

32. COMMISSION DES 'SELECTED AREAS'

PRÉSIDENT: M. P. J. VAN RHIJN, *Astronomical Laboratory 'Kapteyn', Groningen, Netherlands.*

MEMBRES: MM. W. S. Adams, Alden, Baade, E. A. Baker, A. N. Deutsch, Mme Payne Gaposchkin, MM. Knox-Shaw, Oort, Seares, Shapley.

The following lines give a summary of the work of Kapteyn's Plan of Selected Areas from January 1938 up to September 1947.

I. DURCHMUSTERUNG

Two surveys of the Selected Areas of the Systematic Plan are available: [1] and [5].*

HARVARD, GRONINGEN

The Durchmusterung of the areas of the Special Plan will be printed in the near future.

2. PHOTOGRAPHIC AND VISUAL OR PHOTOVISUAL MAGNITUDES, COLOUR INDICES AND EFFECTIVE WAVE-LENGTHS

The investigations [2] to [4] and [6], [7], [10], [12] to [14] had been completed before the publication of the previous Report in 1938.

MOUNT WILSON: PHOTOVISUAL MAGNITUDES, NORTHERN AREAS

All the available photographs for determining photovisual magnitudes in 42 Selected Areas between declination $+75^\circ$ and -15° have been completely reduced. Publication has been deferred because the long-exposure plates for some of the areas proved unsatisfactory owing to peculiarities of gradation. Meanwhile standards have been supplied on request to numerous observers. It now seems desirable to print the results as they stand, and it is hoped that this may be done within the coming year.

HARVARD: PHOTOVISUAL MAGNITUDES, NORTHERN AREAS

The determination of the photovisual magnitudes in the northern Selected Areas at the Harvard Observatory, see [3], has been discontinued. The plates of some of the more interesting areas in the zone at $+60^\circ$ declination have been measured and the results have been discussed in *Astrophysical Journal*, **90**, 249, 1939.

MCCORMICK OBSERVATORY: PHOTOVISUAL MAGNITUDES, NORTHERN AREAS

Plates have been taken for the determination of photovisual magnitudes in 52 Selected Areas down to the magnitude 13. It is doubtful whether the project will be finished.

PERKINS OBSERVATORY

The red magnitudes of the stars brighter than $15^m.18$ in a square $15' \times 15'$ of Selected Area 108 have been determined at the Perkins Observatory by J. J. Nassau and J. A. Hynek, see [17]. The probable error is $\leq \pm 0^m.05$.

POTSDAM: PHOTOGRAPHIC MAGNITUDES, NORTHERN AREAS

Plates have been taken at the Potsdam Observatory for the determination of the photographic magnitudes in the areas at declination $+15^\circ$ and in the Special Areas 2 to 7, 24 and 25. No report has been received about the progress of this work.

* [1] means No. 1 of the list of Publications in section II. This notation is continued in the following pages.

HARVARD, GRONINGEN: PHOTOGRAPHIC MAGNITUDES, NORTHERN AREAS

Photographic magnitudes of the stars in the northern Selected Areas brighter than 13.0 are being determined at the Kapteyn Laboratory on plates taken at the Harvard Observatory. The field is $3^{\circ}.5 \times 3^{\circ}.5$. The spectral classes of the same stars are being determined at the Hamburg Observatory. The results for areas 1 to 43 have been published, see [40]. The manuscript for the areas 44 to 67 is ready for the printer. The magnitudes of the zones of declination $+15^{\circ}$ and 0° are being determined at present.

HARVARD: SOUTHERN AREAS

The photographic magnitudes of the S.A. at declinations -15° , -45° and -60° have been published, see [12]. The photographic and red magnitudes of standard stars in the S.A. 140 to 206 also have been published, see [14]. The work will not be continued.

LEIDEN: PHOTOGRAPHIC MAGNITUDES, SOUTHERN AREAS

The main purpose of the programme is to obtain photographic magnitudes which are reliable in scale and zero point. The plates are taken with the Rockefeller twin-astrograph at the Leiden station at Johannesburg (aperture 40 cm., focal length 229 cm.).

The programme will be carried out in separate parts. The first part, which is being undertaken now, consists in the determination of magnitudes for stars brighter than about $10^m.5$ in the 91 areas with negative declination. The field to be measured is 16 square degrees. The scale is found by means of an objective grating and will be checked by means of a neutral filter and perhaps photoelectric measurements. The zero point will be determined by means of many intercomparisons of southern areas and a comparison of some of the southern fields with northern fields for which the international magnitudes are known.

Plates of the southern areas have also been taken with 10^m exposures, one telescope with the objective grating, the other with the full aperture. By means of these plates the scale can be extended to the 14th photographic magnitude. This second part of the programme will, however, not be undertaken until the first part is completed.

POTSDAM: PHOTOGRAPHIC MAGNITUDES, SOUTHERN AREAS

It was announced in the former report that the photographic magnitudes of the stars in the southern hemisphere, the spectra of which have been classified (see section 7), would be determined at the Potsdam Observatory. This work has been discontinued.

