$

$$\delta = -24^\circ 46'$$

*GD*₇

F. A. C. 51

$$\bar{n} = 9.2 \quad a = 87$$

I II *T* IV

$$d = [7] \quad n = 21$$

M-e 66 (Not in N. G. C.).

Shows a peculiar appearance: a circular cl. of faint stars surrounded by brighter stars unevenly distributed. Melotte's value of the diameter is quite too small, as evidently he has only considered the inner faint cl.

53.

Pl. 7.

$$\alpha = 7^h 23.^m 4$$

$$\delta = -47^\circ 32'$$

*GC*₇

F. A. C. 31

$$\bar{n} = 10.4 \quad a = 118$$

I II *T* II

$$d = 33-39$$

$$n = 127 \quad n_A = 2$$

$$n_K = 1$$

TAB. A.

α	δ	m	m'	Sp.
$7^h 22.^m 0$	$-47^\circ 22'$	9.1	9.4	A 0
24.5	35	7.9	8.2	A 5
23.3	34	7.8	8.4	K 0

TAB. B.

n	Sp.	n	Sp.
7	B	3	F
4	A 0	2	G
2	A	2	K 0

54.

Pl. 7.

$$\alpha = 7^h 31.^m 9$$

$$\delta = -20^\circ 23'$$

*GC*₇

F. A. C. 76

$$\bar{n} = 6.1 \quad a = 123$$

I II *T* III

$$d = [10] \quad n = 47$$

N. G. C. 2421 (M-e 67).

A small, well defined cl. with fairly clear condensation. The outsides are rather irregular. No stars in D. C.

N. G. C. 2422 (M-e 68).

A curious specimen; contains some very bright stars, which seem to be mingled in a dense gathering of relatively faint stars. Three bright stars are lying close together. Irregular form.

55.
Pl. 9.
 $\alpha = 7^h 32.^m 0$
 $\delta = -14^\circ 16'$
 GC_7
F. A. C. 76
 $\bar{n} = 7.6$ $a = 92$
 $I II$ $T III$
 $d = 34-41$
 $n = 72$ $n_B = 1$
 $n_A = 13$ $n_K = 3$

TAB. A.

α	δ	m	m'	Sp.
$7^h 31.^m 4$	$-14^\circ 16'$	5.57	5.45	B 5
33.1	13	6.42	6.40	B 9
31.9	23	7.7	7.7	,
32.0	16	7.9	7.9	,
32.0	16	7.9	7.9	,
32.1	14	7.9	7.9	,
31.4	29	8.5	8.5	,
32.0	2	9.1	9.1	[,]
32.2	21	8.6	8.6	A 0
31.1	28	9.1	9.1	,
31.8	31	9.1	9.1	[,]
32.0	27	9.1	9.1	,
31.8	22	9.8	9.8	,
31.8	23	9.8	9.8	[,]
31.1	6	9.6	9.7	A 2
31.0	14	10.1	10.2	,
31.8	17	9.1	9.1	A
32.0	12	9.2	9.2	,
31.9	14	10.1	11.1	K 0
31.6	29	8.5	9.5	,
31.6	11	8.6	9.7	K 2

TAB. B.

n	Sp.
1	B 2
1	B 5
1	B 8
9	B 9
2	B
30	A 0
11	A 2
2	A 3
2	A
10	F
7	G
7	K 0
5	K 2
3	K 5
1	K
2	Ma

N. G. C. 2420 (M-e 69).

A small, dense, distinct and circular cl., with faint stars. May be referred to the globular clusters. No stars in D. C.

56.
Pl. 7.
 $\alpha = 7^h 32.^m 5$
 $\delta = +21^\circ 48'$
 GC_6
F. A. C. 124
 $\bar{n} = 2.4$ $a = 137$
 $I III$ $T I$
 $d = [6]$ $n = 42$

TAB. C (c = -0.5).

m'	11	12	13	> 13.5
n	2	4	6	30

N. G. C. 2423 (M-e 70).

A very thin, not well defined cl. consisting of faint stars. Rather irregular outline; no condensation; the stars unequally dispersed. This cl. borders upon N. G. C. 2422.

57.
Pl. 9.
 $\alpha = 7^h 32.^m 5$
 $\delta = -13^\circ 38'$
 GC_7
F. A. C. 76
 $\bar{n} = 5.5$ $a = 91$
 $I II$ $T III$
 $d = 27-33$
 $n = 92$ $n_A = 2$
 $n_K = 1$

TAB. A.

α	δ	m	m'	Sp.
$7^h 32.^m 2$	$-13^\circ 47'$	9.1	9.1	B 9
32.5	39	9.1	9.1	A 0
32.0	50	9.1	10.1	K 0

TAB. B.

n	Sp.	n	Sp.	n	Sp.
1	B 2	19	A 0	5	K 0
1	B 3	5	A 2	2	K 2
2	B 5	3	A	3	K 5
1	B 8	3	F	1	K
12	B 9	2	G 5	1	Ma
1	B				

M-e 71 (Not in N. G. C.)

A rather small and irregular cl., containing exclusively faint stars. Distinct condensation. No stars in D. C.

58.

Pl. 7.

$$\alpha = 7^h 32.^m 9$$

$$\delta = -11^\circ 50'$$

GC₇ F. A. C. 76

$$\bar{n} = 6.7 \quad a = 100$$

I II T II

$$\bar{d} = 13-16$$

$$n = 58$$

M-e 72 (Not in N. G. C.)

Very small; irregular form; faint stars. Well defined. No stars in D. C.

59.

$$\alpha = 7^h 33.^m 7$$

$$\delta = -10^\circ 27'$$

GC₇ F. A. C. 76

$$\bar{n} = 6.7 \quad a = 108$$

I II T II

$$\bar{d} = [5] \quad n = 16$$

N. G. C. 2432 (M-e 73).

This cl. is not shown on the chart.

60.

$$\alpha = 7^h 36.^m 5$$

$$\delta = -18^\circ 51'$$

GC₇ F. A. C. 76

N. G. C. 2439 (M-e 74).

A very interesting specimen. The brightest stars are lying in a dense, sharply marked ring round the nearly starless centre. Outside the ring lie faint stars irregularly dispersed. No stars in D. C.

