37. COMMISSION DES AMAS STELLAIRES ET DES ASSOCIATIONS

PRÉSIDENT: O. Heckmann.

MEMBRES: M. Baade, Mme Barkhatova, MM. W. Becker, Binnendijk, Blaauw, Chandrasekhar, Cuffey, Eggen, Gascoigne, Günther, Haffner, Hertzsprung, Irwin, H. L. Johnson, Kholopov, Lohmann, Markarian, Meurers, W. W. Morgan, Rosino, Sandage, Mme Sawyer-Hogg, MM. H. Shapley, Stock, Trumpler†, Vanderlinden, van Wijk, Wallenquist, Weaver.

INTRODUCTION

The following report is based exclusively on the information sent to the writer in response to his circular letter of August 1957. The tendency to reduce the number of members of commissions—well justified under several aspects—will make it necessary in the near future to extend considerably the number of astronomers, outside the membership of the commissions, who are asked to report to the commissions. The writer feels that this report is written in a transitory state of the I.A.U., and that the next report will have to be written from information on a much wider basis. In some cases members have felt responsible for a complete report on cluster work in their country (e.g. Sweden, U.S.S.R.); in others they have described their personal work only.

The report is divided into three parts dealing with associations, galactic clusters, and globular clusters. As far as possible the information has been condensed into tabular form. But before giving details it is satisfying to announce that Dr Georg Alter of Prague has completed a new catalogue of associations, galactic and globular clusters, giving full references to the literature on special objects. It is printed as a card file and will be distributed among astronomers in 1958. This catalogue will be very welcome for any work in the field of our Commission.

ASSOCIATIONS

K. A. Barkhatova reports about work on associations in U.S.S.R.:

I. M. Kopylov, on the basis of the H.R. diagrams of ten O-associations and the Pleiades has derived absolute magnitudes of O 5–A 0 stars [1]. N. L. Ivanova investigated the continuous spectrum and H absorption lines of some B stars in the Orion association [2]. P. P. Parenago studied the distribution of 1330 stars in Orion [3]. A. I. Lebedinsky and O. V. Khorosheva studied the motions in the associations of Lacerta, Perseus II, and Cepheus II [4] and [5].

Since October 1954, A. Blaauw has been concerned with the following items:

(1) pe U,B,V photometry of association Cepheus III in collaboration with H. L. Johnson.

(2) Study of differential luminosity effects in the nearest associations: to be published in Report of Charlottesville Conference on Cosmic Distance Scale.

(3) Study of Scorpio-Centaurus association in collaboration with F. C. Bertiau, S.J., based on new proper motions, spectral types, and radial velocities resulting in improved absolute magnitudes of the members.

(4) About 1000 radial-velocity plates in coudé focus of 82-in. McDonald reflector, mostly in the associations Perseus II, Lacerta I, Orion I, Scorpio-Centaurus, and Cassiopeia-Taurus, serve to investigate duplicity among association members. Measures and reductions completed for more than half of the material (in collaboration with E. Roemer, A. van Hoof, J. Seawright).

S. C. B. Gascoigne reports special classification of some stars in the Scorpio-Centaurus association by A. de Vaucouleurs (*M.N.* in press) to be extended by Buscombe and Morris, while Buscombe, Gollnow and Hagemann are working on radial velocities in this association.

W. W. Morgan investigated the Orion association. Revised spectral types showed regional differences probably evolutionary in nature. Brighter members of the inner Trapezium cluster have spectral peculiarities and are systematically fainter in absolute magnitudes than the stars of the larger clusters with north-south extent of 2° centred on the great nebula. The loose clustering near δ, ϵ and ζ Ori forms a separate sub-system of the Orion association; there seems to be a progressive increase in luminosity for stars of similar spectral types in this sub-system on passing from the neighbourhood of the 'horsehead' toward north-west.

GALACTIC CLUSTERS

The following Table 1*a* gives some data on eighty-six clusters under observation since October 1954. Thirty-seven of them are in common with the clusters of the corresponding table of the 1955 report, which contained 84 clusters. The most significant difference is the larger number of southern clusters, because of the new activity at Boyden Observatory. (See also Table 1*a*′ in the Appendix.)

Table 1*a*. *Galactic clusters*

NGC	Type	Observer	$\bar{\lambda}$	Limiting magnitude	Method	Data observed, reference, and remarks (*a*)
103		Hardorp	370 470 640	17	pg+pe	pe scales by Hiltner (2)
129		Hardorp	370 470 640	—	—	(2)
136		Hardorp	370 470 640	—	—	—
146		Hardorp	370 470 640	—	—	(2)
King 14		Hardorp	370 470 640	—	—	(2)
188		Barkhatova	427 543	15·5	pg	*Astr. J. Moscow*, **33**, 850, 1956 (2)
King 16		Hardorp	370 470 640	—	—	(2)
457	1b	Weaver	450 540	—	pe	—
581	1–2b	Oja	425 521 641	14	pg	p.m.
752	2f	Weaver	450 540	—	pe	—
		Grigorjeva	427 605	16·5	pg	—
		Wallenquist	—	—	pe	—
957		Larsson-Leander	—	—	pe	(2)
Tr 2		Weaver	450 540	—	pe	(2)
1039	1b–a	Weaver	450 540	—	pe	—
		Wallenquist	—	—	pe	—
1245		Reddish	—	—	pg	—
α Per Cl.	1–2b	Heckmann	370 420 640	12	pg	—
α Per Cl.		Mitchell	450 540	12	pe	—
Pleiades		Johnson	370 450 540	18	pe	—
1513		Barkhatova	427 543	16·5	pg	—
		Melnikova	427 543	16·5	pg	—
1528	1–2b–a	Barkhatova	427 543	15·5	pg	*Astr. J. Moscow*, **33**, 733, 1956
		Larsson-Leander	—	—	pe	—
1545		Barkhatova	427 543	15·5	pg	*Astr. J. Moscow*, **33**, 733, 1956
1582		Barkhatova	427 543	15·5	pg	in print
1605		Barkhatova	427 543	16·5	pg	—
1664		Lodén	—	—	pg	pol. in print
		Barkhatova	427 543	16·5	pg	—
		Melnikova	427 543	16·5	pg	—
		Larsson-Leander	450 530	—	pe+pg	s.t. *Stockh. Ann.* **20**, no. 2, 1957
1960	1b	Meurers	—	—	—	p.m.
2099	2a	Meurers	—	—	—	p.m.
		Lindblad P.O.	—	—	—	p.m. *Stockh. Ann.* **19**, no. 6, 1956
2168	1–2b	Meurers	—	—	—	p.m.
2175		Kirillova	427 543	17·0	pg	in print (2)
2244	1–2o	Kirillova	427 543	17·0	pg	in print
		Lodén	—	—	pg	*Ark. Astr.* **2**, no. 5, 1956
		van Schewick	—	—	—	p.m.