ABASTUMANI ASTROPHYSICAL OBSERVATORY: COLOURS IN THE NORTHERN AREAS

The colours of the stars of magnitude 11 to 13 in Selected Areas 1 to 67 will be determined at the Abastumani Astrophysical Observatory by E. K. Kharadze. The field is $2^{\circ} \times 2^{\circ}$; the mean error of the colour indices is $\pm 0^m.08$.

Results for some fields have been published in *Bulletins of Abastumani Astrophysical Observatory*, Nos. 6, 7 and 8. I cannot give the details of these publications because they have not arrived in this country. The results for the areas 1 to 43 are completed. Some results for part of the fields are given in *The Observatory*, 65, 220, 1944.

HAMBURGER STERNWARTE IN BERGEDORF

The colour indices of the stars in the Areas 26, 35 and 40 have been determined by Martin Christopher Clasen, see [15]. The plates have been taken with the Bergedorfer 60 cm. refractor. The limiting magnitude is approximately 11 to 12.

GHENT ASTRONOMICAL INSTITUTE

The effective wave-lengths of the stars in the Selected Areas 40 and 41 have been determined by A. Velghe at the Ghent Astronomical Institute, see [16]. The plates have been taken by H. L. Vanderlinden with the 24-inch reflector at the Yerkes Observatory. The limiting photographic magnitude is 14 to 15.

LUND OBSERVATORY—OBSERVATOIRE DE HAUTE-PROVENCE: NORTHERN AREAS

The colours of the red stars in the northern Selected Areas at galactic latitude of approximately 20° will be investigated by Mr Reiz of the Lund Observatory. The plates will be taken with the 81 cm. Couder telescope of the Observatoire de Haute Provence and will be measured at the Lund Observatory. The limiting magnitude is approximately 16 photographic and the field is the same as that of the *Bergedorfer Spektral Durchmusterung*. Some trial plates have been taken of Selected Area 26.

3. VARIABLE STARS

HAMBURG

Thirty-five variables in Selected Area 41 have been observed by A. A. Wachmann in a field of 34 square degrees, see [9]. Wachmann also investigated Selected Area 64 for variable stars; the results will be published in the near future. The work is being extended to some other areas.

RADCLIFFE OBSERVATORY: NORTHERN AREAS

Twenty-six variable stars have been found on the plates used at the Radcliffe Observatory for the determination of the proper motion, see [8] and [22].

EDINBURGH: AREAS AT $+75^\circ$ DECLINATION

E. A. Baker investigates the variables rising above the 14th magnitude at maximum in some northern areas. Results for areas 2, 3 and 4 have been published, see [11], and those for areas 5 to 7 are ready for publication. The work on this subject has now been suspended.

HARVARD: NORTHERN AREAS

Throughout the war the Harvard Observatory has continued to take plates with the 3-inch Ross camera on the northern Selected Areas. The plates will provide a very useful background material for the study of variable stars in and around the Selected Areas to a limiting magnitude of 13.5 to 14.0. There are no immediate plans for the measurement of these plates.

STERNBERG ASTRONOMICAL INSTITUTE OF THE UNIVERSITY OF MOSCOW

Systematic observations of variable stars have been made in Selected Areas 1, 2, 3, 8, 9, 10, 19, 24, 25, 38, 39, 65, 66, 88 and 89. No report has been received about the progress of this work since 1938.

4. PROPER MOTIONS

The relative photographic proper motions in the northern areas have been determined at the Radcliffe and Yerkes Observatories, see [18] and [22]. The absolute proper motions in the northern areas have been derived from meridian positions by C. H. Hins, see [23].

POULKOVO: AREAS AT DECLINATION $+75^{\circ}$ TO $+15^{\circ}$

A. N. Deutsch and E. J. Perepelkin have measured the proper motions of 3189 stars in the areas at $+75^{\circ}$ and $+60^{\circ}$ declination and in the area 28, see [24]. The plates have been taken with the 33 cm. astrographic telescope (focal length 346 cm.). The probable error of the proper motions is $\pm 0''.0065$. The measured area is the same as in the Durchmusterung of *Harvard Annals*, 101; outside this area only the fundamental stars are measured, see [23]. The proper motions in 74 areas between the pole and declination $+15^{\circ}$ have been measured by A. N. Deutsch, see [27]. The telescope used is again the 33 cm. astrographic telescope and the field of each area is the same as in *Harvard Annals*, 101. The probable error of the proper motions is $\pm 0''.0046$. The limiting magnitude is 14 to 15 photographic.

CAMBRIDGE (ENGLAND): NORTHERN AREAS

Areas of the systematic plan at declination 0° to $+60^{\circ}$ and the special areas 8, 9, 10, 12, 18, 20 and 24 were photographed in 1930 with the Sheepshanks telescope (aperture 30 cm., focal length 590 cm.). The limiting magnitude is about 15; the field to be measured is $90' \times 90'$. The areas will be re-photographed after the lapse of a suitable interval.