61.

Pl. 7.

$$\alpha = 7^h 37.^m 0$$

$$\delta = -31^\circ 25'$$

GD₈ F. A. C. 52

$$\bar{n} = 6.3 \quad a = 66$$

I II T III

$$\bar{d} = [9] \quad n = 49$$

N. G. C. 2437. M. 46 (M-e 75).

A very fine, circular cl., distinctly separated from the surroundings and mainly containing middlebright stars. The condensation not very conspicuous.

62.

Pl. 9.

$$\alpha = 7^h 37.^m 2$$

$$\delta = -14^\circ 35'$$

GC₇ F. A. C. 76

$$\bar{n} = 6.1 \quad a = 73$$

I II T I

$$\bar{d} = 30-36$$

$$n = 255 \quad n_A = 3$$

$$n_F = 1$$

TAB. A.

α	δ	m	m'	Sp.
7 ^h 36. ^m 6	-14° 37'	9.0	9.0	B 9
36.8	35	8.5	8.5	A 0
37.3	45	8.99	8.99	[>]
38.3	37	9.1	9.2	A 2
36.5	49	8.7	9.0	F 2
37.2	29	Neb.	Neb.	Pd

TAB. B.

n	Sp.	n	Sp.
1	B 2	3	F 0
2	B 9	3	F 2
17	A 0	1	F 5
6	A 2	1	F 8
2	A 3	3	G
3	A 5	6	K
3	A	3	Ma

N. G. C. 2447. M. 93 (M-e 76).

This cl. is at the centre so strongly condensed that the stars can scarcely be separated. The density decreases rapidly. Rather irregular outline.

TAB. A.

α	δ	m	m'	Sp.
$7^h 40.^m 3$	$-23^\circ 38'$	11.2	9.0	B 9
40.7	26	10.7	9.3	"
40.7	50	10.4	9.0	[A 0]
40.1	38	8.9	9.0	K

TAB. B.

n	Sp.	n	Sp.
7	B 9	8	F
7	B	7	G
18	A 0	16	K
12	A		

63.
Pl. 10.
 $\alpha = 7^h 40.^m 4$
 $\delta = -23^\circ 38'$
 GC_7 F. A. C. 52
 $\bar{n} = 5.2$ $a = 116$
I II T III
 $d = 29-35$
 $n = 186$
 $n_A = 2$ $n_K = 1$

N. G. C. 2455 (M-e 77).

Not distinctly shown on the chart.

64.
 $\alpha = 7^h 44.^m 6$
 $\delta = -21^\circ 3'$
 GC_7 F. A. C. 76

N. G. C. 2477 (M-e 78).

A very fine, circular, well defined cl. with a strong condensation and a rapidly decreasing density outwards. Contains a very large number of stars, none of which are bright. At the centre the stars are lying so close that one is almost inclined to class the cl. among the »globulars». It is therefore difficult to count the stars lying in the centre. No stars in D. C.

65.
Pl. 10.
 $\alpha = 7^h 48.^m 7$
 $\delta = -38^\circ 17'$
 GD_8 F. A. C. 32
 $\bar{n} = 3.5$ $a = 100$
I II T I
 $d = 28-34$
 $n = 253$

N. G. C. 2489 (M-e 79).

A well defined, circular cl. including only faint stars. Exceptionally thin as containing so faint stars. No stars in D. C.

66.
Pl. 8.
 $\alpha = 7^h 52.^m 2$
 $\delta = -29^\circ 48'$
 GC_8 F. A. C. 52
 $\bar{n} = 7.2$ $a = 19$
I I T I
 $d = [7]$ $n = 67$

N. G. C. 2506 (M-e 80).

A rather small, very dense and well defined cl. containing for the most part very faint stars. Almost of the globular class. No stars in D. C.

67.
Pl. 8.
 $\alpha = 7^h 55.^m 2$
 $\delta = -10^\circ 21'$
 GC_7 F. A. C. 76
 $\bar{n} = 4.4$ $a = 65$
I II T III
 $d = 15-18$
 $n = 56$

N. G. C. 2509 (M-e 81).

68.
 $\alpha = 7^h 56^m 3$
 $\delta = -18^\circ 48'$
*GC*₇ F. A. C. 76
 $\bar{n} = 8.2$ $a = 58$
 III TI
 $d = [5]$ $n = 56$

A small, well defined cl. with clear condensation and exclusively faint stars. Regular outline. The diameter is no doubt much greater than the estimate of Melotte. No stars in D. C.

N. G. C. 2516 (M-e 82).

69.
 Pl. 26.
 $\alpha = 7^h 56^m 7$
 $\delta = -60^\circ 36'$
*GD*₉ F. A. C. 16
 $\bar{n} = 2.5$ $a = 10$
 II T III
 $d = 93-111$
 $n = 703$ $n_B = 1$
 $n_A = 28$ $n_F = 1$
 $n_M = 1$

A very large, thin, irregular, well defined cl. containing a very great number of stars, many of which are very bright. The condensation is conspicuous, but the dispersion unequal.

TAB. A.

α	δ	m	m'	Sp.	α	δ	m	m'	Sp.
7 ^h 57. ^m ₂	— 60° 33'	5.88	5.71	B 3	7 ^h 54 ^m .7	— 60° 32'	8.8	9.0	A 0
57.9	59 56	6.41	6.0	B 8	56.0	47	8.8	8.8	,
56.7	60 35	7.4	6.7	,	59.9	14	8.8	8.7	,
8 2.0	37	8.1	8.0	,	55.5	37	8.9	9.6	,
7 56.3	20	8.2	7.7	,	59.3	61 18	8.9	8.8	[,]
56.1	20	8.4	8.1	,	58.4	60 30	9.0	8.2	,
54.6	50	7.0	6.9	B 9	53.7	3	9.1	9.0	,
56.1	39	7.4	6.7	,	53.7	35	9.1	9.1	[,]
55.7	30	7.6	7.8	,	54.8	61 1	9.3	9.3	[,]
58.2	28	8.5	7.8	[,]	59.6	5	9.4	9.4	,
51.6	40	8.6	8.2	,	54.3	59 58	9.42	8.4	,
57.0	26	8.9	7.6	[,]	8 1.7	60 14	8.7	8.7	[A 2]
59.4	61 15	7.7	7.7	A 0	7 54.1	12	9.16	8.7	[,]
51.9	60 48	7.9	7.7	,	8 0.0	61 8	8.7	9.1	A 3
54.2	54	8.0	8.1	,	7 57.8	60 31	9.1	9.1	A
57.1	22	8.1	8.1	[,]	57.5	61 18	7.2	7.8	[F 0]
57.7	32	8.1	8.1	,	55.9	60 2	5.66	6.6	[F 8]
59.4	39	8.3	8.4	,	8 1.2	59 56	8.7	10.8	,
53.4	17	8.5	8.4	,	7 54.6	60 15	5.59	7.7	[K 2]
57.5	19	8.56	8.1	,	52.2	19	7.3	9.0	[K 5]
8 0.3	48	8.6	9.0	,	57.9	19	5.06	7.4	Ma
7 55.8	22	8.7	8.7	,					