Table 1*a*. *Galactic clusters* (*cont.*)

NGC	Type	Observer	$\bar{\lambda}$	Limiting magnitude	Method	Data observed, reference, and remarks (*a*)
2252		van Schewick	—	—	—	p.m.
2264	1o	Uranova	427 543	16·0	pg	in print
2287	2a	Lodén	—	—	pg	*Ark. Astr.* **2**, no. 5, 1956
2354		Boyden	370 427 640	—	pe+pg	(1)
Mel 66		Boyden	370 427 640	—	pe+pg	(1)
2422	1–2b	Boyden	370 427 640	—	pe+pg	(1)
2451	1–2b	Boyden	370 427 640	—	pe+pg	(1)
2477		Boyden	370 427 640	—	pe+pg	(1)
2516	1–2b	Boyden	370 427 640	—	pe+pg	(1)
2545		Boyden	370 427 640	—	pe+pg	(1)
2546	1b	Boyden	370 427 640	—	pe+pg	(1)
2547	1b	Boyden	370 427 640	—	pe+pg	(1)
2548	1–2a	Haffner	370 427 640	—	pe+pg	—
IC 2602	1–2b	Boyden	370 427 640	—	pe+pg	(1)
		Hogg	—	—	pe+pg	—
		Wood	—	—	—	p.m.
		Gollnow and Hagemann	—	—	—	r.v.+s.t.
Praesepe		Eberlein	800	13	pg	—
IC 2391		Boyden	370 427 640	—	pe+pg	(1)
IC 2395		Boyden	370 427 640	—	pe+pg	(1)
Tr. 10		Boyden	370 427 640	—	pe+pg	(1)
3293	1b	Boyden	370 427 640	—	pe+pg	(1)
3532	2b–a	Boyden	370 427 640	—	pe+pg	(1)
3766	1b	Boyden	370 427 640	—	pe+pg	(1)
Coma	2a	Westerlund	—	—	—	s.t. *Medd. Astr. Obs. Uppsala* 116, 1956
4609		Rodgers	—	—	pe+pg	(2)
4755	1–2b	Hogg	—	—	pe+pg	—
		Buscombe	—	—	—	r.v.+s.t.
5460	1–2b–a	Boyden	370 427 640	—	pe+pg	(1)
6025	1b	Boyden	370 427 640	—	pe+pg	(1)
6087	1–2b	Boyden	370 427 640	—	pe+pg	(1)
6231	1o	Boyden	370 427 640	—	pe+pg	(1)
6242	1–2b	Boyden	370 427 640	—	pe+pg	(1)
Tr. 24		Boyden	370 427 640	—	pe+pg	(1)
6322	1b	Boyden	370 427 640	—	pe+pg	(1)
6405	1–2b	Boyden	370 427 640	—	pe+pg	(1)
6475	1b	Boyden	370 427 640	—	pe+pg	(1)
6494	2a	Johnson	370 450 540	—	pe	—
6530	1o	Boyden	370 427 640	—	pe+pg	(1)
6531	1b	Boyden	—	—	pe+pg	(1)
6611	1o	Boyden	370 427 640	—	pe+pg	(1)
6613	1b	Boyden	370 427 640	—	pe+pg	(1)
6633	1–2b–a	Johnson	370 450 540	—	pe	—
IC 4725	2b	Johnson	370 450 540	18	pe	—
		Boyden	370 427 640	—	pe+pg	(1)
6664		Boyden	370 427 640	—	pe+pg	(1)
IC 4756		Weaver	450 540	—	pe	—
6705	2b–a	Meurers	—	—	—	p.m.
6716	1b	Boyden	370 427 640	—	pe+pg	(1)
6811	2a–f	Weaver	450 540	—	pe	—
		Barkhatova	427 543	15·5	pg	*Astr. J. Moscow*, **34**, 203, 1957
6823		Barkhatova	427 543	15·5	pg	in print
6830		Barkhatova	427 543	15·5	pg	in print
6871	1o	Weaver	450 540	—	pe	—

Table 1*a*. *Galactic clusters* (*cont.*)

NGC	Type	Observer	$\bar{\lambda}$	Limiting magnitude	Method	Data observed, reference, and remarks (*a*)
6885	2–3a	Meurers	—	—	—	p.m.
6939	3a	Meurers	—	—	—	p.m.
6940	2a	Weaver	450 540	—	pe	—
		Grigorjeva	427 605	16·5	pg	*Astr. Circ. U.S.S.R.* 178, 21, 1957
		Reddish	—	—	pg	—
		Larsson-Leander	—	—	pe	—
6996		Barkhatova	427 543	15·5	pg	in print
Cr 428		Barkhatova	427 543	15·5	pg	in print
7086		Barkhatova	427 543	15·5	pg	*Astr. J. Moscow*, **33**, 556, 1956
7092	1a	Weaver	450 540	—	pe	—
		van Schewick	—	—	—	p.m.
IC 1396		Kirillova	427 543	17·0	pg	in print (2)
7160		Weaver	450 540	—	pe	—
IC 1434		Larsson-Leander	—	—	pe	—
7243	1b	Weaver	450 540	—	pe	—
		van Schewick	—	—	—	p.m.
7686		Weaver	450 540	—	pe	—
7788		Sandage	370 450 540	—	pe+pg	(2)
7789	2–3a	Sandage	370 450 540	—	pe+pg	—
		Weaver	450 540	—	pe	—
		Meurers	—	—	—	p.m.
		Haffner	370 427 640	—	pg	—
7790		Sandage	370 450 540	—	pe+pg	—

(*a*) p.m. = proper motions; s.t. = spectral types; r.v. = radial velocities; pol. = polarization. (1) The name Boyden in column 'Observer' includes the Belgian, German, Irish, and Swedish observatories running jointly, together with Harvard Observatory, Boyden Station, South Africa. (2) Compare the following list of spectral types of brightest cluster stars.

Table 1*b* gives additional information on the instruments used.
(See also Table 1*b*′ in the Appendix.)

Table 1*b*. *Observers and Instruments*

Name	Instrument	Locality	Data observed
Barkhatova	15 in. Schmidt	Kazan	pg mag.
Boyden	32 in. Baker-Schmidt	Bloemfontein	pg mag.
	60 in. refl.	Bloemfontein	pe mag.
Buscombe	74 in. refl.	Mount Stromlo	r.v. + s.t.
Eberlein	32 in. Schmidt	Bergedorf	pg infra-red mag.
Gollnow	74 in. refl.	Mount Stromlo	r.v. + s.t.
Grigorjeva	20 in. Maksutov	Alma-Ata	pg mag.
Haffner	32 in. Schmidt	Bergedorf	pe + pg mag.
Hagemann	74 in. refl.	Mount Stromlo	r.v. + s.t.
Hardorp	32 in. Schmidt	Bergedorf	pg mag.
Heckmann	15 in. Schmidt	Bergedorf }	pg mag.
	32 in. Schmidt	Bergedorf }	
Hogg	74 in. refl.	Mount Stromlo	pe + pg mag.
Johnson	—	Flagstaff	pe mag.
Kirillova	20 in. Maksutov	Alma-Ata	pg mag.
Larsson-Leander	24 in. refr.	Saltsjöbaden	pe + pg mag.
Lindblad P.O.	24 in. refr.	Saltsjöbaden	p.m.
Lodén	10 in. refl.	Anacapri	pg pol.
Melnikova	15 in. Schmidt	Kazan	pg mag.
Meurers and coll.	12 in. refr.	Bonn	p.m.
Mitchell	—	Flagstaff	pe mag.