A 0

m	n	m	n	m	n
7.1	1	8.4	2	9.3	5
7.2	2	8.5	4	9.4	1
7.4	4	8.6	2	9.5	3
7.7	2	8.7	4	9.6	6
7.8	1	8.8	2	9.8	3
7.9	2	8.9	9	9.9	3
8.0	2	9.0	3	10.1	3
8.1	2	9.1	8	10.2	1
8.2	4				

B 9

m	n	m	n
6.3	1	7.7	2
6.6	2	7.8	1
6.7	1	8.0	2
7.0	2	8.3	2
7.1	2	8.4	4
7.2	2	8.7	4
7.4	2	8.8	4
7.6	1	8.9	2

TAB. B.

<i>n</i>	Sp.	<i>n</i>	Sp.	<i>n</i>	Sp.	<i>n</i>	Sp.
4	<i>B</i> 3	79	<i>A</i> 0	31	<i>F</i> 0	39	<i>G</i> 0
1	<i>B</i> 5	28	<i>A</i> 2	9	<i>F</i> 2	50	<i>K</i> 0
7	<i>B</i> 8	4	<i>A</i> 3	27	<i>F</i> 5	12	<i>K</i> 2
34	<i>B</i> 9	3	<i>A</i> 5	12	<i>F</i> 8	24	<i>K</i> 5
1	<i>B</i>	12	<i>A</i>	1	<i>F</i>	5	<i>Ma</i>

N. G. C. 2539 (M-e 83).

A particularly fine example. There is scarcely any other cl. with so faint stars in which they lie so thinly dispersed as here. May perhaps be considered as a cl. rather neighbouring, containing exclusively dwarfs. Well defined, and regular outline.

TAB. A.

α	δ	<i>m</i>	<i>m'</i>	Sp.
8 ^h 6. ^m ₅	—12° 38'	9.2	9.3	<i>A</i> 2
6.6	37	4.68	5.68	[<i>K</i> 0]

TAB. B.

<i>n</i>	Sp.	<i>n</i>	Sp.
1	<i>B</i> 9	1	<i>A</i>
7	<i>A</i> 0	5	<i>F</i>
2	<i>A</i> 2	3	<i>G</i>
1	<i>A</i> 5	3	<i>K</i> 0

70.
Pl. 11.
 $\alpha = 8^h 6.^m_0$
 $\delta = -12^\circ 32'$
*GC*₇ F. A. C. 76
 $\bar{n} = 6.8$ $a = 46$
I I *T* II
 $d = 27-33$
 $n = 118$ $n_A = 1$

N. G. C. 2547 (M-e 84).

A very thin, irregular cl. containing a small number of rather bright stars which are lying in a ring round the centre which is almost devoid of stars. In the environs are numerous bright stars.

TAB. A.

α	δ	<i>m</i>	<i>m'</i>	Sp.
8 ^h 7. ^m ₄	—48° 56'	6.68	6.2	<i>B</i> 3
8.0	59	8.2	8.0	<i>B</i> 8
7.2	58	9.0	8.0	,
7.5	52	8.3	7.6	<i>B</i> 9
7.0	58	8.9	8.0	,
7.0	49 2	9.6	8.4	,
7.5	48 48	9.6	9.3	[,]
7.0	50	9.4	9.0	[<i>A</i> 0]
8.4	54	10.9	9.8	<i>A</i> 2
7.8	49	10.9	10.1	<i>F</i> 0

TAB. B.

<i>n</i>	Sp.
1	<i>B</i> 3
1	<i>B</i> 8
8	<i>B</i> 9
12	<i>A</i> 0
2	<i>A</i> 2
1	<i>A</i> 5
1	<i>A</i>
3	<i>F</i> 0
1	<i>F</i> 2
3	<i>G</i>
1	<i>Mb</i>

71.
Pl. 11.
 $\alpha = 8^h 7.^m_7$
 $\delta = -48^\circ 58'$
*GD*₈ F. A. C. 32
 $\bar{n} = 6.5$ $a = 65$
I I *T* III
 $d = 22-27$
 $n = 30$ $n_F = 6$
 $n_B = 1$ $n_A = 6$

N. G. C. 2548 (M-e 85).

A large, fine, very well defined cl. with mainly bright stars. Irregular outline and unequal distribution of the stars. At the centre are gathered about ten bright stars. The outsides are thin.

72.
Pl. 12.
 $\alpha = 8^h 8.^m_8$
 $\delta = -5^\circ 30'$

GC_7

F. A. C. 100

 $\bar{n} = 4.0$ $a = 89$

I II T III

 $d = 49-59$ $n = 188$ $n_A = 15$ $n_F = 1$ $n_K = 1$

TAB. A.

α	δ	m	m'	Sp.
$8^h 8^m 6$	$-5^\circ 46'$	10.2	10.2	B 9
8.4	16	8.50	8.50	A 0
8.3	20	8.7	8.7	,
8.0	16	9.30	9.30	,
9.3	51	9.5	9.5	,
8.1	35	9.9	9.9	,
7.4	11	9.9	9.9	,
8.8	19	8.7	8.8	A 2
8.2	20	9.2	9.3	,
9.3	25	9.2	9.3	,
8.1	27	9.3	9.4	[,]
8.9	24	9.7	9.8	,
9.8	9	9.7	9.8	,
9.8	30	10.2	10.3	,
7.3	16	10.3	10.4	,
8.8	31	9.2	9.2	A
9.2	16	9.3	9.7	F 5
10.0	14	9.25	10.03	[G 5]
9.3	36	8.5	9.5	[K 0]
7.7	23	9.7	10.7	,

TAB. B.

n	Sp.
6	A 0
10	A 2
2	A 5
1	A
2	F
14	G
11	K 0
3	K 2
2	K 5
1	Ma

N. G. C. 2567 (M-e 86).

A rather distinct, irregular cl. with very unequal dispersion; at the centre the stars form several groups. No stars in D. C.

73.

Pl. 8.

 $\alpha = 8^h 14^m 6$ $\delta = -30^\circ 20'$ GC_8 F. A. C. 52 $\bar{n} = 10$ $a = 54$

I I T III

 $d = [12]$ $n = 58$

N. G. C. 2627 (M-e 87).

A well defined cl. with regular outlines and exclusively faint stars.

74.

Pl. 8.

 $\alpha = 8^h 33^m 1$ $\delta = -29^\circ 36'$ GC_8 F. A. C. 53 $\bar{n} = 5.8$ $a = 80$

I II T I

 $d = [12]$ $n = 36$ $n_K = 2$

TAB. A.

α	δ	m	m'	Sp.
$8^h 33^m 6$	$-29^\circ 34'$	8.4	9.5	K 2
33.0	30	9.3	9.8	,

TAB. B.

n	Sp.	n	Sp.
1	B	1	G
6	A	1	K 2
1	F	2	K 5

N. G. C. 2632. M. 44 Praesepe (M-e 88).

A very large, thin cl. without distinct condensation. The brightest stars are mainly situated in the central part of the cl., which shows a considerable difference between d_δ and d_α ($d_\delta > d_\alpha$).

75.

Pl. 12.

 $\alpha = 8^h 34^m 3$ $\delta = +20^\circ 20'$

GB_5

F. A. C. 125

$\bar{n} = 1.8$ $a = 116$

I II T III

$d = 2^\circ 8' - 2^\circ 34'$

$n = 174$ $n_A = 32$

$n_F = 13$ $n_G = 3$

$n_K = 2$ $n_M = 1$

TAB. A.

α	δ	m	m'	Sp.	α	δ	m	m'	Sp.
$8^h 34.^{m_1}$	$+20^\circ 20'$	6.52	6.52	A 0	$8^h 34.^{m_2}$	$+20^\circ 32'$	9.5	9.6	A 5
34.2	19 55	6.94	6.94	"	34.2	23	9.6	9.6	A
34.2	54	7.15	7.15	"	34.0	9	6.68	6.96	F 0
34.6	53	7.40	7.40	"	34.6	19 43	6.85	7.13	"
31.9	20 6	8.3	8.3	"	33.4	20 2	8.1	8.4	"
31.1	19 15	8.52	8.52	"	31.8	22	9.1	9.4	"
33.4	57	8.58	8.58	"	33.5	19 18	9.1	9.4	[]
34.6	20 3	8.7	8.7	"	34.1	20 55	9.2	9.5	"
34.7	12	8.7	8.7	[]	36.2	32	9.2	9.5	"
34.7	33	9.1	9.1	"	35.4	11	9.5	9.8	"
34.7	19 54	6.32	6.38	A 2	36.6	32	9.5	9.8	"
35.5	20 50	6.60	6.66	"	37.1	21 11	9.6	9.9	"
31.9	19 53	8.20	8.26	"	36.2	19 17	9.8	10.1	[F 2]
31.6	13	8.48	8.54	"	32.6	20 34	8.1	8.5	F 5
33.3	20 22	8.7	8.8	"	34.3	19 34	9.3	9.7	"
35.1	38	8.9	9.0	"	33.3	20 28	9.5	9.9	"
35.2	18	9.5	9.6	"	34.3	21 26	9.9	10.3	[]
35.2	19 56	6.75	6.83	A 3	31.7	20 50	8.1	8.6	F 8
34.0	38	7.8	7.9	"	31.3	19 57	9.9	10.4	[]
36.4	46	7.90	7.98	"	34.6	20 1	6.40	7.18	G 5
34.0	20 27	8.1	8.2	"	32.8	13	9.6	10.4	"
35.6	19 37	8.6	8.7	"	34.6	21 12	9.9	10.7	"
35.5	20 17	8.8	8.9	"	34.3	20 30	10.1	10.9	[]
34.3	19 18	9.8	9.9	"	34.4	22	6.48	7.48	[K 0]
32.1	38	6.70	6.84	A 5	34.1	19 54	6.68	7.68	[]
35.0	20 5	6.72	6.86	"	36.1	20 14	6.98	7.98	"
34.9	19 34	8.0	8.1	"	33.3	21 9	8.8	9.8	[]
36.5	17	8.00	8.14	[]	35.9	20 1	8.9	9.9	[]
32.9	20 21	8.6	8.7	"	33.8	32	9.5	10.5	[]
33.1	19 51	8.85	8.99	"	33.6	24	9.6	10.6	[]
35.9	30	8.9	9.0	"	33.2	21 9	10.1	11.1	"
34.8	33	9.1	9.2	"	34.6	29	10.1	11.5	Ma

TAB. B. *

n	Sp.	n	Sp.	n	Sp.
6	A 0	3	F 5	1	K 2
5	A 2	12	F 8	1	K 5
5	A 5	6	G 0	1	Ma
4	F 0	5	G 5	3	Mb
3	F 2	17	K 0	1	Md

TAB. C ($c = -1.1$).

m'	6	7	8	9	10	11	12	13	>13.5
n	1	7	19	19	14	15	17	23	59

76.

$\alpha = 8^h 34.^{m_5}$

$\delta = -34^\circ 25'$

GC_8 F. A. C. 53

N. G. C. 2635 (M-e 89).

This cl. is not clearly shown on the chart.

77.

Pl. 9.

$\alpha = 8^h 39.^{m_4}$

N. G. C. 2658 (M-e 90).

A rather thin, not well defined cl. Seems to consist of a circular centre with several offshoots. The cl. appears very indistinct on the chart.