Table 1*b*. *Observers and Instruments (cont.)*

Name	Instrument	Locality	Data observed
Oja	13 and 14 in. refr.	Uppsala	p.m.
	15 in. Schmidt	Uppsala	pg mag.
Reddish	—	Edinburgh	pg mag.
Rodgers	16 in. Schmidt	Mount Stromlo	pe+pg mag.
Sandage	60 in. refl.	Mount Wilson	pe+pg mag.
	100 in. refl.	Mount Wilson	
Uranova	15 in. Schmidt	Kazan	pg mag.
van Schewick	12 in. refr.	Bonn	p.m.
Wallenquist	16 in. Cassegrain	Kvistaberg	pe mag.
Weaver	—	Berkeley	pe mag.
Westerlund	6 in. astrograph	Uppsala	s.t.
	15 in. Schmidt	Uppsala	
Wood	—	Sydney	p.m.

On objective prism plates taken with the 32-inch Bergedorf Schmidt and the ADH telescope of Boyden Observatory, J. Stock has determined the spectral types of the brightest stars in some galactic clusters. He also detected some new clusters which on account of their concentration were difficult to recognize. His results are given in the following Table 2. The list is reproduced here, because it could be helpful in making new observing programmes; it gives for each cluster an equivalent of the Trumpler-type. The table is incomplete because of the incompleteness of the underlying plate material.

Table 2. *Spectral characteristics of brightest stars in some galactic clusters with unknown Trumpler type, by J. Stock*

NGC 46. Brightest stars of type OB, followed by main sequence stars. The spectral type of the stars near the plate limit is B 3 V. One A 2 Ia^+ star in the cluster field is probably not a member.

NGC 103. Brightest stars of type B 3 III–V, followed by main sequence stars.

NGC 129. The two brightest stars in the cluster are F-type super-giants. One A 4 II–III star may also be a member. The nucleus of the cluster consists of B stars (from B 3 on).

NGC 133. Doubtful cluster. Besides four A 4 V stars there are no other stars which seem to be physically connected.

NGC 146. Brightest stars of type OB, followed by main sequence B stars.

NGC 188. Brightest stars are late K or early M stars. Object similar to M 67 or NGC 7789.

NGC 189. Cluster begins with A 2 V stars. No late type giants.

NGC 225. Sixteen main sequence A-type stars and one A 2 III, one F 3 II, and one K 0 III star form a clearly visible concentration. There are however no faint F stars, and for the A stars there is no clear relation between spectral type and apparent magnitude.

NGC 366. A strongly reddened cluster. Brightest stars of type OB^+. Faintest stars visible on our plates are of type AB^-.

NGC 381. Cluster begins with A 2 V stars. No late-type giants.

NGC 637. Brightest stars of type OB, followed by B main sequence stars.

NGC 654. One A 3 II star and one F-type super-giant are the brightest stars in the area. Three fainter OB stars and about fifteen OB^- stars close to the limit of the plate form the nucleus of the cluster.

NGC 659. Brightest stars of type OB^+ and OB.

NGC 744. Brightest stars are of spectral class B 7–B 9 and of luminosity class IV and V. Fainter A-type stars belong to the main sequence.

NGC 957. Brightest stars of type OB, followed by B main sequence stars.

IC 1848. Cluster begins with one bright OB star and several OB^- stars, followed by fainter stars, which are not resolved on our plates.

NGC 1893. Brightest stars of type OB^+, followed by OB and OB^- stars and main sequence B stars.

NGC 1907. Brightest star of type OBce. Main sequence begins with B 5 stars. Two A 4 III stars are situated in the immediate neighbourhood of the cluster. Their membership is uncertain.

NGC 1931. This object appears to be a very small cluster (diameter 1′) which is imbedded in luminous nebulosity. Brightest stars probably of type OB^-.

NGC 2129. Brightest stars of type OB, followed by OB^- and main sequence B stars.
NGC 2175. Doubtful cluster. One OB, one OB^-, and several main sequence B stars and one A 2 III star are in the cluster area.
NGC 2453. Brightest stars of type OB^+ or OB. No late-type stars of corresponding apparent magnitude in cluster area.
NGC 2489. Brightest stars of type B 8 III–V. Several late-type stars within the cluster area.
IC 2581. One bright F 3 Ia star within the cluster. OB^+ stars, one with strong H emission, are several magnitudes fainter.
NGC 4052. Brightest stars of type B 3 V. No late-type stars.
NGC 4103. Brightest stars of type OB, one with variable H emission. One K-type super-giant at a distance of 15′ from the cluster.
NGC 4349. Brightest stars of type B 8 IV–V. No late-type stars.
NGC 4439. Brightest stars of type OB^-. No late-type stars.
NGC 4609. Brightest stars of type B 4 IV–V. One bright star at the edge of the cluster is probably an A-type super-giant.
NGC 5281. Small and dense cluster. Brightest stars probably of type OB^+.
NGC 5316. Brightest stars of type B 5 III. One K 0 II–III star.
NGC 5606. Brightest stars of type OB^+.
NGC 5617. Brightest stars of type OB. Several late-type giants in cluster area.
NGC 5925. This object makes the impression of a window in an absorbing cloud. Bright stars of type A 1 V–A 3 V. Several K-type giants along the fringe of the object.
NGC 6664. This is probably not a cluster but an opening in an absorbing cloud.
IC 1396 = An. Tr. 37. Cluster begins with one OB^+ star, two OB^- stars, and one star of type A 2 Ia.
NGC 7510. Cluster begins with numerous OB^+ stars. It also contains numerous fainter stars of type OB.
NGC 7788. Brightest star of type OB, followed by early main sequence B stars. One B 8 III star in cluster area, probably not a member.
Mel 101. Brightest stars of type B 6 V–B 8 V. No late-type giants.
Tr 1. Brightest stars of type B 2 III–V.
Tr 2. Brightest stars of type B 9 V. One K 1 giant.
Tr 4. Brightest stars of type OB^- and early B stars, followed by main sequence stars of later type.
Tr 21. Brightest stars of type B 3 V. One G-type giant at a distance of 10′.
Tr 22. Doubtful cluster. Brightest stars in area of type OB.
Cr 89. Concentration of OB and cA stars in an association with a diameter of 5′–10′.
Cr 107. Probably an object at $6^h\,31^m3$, +4° 36′ (1855) is meant. It consists of two OB^- stars and several faint early B stars. Cluster nature doubtful.
K 12. A double cluster, the two components separated by approximately 5′. One component begins with OB stars, the other with OB^- stars. Both contain B 1–B 3 main sequence stars down to the limit of the plate.
K 14. One OB star, two OB^- stars and several early main sequence B stars are situated within the cluster area.
K 16. Brightest stars of type OB and OB^-.