* In this case the area for Tab. B is only three times as large as the clusterarea.

$\delta = -32^\circ 18'$
 GC_8 F. A. C. 53
 $\bar{n} = 3.9$ $a = 6.8$
 I II T III
 $d = [9]$ $n = 32$
 $n_F = 1$

TAB. A.

α	δ	m	m'	Sp.
$8^h 38.^m 9$	$-32^\circ 18'$	10.8	10.1	F 8

TAB. B.

n	Sp.	n	Sp.
1	B	1	F 2
3	A	2	K

N. G. C. 2659 (M-e 91).

A very thin, not well defined cl. with very irregular outline.

78.

Pl. 9.

$\alpha = 8^h 39.^m 2$
 $\delta = -44^\circ 36'$
 GD_8 F. A. C. 33
 $\bar{n} = 6.7$ $a = 99$
 I II T IV
 $d = [12]$ $n = 36$
 $n_A = 1$

TAB. A.

α	δ	m	m'	Sp.
$8^h 38.^m 2$	$-44^\circ 38'$	7.3	7.0	B 9

TAB. B.

n	Sp.	n	Sp.
1	B 2	1	G
1	A 0	4	K

79 (Not in N. G. C. and M-e).

A very irregular cl., containing exclusively bright stars.

79.

Pl. 13.

$\alpha = 8^h 38.^m 0$
 $\delta = -47^\circ 58'$
 GD_8 F. A. C. 33
 $\bar{n} = 7.2$ $a = 106$
 I II T III
 $d = 25-30$ $n = 37$
 $n_B = 1$ $n_A = 1$
 $n_K = 1$

TAB. A.

α	δ	m	m'	Sp.
$8^h 37.^m 7$	$-47^\circ 52'$	7.3	7.0	B 5
38.9	53	8.3	7.6	B 8
37.8	48 0	10.0	8.8	[A 0]
37.0	5	7.8	9.0	K 0

TAB. B.

n	Sp.	n	Sp.	n	Sp.
1	B 3	4	A 2	1	G
2	B 5	1	A 3	4	K 0
9	B 8	1	A 5	3	K 2
12	B 9	3	F	1	K 5
10	A 0				

N. G. C. 2670 (M-e 93).

A very well defined and irregular cl. with mainly rather faint stars; rather thin at the outsides. The centre is dense.

Remark: In the vicinity of this cl. lies a group of bright stars ($\alpha = 8^h 38.^m 0$; $\delta = -47^\circ 58'$) reminding of N. G. C. 2547 which has not been noted by Melotte whose description of N. G. C. 2670 is more applicable to this one. This cl. is described above.

TAB. A.

α	δ	m	m'	Sp.
$8^h 43.^m 5$	$-48^\circ 23'$	8.5	8.0	[A 0]

TAB. B.

n	Sp.	n	Sp.	n	Sp.
2	B	1	A 3	2	G
1	A 0	1	F	5	K
1	A 2				

N. G. C. 2682. M. 67 (M-e 94).

A fine cl. with equal dispersion; almost circular and rather dense. Curious position of the brightest stars: they are lying mainly along a diameter of the cl.; the faint stars are lying on both sides of this diameter. Well defined from the surroundings which are very thin.

81.

Pl. 13.

$\alpha = 8^h 45.^m 8$
 $\delta = +12^\circ 11'$
 GB_6 F. A. C. 125

$\bar{n} = 2.3$ $a = 63$
 III T I
 $d = 25 - 30$
 $n = 190$ $n_K = 1$

TAB. A.

α	δ	m	m'	Sp.
$8^h 46.^m 4$	$+ 12^\circ 15'$	7.8	8.8	K 0

TAB. B.

n	Sp.
2	F
1	G

82.

N. G. C. 2818 (M-e 96).

 $\alpha = 9^h 12.^m 0$

Not distinctly shown on the

 $\delta = -36^\circ 12'$

chart. Classed as »globular» in

 GC_8 F. A. C. 53

N. G. C.

TAB. C ($c = -1$).

m'	8	9	10	11	12	13	> 13.5
n	1	1	4	10	15	36	123

83.

M-e 97. (Not in N. G. C.).

Pl. 10.

An irregular, for the greatest part thin cl.; yet ten stars
 are lying very close together.

 $\alpha = 9^h 24.^m 1$ $\delta = -56^\circ 36'$ GD_9 F. A. C. 17 $\bar{n} = 10.5$ $a = 50$

III T III

 $d = 39 - 47$ $n = 74$ $n_A = 1$ $n_K = 1$ $n_M = 1$

TAB. A.

α	δ	m	m'	Sp.
$9^h 22.^m 5$	$-56^\circ 55'$	8.2	7.4	B 8
23.0	49	8.3	9.5	K 5
24.9	53	7.9	8.9	Ma

TAB. B.

n	Sp.	n	Sp.	n	Sp.
2	B 5	4	F	3	K 5
3	B 8	5	G	1	K
6	B 9	9	K 0	2	Ma
22	A	6	K 2	1	Pa

N. G. C. 3114 (M-e 98).

84.

A very large, thin, rather irregular cl. not sharply separated
 from the surroundings and without perceptible condensation.
 Contains many bright stars. These are lying in a circle round
 the centre which contains faint stars. The brightest star pre-
 sents a peculiar aspect: it is surrounded by a circle of faint
 stars which lie quite close to it.

Pl. 14.

 $\alpha = 9^h 59.^m 5$ $\delta = -59^\circ 38'$ GD_9 F. A. C. 17 $\bar{n} = 20.2$ $a = 44$

III T III

 $d = 45 - 54$ $n = 134$ $n_A = 30$ $n_F = 1$ $n_G = 2$ $n_K = 5$ $n_N = 1$

TAB. A.