New clusters

No. 1. See J. Stock, *Ap. J.* **123**, 258, 1956. Photographic photometry at 470 and 640 mμ.
No. 2. See J. Stock, *Ap. J.* **123**, 258, 1956. Photographic photometry at 470 and 640 mμ.
No. 3. $1^h\,03^m2$ +61° 32′ (1855). D: 2′. Brightest star of type OB (11th magnitude), followed by OB^- and B 2 V stars of 12th-13th magnitude.
No. 4. $1^h\,43^m0$ +56° 19′ (1855). D: 20′. Brightest stars of type B 5 V of 11th magnitude. Main sequence reaches A 2 V at the limit of the plate. One A 6 III star in the cluster area may be a member.
No. 5. $1^h\,54^m0$ +63° 42′ (1855). D: 15′. The two brightest stars are of type OB and OB^- (7th–8th magnitude). The main cluster begins with B 8 V stars of the 10th magnitude. The main sequence reaches the spectral type A 4 at the limit of the plate.
No. 6. $2^h\,12^m3$ +63° 10′ (1855). D: 20′. The cluster consists of approximately twenty A 2 V–A 5 V stars of 11th–13th magnitude and three G 8 giants.
No. 7. $2^h\,19^m0$ +60° 05′ (1855). D: 4′. Poor cluster, beginning with B 5 V stars (9th magnitude), followed by late B- and A-type main sequence stars.
No. 8. $5^h\,18^m3$ +34° 17′ (1855). D: 5′. Brightest star (9th magnitude) is of type OB, followed by fainter OB^- stars and a B star main sequence.
No. 9 is not new; identical with NGC 1931; brightest star type OB; nebulosity?

No. 10. $5^h\,29^m2$ $+37°\,50'$ (1855). D: 25′. Cluster begins with B 7 III–IV stars, followed by a late B- and A-type main sequence. No red giants.

No. 11. $23^h\,24^m5$ $+54°\,57'$ (1855). D: 10′. Poor cluster, beginning with A 0 V stars of 8th-9th magnitude. No red giants.

No. 12. $23^h\,28^m7$ $+51°\,54'$ (1855). D: 20′. Cluster begins with B 9 V stars of 8th magnitude, followed by A and F main sequence stars.

No. 13. $11^h\,07^m6$ $-58°\,15'$ (1875). D: 3′. Poor cluster. Brightest stars of type OB of approximately 10th magnitude.

No. 14. $11^h\,38^m0$ $-61°\,48'$ (1875). D: 4′. Poor cluster. Brightest stars are OB stars of approximately 10th magnitude.

No. 15. $12^h\,00^m4$ $-58°\,48'$ (1875). D: 12′. Brightest stars (10th–11th magnitude) of type B 5 III–V. Approximately thirty cluster members to the limit of the plate (13th magnitude).

No. 16. $13^h\,11^m0$ $-61°\,54'$ (1875). D: 3′. Somewhat doubtful cluster. Brightest stars (10th–11th magnitude) are of type OB.

Additional information

K. A. Barkhatova reports that the *C-m* diagrams of IC 1805, NGC 2175, Cr 377, Tr 37, derived by T. S. Kirillova, differ much from the normal diagrams, not only for O-A stars but also for F and G stars. Kholopov investigated the presence of variable stars in galactic clusters. A. G. Masevich confirmed her earlier result that the divergence to the right of the upper part of the main sequence in galactic clusters is due to the evolution of stars without mixing between envelope and convective core [6–8]. V. V. Lavdovsky determined, together with N. M. Bronnikova, proper motions in the clusters NGC 129, 457, 581, 752, 869, 884, 1513, 1907, 1912, 1960, 2099, 2168, 6705, 6885, 7092, 7209 and A. B. Onegina in NGC 6940 [9]. G. A. Manova studied morphological peculiarities of several open clusters. V. V. Ptchelintseva made estimates of the distances of NGC 381, 1664, and Cr 69 [10]. For all clusters connected with her name in Table 1*a* K. A. Barkhatova herself derived *C-m* diagrams, distances, angular and linear diameters, and the luminosity functions (see references given in Table 1*a*); she prepared an album of diagrams of all published data. She also re-determined the distances of 100 clusters and studied questions of the space distribution and motions of clusters.

W. Becker (Basle) continued his cluster work based on material from Ann Arbor, Asiago, Bergedorf and Pretoria. His $\bar{\lambda}$ are 370, 470, 640. Out of forty clusters he localized thirty-eight in three spiral arms: The Orion arm (going through the Sun) contains twenty-two clusters over a length of 5 kpc, the Perseus arm contains thirteen clusters along 2 kpc. The next inner arm has been fixed by three clusters in Scutum only. The results will soon be published in *Z. Ap.*

H. Haffner began a systematic search for new faint clusters. Between 190° and 220° galactic longitude he found twenty-two new objects [11].

A. Sandage (see Table 1*a*) reports: NGC 7789 is very old with a *C-m* diagram very similar to NGC 752. The giant branch extends to $B-V=1{\cdot}95$. The Hertzsprung gap goes from $B-V=0{\cdot}7$ to $B-V=1{\cdot}1$. These observed colours are not corrected for a reddening of $E_{B-V}\approx 0{\cdot}3$ mg. NGC 7789 contains three cepheids CF Cas, CEa and CEb Cas.

H. L. Vanderlinden studied, together with N. Catry [12], a slight selective absorption in Praesepe.

H. Weaver hopes to have the posthumous work of the late R. J. Trumpler ready for print at the time of the Moscow meeting. He studied, together with M. Roberts, the luminosity function of galactic clusters.

B. Westerlund derived the interstellar reddening of the Pleiades on the basis of other photometric data. He found an average of 0·08 mag. in the Johnson *B,V* system with large local variations.

GLOBULAR CLUSTERS

The following Table 3 gives a condensed survey of the observations of globular clusters as far as they were reported to the writer. Observations, and other particulars, of variables in globular clusters are not given here, as they have been summarized in the report of Sub-Commission 27*b* (Variables in Globular Clusters: President, H. Sawyer-Hogg).

Table 3. *Globular clusters*

NGC	Name	Observer	Method	Purpose	Instrument	Locality
104	47 Tuc	Gascoigne (*a*)	—	*C–m*, brightness distribution	30 in. refl.	Mount Stromlo
1866	—	Sandage with Thackeray and Arp	*UBV* pe+pg	*C–m*	74 in. refl.	Pretoria
5024	M 53	Cuffey	*BV* pg	*C–m*	100 in. refl.	Mount Wilson
			pe	—	36 in. refl.	Bloomington
5139	ω Cen	Gascoigne (*a*)	—	*C–m*, brightness distribution, standard sequences	30 in. refl.	Mount Stromlo
5466	—	Cuffey	*BV* pg	*C–m*	100 in. refl.	Mount Wilson
			pe	—	36 in. refl.	Bloomington
5897	—	Sandage with Schmidt	*UBV* pe+pg	*C–m*	—	Mount Wilson
6205	M 13	Johnson	*UBV* pe	*C–m*	—	—
6356	—	Sandage	*UBV* pe+pg	*C–m*	—	Mount Wilson
6397	—	Gascoigne	pe+pg	*C–m*, standard sequences	74 in. refl.	Mount Stromlo
7006	—	Sandage with Wildey	*UBV* pe+pg	*C–m*	—	—
7492	—	Cuffey	*BV* pg	*C–m*	100 in. refl.	Mount Wilson
			pe	—	36 in. refl.	Bloomington

(*a*) *M.N.* **116**, 570, 1956.

Additional information

S. C. B. Gascoigne is planning an integral photometry of southern globular clusters.

P. N. Kholopov investigated the space distribution of red giants and of RR Lyr stars in M 15, and also was engaged with special features of M 3 and M 4 [13–15].

W. W. Morgan obtained integrated spectra of some globular clusters at the McDonald Observatory. Clusters at great distances from the galactic plane are systematically different in stellar population from those situated within the highly-flattened system. In the first group the principal contribution comes from 'weak-lined' F stars; in the second group the principal contribution comes from later-type stars with stronger metallic lines.

L. Rosino derived distances for the new clusters Abell no. 4 and no. 13. He is also studying the distribution of stars in some globular clusters.

A. R. Sandage communicates that NGC 5897, according to Deutsch, has the weakest spectral lines hitherto known among globular clusters. $\Delta\,(U-B)$ for this cluster is therefore important. NGC 6356 is one of W. W. Morgan's strong-line clusters near the nucleus. Perhaps its *C-m* diagram resembles that of M 67. NGC 7006 has a long-period variable ($P=252$ days) making the cluster unique. NGC 1866 looks like a globular cluster but has a *C-m* diagram like M 11. This may be an example of a young globular cluster.

H. Sawyer-Hogg has continued her extensive bibliographical work. The following globular clusters have been added to her list: Abell nos. 1, 2, 3, 4, 6, 8, 10, 11, 12, 13; NGC 6380, Shakbazian's cluster at $10^h\,52^m0$, $+40°\,44'$; and one detected at Haute Provence at $17^h\,24^m9$, $-29°\,57'$. The following three have been deleted: Anon. at $17^h\,45^m7$, $-60°\,45'$, NGC 2682 = M 67, and NGC 6684.

H. Shapley reports that he has rediscussed the distances of globular clusters and variables in the Galaxy. He completed a new determination of the position co-ordinates and the distance of the galactic centre. The results are included in a book *The Inner Metagalaxy*, published by the Yale University Press. Shapley is also collecting material for a revision of his monograph *Star Clusters*.

H. L. Vanderlinden is working on the dynamics of globular clusters.

G. E. Zeliakh [16] revised the results of mass determinations of globular clusters considering the light absorption in the Galaxy.

GENERAL REMARKS

Conferences on clusters

Since the Dublin meeting there have been several conferences dealing, among other subjects, with various problems relating to star clusters. We mention only two here: A 'Semaine d'Etudes' on Stellar Populations was organized by the Academia Pontificia in Rome in May 1957, and early in June 1957 there was the second conference on the Co-ordination of Galactic Research in Saltsjöbaden. The reader is referred to the transactions of the first conference for almost all questions concerning the evolutionary aspects of star clusters. The observational aspects were in the foreground of the second conference about which a report is being prepared by A. Blaauw. The Saltsjöbaden conference was preceded by a 'Pre-Conference on Galactic Research' at Canberra. Here too observing programmes were discussed and a useful report was prepared in order to inform the Saltsjöbaden conference about the Australian contributions and plans.

Photometric questions

The photometric recommendations of the 1955 I.A.U. meeting need not be repeated here. A glance at Table 1*a* shows, however, that many observers have not chosen the *U,B,V* system of Johnson and Morgan. It is to be hoped that modern working lists of any star cluster contain stars of different colours in each magnitude interval. Only if this rule is carefully obeyed can the photometric results of one observer be compared with those of another observer if the effective wave-lengths are not too far apart. Sandage advocates a strict condemnation of photographic transfers to set up standard sequences.

Finally it might be worth mentioning that infra-red photography could be of great help in detecting new clusters in regions of strong obscuration.

Proper motions and radial velocities

At the 1955 meeting Commission 37 expressly stated its desire that lists of cluster plates, the repetition of which could be used for the derivation of proper motions, should either be published or sent to the writer for publication. Only three observatories have fulfilled this wish: Pulkovo, Vienna, and Zô-Sè (Shanghai). These observatories are partly evaluating the material, partly willing to take new plates on request and to measure them, together with the old plates. It does not seem justified to publish the scarce material here. Astronomers interested in the proper motions of cluster stars are requested to write to the observatories mentioned.

In the meantime the Fehrenbach method of measuring radial velocities on plates taken with an appropriate objective prism has been developed so far that it would be satisfying to see more astronomers applying it to star clusters.

O. HECKMANN

President of the Commission

REFERENCES

[1] Kopylov, I. M. *Publ. Crim. Astrophys. Obs.* **15**, 153, 1955.
[2] Ivanova, N. L. *Comm. Burakan Obs.* **16**, 1955.
[3] Parenago, P. P. *Astr. J. Moscow*, **33**, 444, 1956.
[4] Lebedinsky, A. I. and Khorosheva, O. V. *Astr. J. Moscow*, **33**, 54, 1956.
[5] Khorosheva, O. V. *Astr. J. Moscow*, **33**, 880, 1956.
[6] Masevich, A. G. *Astr. J. Moscow*, **32**, 312, 1955.

[7] Masevich, A. G. *Astr. J. Moscow*, **33**, 576, 1956.
[8] Masevich, A. G. *Astr. J. Moscow*, **34**, 176, 1957.
[9] Onegina, A. B. *Bull. Central Astr. Obs. Ukrainian S.S.R.*
[10] Ptchelintseva, V. V. *Astr. Circ. U.S.S.R.* 159, 14, 1955.
[11] Haffner, H. *Z. Ap.* **43**, 89, 1957.
[12] Vanderlinden, H. L. and Catry, N. *Ann. Astrophys.* **18**, 259, 1955.
[13] Kholopov, P. N. *Bull. 'Variable Stars'*, **89**, 253, 1956.
[14] Kholopov, P. N. *Astr. J. Moscow*, **33**, 46, 1956.
[15] Kholopov, P. N. *Astr. J. Moscow*, **32**, 309, 1955.
[16] Zeliakh, G. E. *Bull. Univ. Leningr.* **190**, 52, 1957.