α	δ	m	m'	Sp.	α	δ	m	m'	Sp.
$9^h 58.^m 5$	$-59^\circ 38'$	8.3	8.1	B 9	$10^h 2.^m 4$	$-59^\circ 31'$	9.5	9.5	[A 0]
58.7	30	8.5	8.7	"	9 58.3	35	9.6	9.6	"
59.3	24	8.8	9.2	"	58.5	22	9.6	9.6	["]
57.3	31	8.9	8.9	"	59.4	40	9.6	9.6	"
10 2.3	25	8.9	9.2	"	10 1.9	45	9.6	9.6	"
9 57.8	29	9.0	9.0	"	9 58.1	51	9.8	9.8	"
58.4	52	9.0	9.2	"	10 1.7	57	10.0	10.0	"
57.2	31	9.1	9.0	"	0.8	47	9.7	9.8	A 2
10 0.9	23	9.1	8.9	"	9 59.8	41	6.02	6.7	[A 5]
2.5	37	9.1	9.5	["]	10 0.6	38	9.6	9.6	A
0.6	22	9.3	9.3	"	9 58.8	56	6.11	6.4	[F 0]
9 59.6	21	9.5	9.5	"	56.8	56	9.2	9.5	"
10 0.0	51	9.6	9.6	"	10 0.4	43	8.4	8.7	G 5
9 56.9	51	9.8	9.8	"	9 56.7	42	9.0	9.8	"
56.8	41	10.1	10.1	"	57.7	45	8.2	9.0	K 0
57.9	50	8.31	8.6	A 0	10 0.1	28	8.5	9.3	["]
59.9	21	8.4	8.6	"	0.6	34	8.7	9.8	"
59.6	28	8.9	9.2	"	9 57.5	41	9.1	10.1	"
10 1.3	39	9.1	9.8	"	58.1	58	9.31	10.3	"
1.9	34	9.1	9.2	"	10 0.9	43	9.3	10.3	"
0.3	43	9.2	9.2	"	9 56.7	44	var.	var.	Nb.
9 59.0	41	9.5	9.5	"					
10 0.7	40	9.5	9.5	"					

TAB. B.

<i>n</i>	Sp.	<i>n</i>	Sp.	<i>n</i>	Sp.	<i>n</i>	Sp.	<i>n</i>	Sp.	<i>n</i>	Sp.
1	B 0	12	B 9	1	A 3	3	F 2	4	G 5	8	M
2	B 3	4	B	1	A 5	4	F 5	15	K 0	1	Oa
3	B 5	37	A 0	6	A	1	F 8	4	K 2		
17	B 8	9	A 2	12	F 0	7	G 0	12	K 5		

85.

$\alpha = 10^h 32.^m 0$
 $\delta = -57^\circ 43'$
*GC*₉ F. A. C. 18
 $\bar{n} = 16.1$ $a = 88$
 I III T II
 $d = [10]$ $n = 19$

N. G. C. 3293 (M-e 100).

A few bright stars forming a small cl., situated in a very rich region. No stars in D. C.

86.

Pl. 14.
 $\alpha = 10^h 38.^m 6$
 $\delta = -64^\circ 34'$
*GD*₉ F. A. C. 18
 $\bar{n} = 9.9$ $a = 91$
 I III T II
 $d = 30-36$
 $n = 102$

M-e 101 (Not in N. G. C.).

An irregular cl. with the centre rather condensed and the outsides thin. No stars in D. C.

87.

Pl. 14.
 $\alpha = 10^h 39.^m 4$
 $\delta = -63^\circ 52'$
*GD*₉ F. A. C. 18
 $\bar{n} = 12.9$ $a = 83$
 I II T I
 $d = 70-84$
 $n = 289$ $n_B = 8$
 $n_A = 11$ $n_G = 2$
 $n_K = 3$

M-e 102. (Not in N. G. C.).

A circular group, containing numerous very bright stars round Θ Carinae. May be counted to Melotte's class II. (Melotte counts it to the coarse clusters, class IV).

TAB. A.

α	δ	<i>m</i>	<i>m'</i>	Sp.	α	δ	<i>m</i>	<i>m'</i>	Sp.
10 ^h 39. ^m 4	-63° 52'	3.03	2.79	B 0	10 ^h 39. ^m 9	-63° 33'	7.3	7.3	A 0
40.5	26'	5.09	4.92	B 3	39.1	64 10	7.5	7.5	,
38.7	57	5.20	5.03	,	35.5	27	7.7	7.7	,
40.3	44	6.14	6.2	,	43.5	63 44	7.8	7.8	[,]
44.0	64 2	6.6	6.4	,	36.1	64 10	9.0	9.0	[,]
43.2	63 52	5.10	4.98	B 5	42.0	11	7.7	7.8	A 2
42.7	59	5.54	5.42	,	42.6	4	7.7	7.7	A
37.6	57	6.5	6.4	,	40.6	9	8.9	8.9	,
42.8	44	5.43	5.38	[B 8]	43.1	64 6	8.0	8.6	G 0
35.9	36	6.60	6.4	B 9	41.9	63 42	8.6	9.2	,
37.2	64 8	6.7	6.7	,	41.0	17	7.9	8.9	K 0
35.4	63 59	6.7	6.7	[,]	36.8	29	8.0	9.0	,
38.9	53	6.9	6.9	,	44.4	21	8.2	9.2	[,]
38.0	35	7.0	7.0	,	42.5	31	8.3	9.5	K 5
44.2	44	6.4	6.4	A 0					

TAB. B.

<i>n</i>	Sp.	<i>n</i>	Sp.	<i>n</i>	Sp.	<i>n</i>	Sp.	<i>n</i>	Sp.
1	B 0	1	B 3p	4	A	6	F 8	3	K 2
3	B 3	46	A 0	1	A 0p	5	G 0	7	K 5
14	B 8	8	A 2	4	F 0	3	G 5	1	Mb
16	B 9	9	A 3	3	F 2	1	G	1	R 5
1	B	9	A 5	9	F 5	10	K 0	1	Oa

88.

N. G. C. 3532 (M-e 103).

Pl. 15.

 $\alpha = 11^h 2^m 2^s$ $\delta = -58^\circ 8'$ GC₉ F. A. C. 18 $\bar{n} = 35$ $a = 32$

III TI

 $d = 60-72$ $n = 302$ $n_B = 3$ $n_A = 113$ $n^F = 0$ $n_G = 4$ $n_K = 4$

A very large, dense cl. with rather regular outline and distinct condensation. In this case the counting of the stars was very difficult. In the surroundings many dense groups are to be found. Owing to the great density of this cl. I have been able to count the stars only down to the 12th magnitude incl.

TAB. A.

α	δ	m	m'	Sp.	α	δ	m	m'	Sp.	α	δ	m	m'	Sp.
11 ^h 1 ^m 9 ^s	-58° 21'	8.4	8.3	[B 5]	11 ^h 1 ^m 0 ^s	-58° 8'	9.2	9.2	A 0	11 ^h 3 ^m 0 ^s	-57° 44'	9.6	9.7	A 2
2.0	18	8.0	8.0	B 8	0.9	57 52	9.4	9.4	"	3.6	45	9.8	9.9	"
1.5	18	8.3	8.3	"	2.2	59	9.4	9.4	"	2.0	47	9.9	10.0	"
6.0	57 58	8.8	8.8	"	2.8	55	9.4	9.4	"	2.1	53	9.9	10.0	"
1.6	58 17	8.9	8.9	"	2.9	51	9.4	9.4	"	2.8	58 6	9.9	10.0	"
0.6	1	9.0	8.2	[]	3.6	58 24	9.4	9.4	[]	4.5	10	9.9	10.0	[]
3.1	10	9.7	9.7	[]	10 58.8	57 40	9.5	9.5	"	5.4	1	10.1	10.2	"
2.9	10	8.2	8.2	B 9	11 3.3	56	9.5	9.5	"	1.5	25	10.2	10.3	"
10 59.6	14	8.5	7.6	"	3.6	56	9.5	9.5	[]	2.0	30	10.2	10.3	"
11 2.6	10	8.5	8.5	"	10 59.8	54	9.7	9.7	"	3.1	26	10.2	10.3	"
1.3	5	8.6	8.6	"	59.9	58 18	9.7	9.7	"	0.9	14	8.8	8.9	A 3
10 58.4	57 52	8.7	8.5	"	11 0.2	19	9.7	9.7	"	0.3	57 58	10.2	10.3	"
59.6	51	8.7	8.6	"	1.5	4	9.7	9.7	"	4.3	58 8	9.6	9.7	A 5
11 4.2	58 17	8.8	8.8	"	3.6	17	9.7	9.7	"	0.4	9	8.6	8.6	A
10 59.0	35	8.9	8.9	"	4.3	57 59	9.7	9.7	[]	1.7	7	8.6	8.5	"
11 2.7	15	8.9	7.1	[]	2.3	58 31	9.9	9.9	"	0.6	13	8.9	8.2	"
10 59.1	30	9.1	9.2	"	10 58.3	2	10.0	10.0	"	0.7	15	8.9	8.5	"
11 3.4	36	9.1	8.5	"	59.1	13	10.0	10.0	"	0.8	10	8.9	8.9	"
5.3	38	9.1	9.1	[]	11 0.0	57 45	10.0	10.0	"	0.5	10	9.1	8.3	"
10 59.1	57 56	9.5	9.5	"	0.1	58 23	10.0	10.0	"	0.5	9	9.1	9.1	"
59.4	47	9.7	9.7	"	0.5	57 56	10.0	10.0	"	1.0	18	9.1	9.1	"
11 3.4	58 8	9.7	9.7	[]	1.2	58 0	10.0	10.0	"	2.4	19	9.1	9.1	"
10 58.5	17	9.0	9.1	B	2.7	57 56	10.0	10.0	"	0.4	17	9.4	9.4	"
11 4.3	57 53	9.0	8.8	"	3.9	58 11	10.0	10.0	"	3.0	16	9.4	9.4	"
3.7	58 6	10.1	9.9	"	4.1	57 53	10.0	10.0	[]	3.4	15	9.7	9.7	"
3.0	22	8.2	8.2	A 0	10 58.4	58 29	10.2	10.2	"	10 59.5	2	10.0	10.0	"
3.5	13	8.2	8.2	"	59.0	4	10.2	10.2	"	59.8	57 55	10.0	10.0	"
2.7	57 42	8.4	8.5	[]	11 2.6	57 47	10.2	10.2	"	11 0.8	50	10.0	10.0	"
1.0	58 15	8.5	8.5	"	3.9	37	10.2	10.2	"	1.6	57	10.0	10.0	"
0.7	8	8.6	8.6	"	0.0	58 4	10.3	10.3	"	5.4	58 8	10.0	10.0	"
10 58.3	57 50	8.7	9.5	"	0.0	4	10.3	10.3	"	10 59.1	57 48	10.2	10.2	"
58.9	58 34	8.7	8.2	"	2.6	12	8.4	8.5	A 2	11 3.7	58 31	10.3	10.3	"
11 0.1	14	8.7	7.9	"	5.5	10	8.5	8.6	"	4.2	8	10.6	10.6	"
1.0	32	8.8	8.9	"	0.0	57 56	8.6	8.9	"	4.3	21	8.9	8.3	[F 0]
4.0	24	8.8	8.8	"	4.9	58 11	8.6	8.0	"	0.0	11	8.4	8.5	[F 2]
10 59.5	15	8.9	8.9	"	0.9	28	8.7	8.8	"	4.4	26	4.02	5.5	[F 8p]
11 1.1	57 40	8.9	8.9	"	3.8	18	8.7	8.8	"	5.4	18	var	var.	[F 8]
1.4	58 11	8.9	8.9	"	4.6	17	8.7	8.8	[]	10 58.6	10	8.4	8.8	[G 5]
2.4	12	8.9	7.5	"	2.5	32	8.8	8.9	"	11 0.3	13	8.4	8.5	"
5.8	19	8.9	8.9	[]	4.7	25	8.8	8.9	"	0.3	9	8.7	8.5	"
10 58.9	57 51	9.1	8.8	"	0.7	29	9.0	8.0	"	10 59.2	15	9.1	9.2	G
59.0	58 21	9.1	9.1	"	1.9	6	9.0	9.1	"	11 1.8	11	8.9	8.8	"
59.3	1	9.1	9.1	"	3.8	57 57	9.0	9.1	"	2.3	7	6.07	8.2	K 0
59.3	40	9.1	9.1	"	3.9	58 27	9.1	9.2	"	3.7	57 45	7.9	8.8	[]
11 1.5	11	9.1	9.1	"	10 58.6	57 58	9.3	9.4	"	0.0	56	8.6	8.9	"
3.2	33	9.1	9.4	"	11 1.6	58 0	9.3	9.4	"	10 59.5	42	9.0	10.0	[]
5.6	57 43	9.1	9.1	[]	2.9	57 59	9.3	9.4	"	11 2.5	58 3	8.9	10.0	K 2
10 59.3	58 13	9.2	9.2	"	6.1	58 22	9.3	9.4	"	5.1	57 59	9.1	10.2	[]
59.8	20	9.2	9.2	"	3.5	57 58	9.4	9.5	"	1.2	43	9.0	10.0	K

TAB. B.