APPENDIX

The following appendix became necessary because of the considerable amount of information received in response to a new circular letter. This was sent on 10 July 1958 to all observatories exchanging publications with the Hamburg Observatory. The following Tables 1*a'* and 1*b'*, with the following remarks, will probably make the account of current cluster-work reasonably complete. Even if some of the clusters mentioned in the *Draft Report* occur again in the Appendix the new information provides at least slight corrections and often mentions additional observations; many new clusters are cited, which certainly justifies the somewhat unusual procedure of this Appendix.

Additional remarks

Van den Bergh has studied galactic clusters on the Palomar Sky Survey prints. Among 141 cepheids north of $\delta = -27°$, with median magnitudes brighter than 12·0, he found seven to be probable cluster members. Only one cluster member was found among 173 cepheids with median magnitudes fainter than 12·0. It is estimated that 8 ± 3 (m.e.) per cent of all classical cepheids are located in galactic clusters. NGC 188, 2243 and 2420 seem to be old clusters with luminosity functions similar to M 67. These clusters are located far from the galactic plane. Luminosity functions of twenty-six clusters have been obtained.

Bless has determined the physical characteristics, e.g. masses, effective temperatures, of a variety of A stars by comparing photo-electric observations of the energy distributions in the continuous spectra of these stars with the predictions of model atmospheres. Stars in open clusters of a wide range in age were chosen so that possible evolutionary effects could be studied.

Golay plans to concentrate the activity of Geneva Observatory (Switzerland) on clusters exclusively. He reports on new equipment for photo-electric and photometric observations in combination with a 40-cm telescope on the Jungfraujoch and with a 100-cm telescope to be installed between 1500 and 2000 m in height. The equipment works on five or six colours.

Johnson started photo-electric and photographic observations of the following clusters: NGC 103, 129*, 136, 225*, 457*, 581*, 609, 654, 663, 744*, 957, 1220, 1245, 1342*, 1444, 1502*, 1513, 1528, 1545, 1605, 1664, 1746, 1778, 1857, 1883, 1893, 1907, 1912, 1960, 2099, 2129, 2141, 2158, 2168, 2169, 2194, 2215, 2236, 2251, 2254, 2259, 2269, 2301, 2311, 2323, 2324, 2345, 2353, 2360, 2368, 2383, 2401, 2414, 2432, 2447, 2453, 2455, 2482, 2489, 2509, 2527, 2533, 2546, 2571, 2588, 2635, 2658, 6400, 6404, 6405, 6451, 6469, 6475*, 6494, 6520, 6531, 6546, 6583, 6603, 6611, 6645, 6649, 6664, 6694, 6704, 6709, 6755*, 6756, 6802, 6819, 6823, 6830, 6834, 6866, 6871*, 6882*, 6885*, 6910*, 6913*, 6940, 7031*, 7044, 7062, 7063, 7067*, 7086*, 7128, 7142, 7160*, 7209, 7235, 7261, 7380*, 7419, 7510, 7654, 7686*, 7762, 7788, 7790; IC 361, 1369, 1434, 1805, 1848, 4725, 4996; Tr 2*, 4, 5, 34, 35, 36.

Johnson intends to make all of the observations on the *U*, *B*, *V* system. A photo-electric calibrated sequence will be observed in each cluster, and the zero-points determined photo-electrically on at least three different nights. In general, only one photo-electric observation on each cluster star will be obtained. At least thirty stars in each cluster will be observed photo-electrically. At least 100 stars in the region of each cluster will be observed photographically.

* = Photoelectric observations completed.

The magnitude limit will be about visual magnitude 16. The following are engaged on this project: A. A. Hoag, K. L. Hallam, B. Iriarte, and H. L. Johnson. This is a joint project between the Lowell Observatory and the Flagstaff Station of the U.S. Naval Observatory. It is planned to carry out this programme in three years.

Reddish has discussed in some detail the error correlations between photographic observations at Mill Hill (red and blue plates taken simultaneously on the twin 18-in./24-in. refractor) and photo-electric results of Johnson and Sandage for M 11 and M 67 besides the globular clusters M 3 and M 5.

Strand reports that for twenty-two clusters, for which plates taken forty to fifty years ago are available, proper motions are being derived with an accuracy of $\pm 0''.002$ (m.e.). These are: NGC 663, 869, 884, 1039, 1068, 1647, 1912, 1960, 1976, 2099, 2168, 2548, 2632, 2682, 3031, 4594, 6705, 6709, 6940, 7092, 7654, 7789. The work on NGC 1976 (The Orion Nebula Cluster) has been published (*Ap. J.* **128**, 14, 1958), the work on NGC 869 (h Persei) and 884 (χ Persei) is in progress.

Wagman reports that Allegheny Observatory will derive proper motions in twenty-nine clusters for which plates have been taken forty years ago by Trumpler. The numbers are: NGC 188, 225, 381, 436, 457, 654, 659, 663, 744, 1027, 1342, 1647, 1664, 1807, 1857, 2158, 2244, 2281, 2324, 6633, 6709, 6811, 6830, 6939, 6940, 7510, 7762; IC 1805, 4756. The work on NGC 6940 is published (*Astr. J.* **62**, 175, 1957).

Several writers indicate that the three cepheids CF Cas, CEa Cas and CEb Cas are not situated in NGC 7789 but in 7790. Sandage's statement given in the *Draft Report*, p. 581 was erroneous because of an error in the NGC position of 7790.

Thackeray and Feast continued their study of radial velocities and spectral types on NGC 104.

Wesselink works on photo-electric measurement of NGC 104 and 6752.

Table 1*a'*. *Galactic clusters*

NGC	Type	Observer	$\bar{\lambda}$	Limiting magnitude	Method	Data observed and reference
129		Lavdovsky	—	15·0	pg	p.m.+pg mag.
381		Argue	370 470 640	16·5	pg	—
433		Argue	370 470 640	16·5	pg	—
457	1b	Lavdovsky	—	15·5	pg	p.m.+pg mag.
		Walker	370 450 540	14·3	pe	—
581	1–2b	Lavdovsky	—	14·5	pg	p.m.+pg mag.
659		Larsson-Leander	450 540	16·5	pe+pg	s.t.
752	2f	Lavdovsky	—	15·0	pg	p.m.+pg mag.
Stock 2		Krzemiński	—	12·0	pe	pol. *Ap. J.* **123**, 258, 1956
		Larsson-Leander and Serkowski	—	11·0	pe	pol. in print
869	1b	Lavdovsky	—	15·0	pg	p.m.+pg mag.
		Walker	370 450 540	19·0	pe+pg	—
		Strand	550	14·5	pv	p.m.
884	1–2b	Lavdovsky	—	15·0	pg	p.m.+pg mag.
		Strand	550	14·5	pv	p.m.
h and χ Persei		Perraud and Meysonnier	—	12·0	pg	r.v.+s.t.
		Argue	370 470 640	16·5	pg	—
957		Larsson-Leander	450 540	16·5	pe+pg	s.t.
IC 1805	1–2o	Walker	370 450 540	16·0	pe+pg	—
1039	1b–a	Mathews	550	13·0	pg	—
1245		Reddish and Reid	430 550 630	17·0	pg	—
α Persei		Bappu and Chandra	450 540	11·5	pe	—
		Pels	—	—	pg	p.m.

Table 1*a'*. *Galactic clusters* (*cont.*)

NGC	Type	Observer	$\bar{\lambda}$	Limiting magnitude	Method	Data observed and reference
Pleiades		Pels and Tempesti	—	—	pg	p.m.
		Argue	370 470 640	11·0	pg	—
1513		Bronnikova	—	15·0	pg	p.m.+pg mag. in print
1528		Mathews	550	13·0	pg	—
		Larsson-Leander	450 540	16·5	pe+pg	s.t.
Hyades		Perraud and Meysonnier	—	12·0	—	r.v.+s.t.
		Herbig	—	8·0	—	rot. vel.
		Herbig	—	12·0–16·0	—	s.t. of faint members
		Pels	—	—	pg	p.m.
1605		Larsson-Leander	450 540	16·5	pe+pg	s.t.
1647	1b–a	Larsson-Leander	450 540	16·0	pe+pg	s.t.
1664		Lodén	—	15·5	pg	pol. *Ark. Astr.* **2**, no. 11, 1957
		Larsson-Leander	450 540	16·5	pe+pg	s.t. *Stockh. Ann.* **20**, no. 2, 1957
1750		Li Hen	—	14·0	pg	p.m. *Ann. Zô-Sè*, XXIII, 1954
1817		Li Hen	—	14·0	pg	p.m. *Ann. Zô-Sè*, XXIII, 1954
1907		Lavdovsky	—	14·0	pg	p.m.+pg mag.
1912	2b–a	Akbar Ali	—	—	pg	p.m. *J. d. Obs.* 1958. no. 4
		Lavdovsky	—	14·0	pg	p.m.+pg mag.
		Mathews	550	13·0	pg	—
1960	1b	Bronnikova	—	15·0	pg	p.m.+pg mag. in print
2099	2a	Bronnikova	—	15·0	pg	p.m.+pg mag. in print
2168	1–2b	Lavdovsky	—	15·0	pg	p.m.+pg mag.
2192		Larsson-Leander	450 540	16·5	pe+pg	s.t.
2244	1–2o	Walker	370 450 540	16·0	pe+pg	—
		Lodén	—	10·0	pg	pol. *Ark. Astr.* **2**, no. 5, 1956
2264	1o	Argue	370 470 640	14·0	pg	—
2281	1a	Vasilevskis	429	13·0	pg	p.m.
2287	2a	Lodén	—	9·5	pg	pol. *Ark. Astr.* **2**, no. 5, 1956
2516		Wood	—	—	—	p.m.
2548	1–2a	Li Hen	—	14·0	pg	p.m. *Ann. Zô-Sè*, XXIII, 1954
2632= Praesepe	2a	Argue	370 470 640	15·5	pg	—
		Bidelman	—	10·0	—	s.t. *P.A.S.P.* **68**, 318, 1956
		Willstrop	370 450 540	—	pe	—
IC 2391		Hernandez	—	—	—	r.v.+s.t.
2682	2–3a	Strand	550	14·5	pv	p.m.
3228		Hogg	370 435 550	15·0	pe	—
3293		Feast	—	—	—	r.v.+s.t.
IC 2602	1–2b	Hernandez	—	—	—	r.v.+s.t.
		Wood	—	—	—	p.m.
		Whiteoak	370 435 550	11·0	pe	—
		Gollnow and Hagemann	—	11·0	—	r.v.+s.t.
Tr 16		Thackeray	—	—	—	r.v.+s.t.
3532	2b–a	Wood	—	—	—	p.m.
		Koelbloed	370 430 550	11·5	pe+pg	p.m. *B.A.N.* 489 (in press)
3766		Wood	—	—	—	p.m.
IC 2944		Thackeray	—	—	—	r.v.+s.t.
		Wesselink	370 435 550	14·0	pe	—
4103		Wood	—	—	—	p.m.
		Wesselink	370 435 550	14·0	pe	—
Coma		Chandra	450 540	10·0	pe	—
4349		Wood	—	—	—	p.m.
4609		Rodgers	370 435 550	15·0	pe+pg	—

Table 1*a'*. *Galactic clusters* (*cont.*)

NGC	Type	Observer	$\bar{\lambda}$	Limiting magnitude	Method	Data observed and reference
4755	1–2b	Wood	—	—	—	p.m.
		Hernandez	—	—	—	r.v.+s.t.
		Hogg	370 435 550	16·0	pe+pg	—
		Buscomb	—	—	—	r.v.+s.t.
5281		Hogg	370 435 550	15·0	pe	—
5662		Wood	—	—	—	p.m.
6025		Wood	—	—	—	p.m.
		Hogg	370 435 550	15·0	pe	—
6067		Wesselink	370 435 550	14·0	pe	—
		Thackeray	—	—	—	r.v.+s.t.
6124	2b–a	Koelbloed	370 430 550	12·0	p	*B.A.N.* 489 (in press)
6193		Westerlund	370 435 550	15·0	pe+pg	s.t.
IC 4725		Hogg	370 435 550	15·0	pe	—
IC 4665		McCarthy	450 540	13·0	pe	—
		Vasilevskis	—	13·5	—	p.m.
6475	1b	Bappu and Chandra	450 540	11·5	pe	—
		Koelbloed	370 430 550	11·5	pe+pg	*B.A.N.* 489 (in press)
6611		Walker	370 450 540	17·0	pe+pg	—
6633	1–2b–a	Mathews	550	13·0	pg	—
		Lynds	370 450 540	13·5	pe	—
		Vasilevskis	429	14·0	pg	p.m.
6705	2b–a	Bronnikova	—	14·5	pg	p.m.+pg mag. (in press)
6709	1–2b–a	Vasilevskis	429	13·5	pg	p.m.
		Strand	550	14·5	pv	p.m.
6802		Larsson-Leander	450 540	16·5	pe+pg	s.t.
6823		Walker	370 450 540	16·0	pe+pg	—
6819		Reddish and Reid	430 550 630	17·0	pg	—
Mel 227		Hogg	370 435 550	15·0	pe	—
6871		Mathews	550	13·0	pg	—
6885	2–3a	Lavdovsky	—	14·5	pg	p.m.+pg mag.
IC 4996		Walker	370 450 540	16·0	pe+pg	—
6910		Walker	370 450 540	16·0	pe+pg	—
6940	2a	Walker	370 450 540	13·0	pe	in print
		Reddish and Reid	430 550 630	17·0	pg	—
		Larsson-Leander	450 540	16·5	pe+pg	s.t.
7092	1a	Lavdovsky	—	15·0	pg	p.m.+pg mag.
IC 5146		Walker	370 450 540	16·8	pe+pg	—
7209		Lavdovsky	—	14·5	pg	p.m.+pg mag.
IC 1434		Larsson-Leander	450 540	16·5	pe+pg	s.t.
7243		Mathews	550	13·0	pg	—
		Krzeminski	—	12·0	pe	pol.
7380		Li Hen	—	14·0	pg	p.m.
		Mathews	550	13·0	pg	—
ζ Scl. Clus.		Bidelman	—	9·0	—	s.t.