<i>n</i>	Sp.	<i>n</i>	Sp.	<i>n</i>	Sp.	<i>n</i>	Sp.	<i>n</i>	Sp.
8	B0	1	B6	34	A2	10	F2	8	G5
1	B1	39	B8	13	A3	14	F5	30	K0
6	B2	38	B9	7	A5	5	F8	10	K2
8	B3	9	B	5	A	4	G0	10	M
17	B5	111	A0	17	F0	1	G4	3	O

M-e 104. (Not in N. G. C.).

A regular, condensed and well defined cl. with exclusively faint stars. No stars in D. C.

89.

Pl. 10.

$$\alpha = 11^h 13.^m 6$$

$$\delta = -62^\circ 10'$$

*GD*₉ F. A. C. 18

$$\bar{n} = 14.6 \quad a = 34$$

II TI

$$d = 15-18$$

$$n = 79$$

90.

$$\alpha = 11^h 15.^m 2$$

$$\delta = -62^\circ 58'$$

*GD*₉ F. A. C. 18

$$\bar{n} = 14.4 \quad a = 45$$

II TI

$$d = [4] \quad n = 17$$

M-e 105. (Not in N. G. C.).

A very small cl. so sharply condensed at the centre, that the star-counting gets very difficult. No stars in D. C.

91.

Pl. 10.

$$\alpha = 11^h 20.^m 9$$

$$\delta = -42^\circ 41'$$

*GC*₉ F. A. C. 34

$$\bar{n} = 4.5 \quad a = 114$$

II II T II

$$d = [12] \quad n = 33$$

N. G. C. 3680 (M-e 106).

A well defined but thin, fairly regular cl. Some slight condensation visible. Contains scarcely any very faint stars. Clusters whose brightest stars are so faint as in this case contain as a rule a larger number of very faint stars. No stars in D. C.

92.

Pl. 10.

$$\alpha = 11^h 31.^m 5$$

$$\delta = -61^\circ 3'$$

*GD*₉ F. A. C. 18

$$\bar{n} = 34.2 \quad a = 36$$

III TI $d = [12]$

$$n_B = 4 \quad n_A = 1$$

N. G. C. 3766 (M-e 107).

This cl. contains a great number of bright stars which lie so close together that it is quite impossible to distinguish and count them.

TAB. A.

α	δ	<i>m</i>	<i>m'</i>	Sp.
11 ^h 31. ^m 9	-61° 6'	6.7	7.2	B0
32.1	60 58	9.1	9.0	B5
31.2	61 0	8.5	8.3	B
31.3	3	8.5	8.3	"
32.2	7	9.1	8.9	B8

TAB. B.

<i>n</i>	Sp.
2	B5
3	B8
2	A0
1	K0
1	Ma

M-e 108 (Not in N. G. C.).

A small, irregular cl. with distinct condensation. No stars in D. C.

93.

Pl. 11.

$$\alpha = 11^h 45.^m 9$$

$$\delta = -55^\circ 8'$$

 GC_9 F. A. C. 18

$$\bar{n} = 7.1 \quad a = 95$$

I II T III

$$d = [8] \quad n = 48$$

N. G. C. 4103 (M-e 109).

A very dense crowd of rather bright stars.

94.

Pl. 11.

$$\alpha = 12^h 1.^m 5$$

$$\delta = -60^\circ 41'$$

 GC_9 F. A. C. 19

$$\bar{n} = 15.0 \quad a = 86$$

I I T I

$$d = [9] \quad n = 25$$

$$n_A = 1$$

TAB. A.

α	δ	m	m'	Sp.
$12^h 1.^m 6$	$-60^\circ 37'$	8.9	8.9	A 0

TAB. B.

n	Sp.	n	Sp.
2	B	3	K
2	A 0	1	M

N. G. C. 4349 (M-e 110).

A large, dense and rather regular cl.; well defined though situated in a very rich region. A clear condensation. The brightest stars are rather distant from the centre.

95.

Pl. 15.

$$\alpha = 12^h 19.^m 0$$

$$\delta = -61^\circ 20'$$

 GC_9 F. A. C. 19

$$\bar{n} = 16.3 \quad a = 56$$

I II T I

$$d = 26-31$$

$$n = 61 \quad n_A = 1$$

$$n_F = 1$$

TAB. A.

α	δ	m	m'	Sp.
$12^h 20.^m 2$	$-61^\circ 11'$	8.7	8.7	[B 9]
19.3	7	8.8	8.8	[A 0]
18.5	33	8.5	8.6	A 2
19.1	21	8.4	8.6	F 5

TAB. B.

n	Sp.	n	Sp.	n	Sp.
1	B 0	9	A 0	3	F 5
2	B 5	1	A 2	5	F 8
3	B 8	1	F 0	4	G 5
8	B 9	1	F 2	3	K 0

N. G. C. 4755 (M-e 114).

The cl. consists of a group of stars situated round α Crucis. Four very bright stars are lying close together and certainly do not belong to the cl.

96.

Pl. 11.

$$\alpha = 12^h 47.^m 7$$

$$\delta = -59^\circ 48'$$

 GC_{10} F. A. C. 19

$$\bar{n} = 16.6 \quad a = 1$$

I I T II

$$d = [12] \quad n = 50$$

TAB. A.

α	δ	m	m'	Sp.
$12^h 47.^m 7$	$-59^\circ 49'$	6.86	7.2	[B 2]
47.9	50	6.11	8.5	[B 3]
48.0	47	7.9	6.8	[,]
47.4	47	5.84	5.5	[B 9p]

TAB. B.

n	Sp.
4	B 3
1	B 5
2	B 8
2	A