https://doi.org/10.1017/S0251107X00021167 Published online by Cambridge University Press

Table 1*b*'. *Observers and instruments*

Name	Instrument	Locality	Data observed
Akbar Ali	Normal astrograph	Hyderabad	
Argue	17 in. Schmidt	Cambridge (G.B.)	pg mag.
Bappu	10 in. refr.	Naini Tal, India	
Bidelman	82 in. McDonald refl.	Lick Obs.	s.t.
Bronnikova	Normal astrograph	Pulkovo	p.m.+pg mag.
Chandra	10 in. refr.	Naini Tal, India	
Feast	74 in. refl.	Pretoria	r.v.+s.t.
Hagemann	74 in. refl.	Mt Stromlo	r.v.+s.t.
Herbig	36 in. refr.	Lick Obs.	rot. vel.
	36 in. refl.	Lick Obs.	s.t.
Hernandez	—	La Plata	r.v.+s.t.
Hogg	50 in. refl.	Mount Stromlo	pe+pg
Koelbloed	20 in. refr.	Cape Obs,	
Krzemiński	24 in. refr.	Beograd	pol.
Larsson-Leander	40 in. refl.	Saltsjöbaden	s.t.
	24 in. refr.	Saltsjöbaden	pe+pg mag. pol.
	20 in. refr.	Saltsjöbaden	pv mag.
Lavdovsky	Normal astrograph	Pulkovo	p.m.+pg mag.
Li Hen	16 in. refr.	Zô-Sè (Shangh.)	p.m.
Lodén	10 in. refl.	Anacapri	pg pol.
	24 in. refr.	Saltsjöbaden	pg pol.
Lynds	36 in. refl.	Lick Obs.	
Mathews	16 in. vis. refr.	Northfield, Minn.	pv mag.
McCarthy	22 in. Tauchman refl.	Lick Obs.	
Meysonnier	Prism. Obj. 6·5 and 16 in.	Marseille	r.v.+s.t.
Pels	13 in. refr.	Leiden	
Perraud	Prism. Obj. 6·5 and 16 in.	Marseille	r.v.+s.t.
Reddish	16 in. Schmidt	Edinburgh	pg mag.
Reid	16 in. Schmidt	Edinburgh	pg mag.
Rodgers	16 in. Upps. Schmidt	Mount Stromlo	pg mag.
	30 in. refl.	Mount Stromlo	pg mag.
Serkowski	24 in. refr.	Saltsjöbaden	pol.
Strand	40 in. refr.	Yerkes	p.m.
Tempesti	13 in. refr.	Leiden	
Thackeray	74 in. refl.	Pretoria	r.v.+s.t.
Vasilevskis	30 in. refr.	Allegheny	p.m.
Walker	100 in. refl.	Mount Wilson	
	60 in. refl.	Mount Wilson	
Wesselink	74 in. refl.	Pretoria	
Westerlund	6 in. astrograph	Uppsala	s.t.
	16 in. Upps. Schmidt	Mount Stromlo	pg mag.
	30 in. refl.	Mount Stromlo	pe mag.
Whiteoak	20 in. refl.	Mount Stromlo	pe
Willstrop	36 in. refl.	Cambridge (G.B.)	pe mag.
Wood	Normal astrograph	Sydney	

AMAS STELLAIRES ET ASSOCIATIONS

Report of Meeting. 14 August 1958

PRESIDENT: O. Heckmann.

SECRETARY: G. Alter.

Opening the session the President spoke a few words in commemoration of the late Professor Trumpler.

He then referred to Oort's *Draft Report* of Sub-Commission 33*a* (Co-ordination of Galactic Research), which gives an excellent summary of the reasons which make cluster research so extremely important today.

The President proposed that a special conference on star clusters be organized and convened in about two years' time. It should deal, among other topics, with detailed questions of the co-ordination of current observational activity. Preferably the conference should be held in some European town. For this Commission 37 may have to ask for some financial support from the I.A.U. The following resolution was then proposed and would be put to the vote during the following meeting:

On account of the increasing importance of star clusters (and associations) for galactic research, Commission 37 proposes to convene a small meeting of about 20 or 30 members who would have to consider the theoretical and empirical problems of cluster research. This meeting would take place in 1960 in Europe. I.A.U. is being asked to provide a fund of $3000 to cover part of the travel expenses.

(For the official French text see Resolution no. 63.)

The President then opened a discussion on the *Draft Report.* Larsson-Leander pointed to some errors in the lists. The President stressed the fact that the report certainly is very incomplete but that, as a result of a new circular letter to more than 300 observatories, it will be completed by an Appendix (see above p. 584). The *Draft Report* was then adopted.

G. Alter described the 'Catalogue of Star Clusters and Associations', produced by him and his associates J. Ruprecht and V. Vanýsek. After a short description of this Catalogue (a copy of which was available for inspection) a number of questions were put, especially about its construction. At least once a year a supplement will be published in the *Bulletin of the Astronomical Institutes of Czechoslovakia,* containing all new entries available. L. Gratton pointed out the necessity of sending reprints of new papers to the authors in order to make the supplements as complete as possible. On the question of how to insert new objects into the Catalogue, Alter advised the decimal arrangement, so that every new intermediate object could be put at its proper place (according to R.A.) in the index. Mrs Hogg congratulated the authors on the useful work done.

The President pointed to the newly discovered groups of stars (Stock) which, on account of their spectra but without notable concentration, seem to form physical assemblies. Evidently it will be necessary in the near future to rediscuss the definition of a cluster.

The importance of precise proper motion and radial velocities was once more emphasized. Fehrenbach's method to determine radial velocities with an objective prism was especially mentioned.

Blaauw referred to the agreement, arrived at the Saltsjöbaden symposium on the Co-ordination of Galactic Research, about photo-electric zeros and scales for further photographic photometry (see report of meeting of 19 August). Weaver reported that Trumpler's unpublished work on 100 clusters is in press. It gives spectra and two colours for the great majority of the objects and somewhat less detail for the rest.

A discussion of globular clusters was left to Sub-Commission 27*a*.