DEARBORN: AREAS AT THE EQUATOR

The proper motions of the stars in the equatorial zone will be determined within the next few years by means of plates taken with the 47 cm. refractor (focal length 703 cm.). The time interval is about 20 years.

BONN: NORTHERN AREAS

The areas of the northern hemisphere between 0° and $+75^{\circ}$ declination were photographed with the 30 cm. refractor (focal length 513 cm.) by F. Küstner some 50 years ago. Two exposures were made on each plate: one of 60 min. and one of 1 or 2 min. The measurable field is $85' \times 85'$ and the limiting magnitude 15. The refractor was damaged in the war; after it has been repaired second-epoch plates will be taken for the determination of the proper motions. A reduction of the proper motions to an absolute system will be performed by means of plates taken with the telescope used for the repetition of the *Astronomische Gesellschaft Catalogue*.

ALGIERS, GRONINGEN: NORTHERN AREAS

Approximately sixty plates have been taken at the Algiers Observatory for the determination of the proper motions in some areas of the equator. The early plates are the regular plates of the *Carte du Ciel* catalogue. At least half of each plate is covered by the $3^{\circ}.5 \times 3^{\circ}.5$ field of the *Bergedorfer Spektral Durchmusterung*. The plates have been measured at the Kapteyn Laboratory. The reduction is progressing slowly.

MOUNT WILSON: NORTHERN AREAS

A. van Maanen and H. C. Willis have determined the large proper motions of 122 stars in 42 Selected Areas, see [20]. The lower limit of completeness is $0''.050$ annually; the limiting magnitude 18 photographic. P. Th. Oosterhoff has extended the investigation to another 651 stars in 97 Selected Areas, see [25]. The areas 1 to 139 have been investigated.

RADCLIFFE, GRONINGEN: NORTHERN SPECIAL AREAS

The proper motions of the stars in the special Selected Areas 2, 5, 9 and 24 have been determined at the Kapteyn Astronomical Laboratory by B. Hiemstra by means of plates taken at the Radcliffe Observatory with the 60 cm. photographic refractor (focal length 690 cm.), see [26]. These areas show a black part surrounded by rich parts of the Milky Way. The distance and absorption of the clouds have been computed.

YERKES OBSERVATORY: AREAS BETWEEN DECLINATION $+90^\circ$ AND -15°

Most of the areas between the north pole and the declination -15° have been photographed by Ross at the Yerkes Observatory with the 10-inch Ross telescope from 1928 to 1932. The limiting magnitude is 16 to 17; the measurable field has a diameter of 4 to 5 degrees. The plates might be used later for finding the stars of large proper motion (*Publications American Astronomical Society*, 9, 98, 1937).

PROPER MOTIONS IN THE SOUTHERN SELECTED AREAS: YALE-COLUMBIA SOUTHERN STATION

Dr D. Brouwer and Dr J. Schilt report as follows:

Between March 1927 and December 1928 plates were taken of the areas 116 to 205 of the systematic plan and nos. 13, 14, 21, 22, 27, 29, 30, 31, 36, 37, 38, 39, 40, 41, 43 and 44 of the special plan with the large Yale telescope (aperture 66 cm., focal length 1100 cm.). Two exposures of 10 min. were taken on each plate and two plates on each area. In 1934 a more extensive programme was begun with the intention of securing proper motions on an absolute basis. Five overlapping plates whose centres are separated by 0.5° , of which the central one coincides with the centre of the Selected Area, are taken with one exposure of not less than 20 min.; all areas of the systematic plan and of the special plan enumerated above are included. These plates are taken with a grating placed in front of the 26-inch lens giving a difference of about 5 magnitudes between the central image and the first-order spectrum. Two plates centred on the same region have also been taken with the Ross camera of 5-inch aperture (scale 1 mm. = 100"), using plates covering 120 square degrees. A grating with a magnitude interval of 3.5 is placed in front of the camera lens. These exposures are also 20 min. The camera plates will be reduced by means of all the stars of the *General Catalogue* that appear on them. The gratings permit the inclusion of stars differing greatly in magnitude without the introduction of magnitude equation (see *Transactions International Astronomical Union*, 5, 207, 1936).

The camera plates show stars fainter than the twelfth photographic magnitude and the plates with the large telescope stars considerably fainter than the fifteenth.

The plates of the series started in 1934 have been taken between February 1934 and April 1936. At least part of the plates of the 1927 and 1934 series will be repeated in the near future and the proper motions will be determined.

Meanwhile, it has been decided that a new lens for the catalogue camera in Johannesburg will be constructed having the same focal length as the present camera (scale 1 mm. = 100") but an aperture of 8 inches instead of the 5 inches of the present camera. The disadvantage of the present camera lens is the colour magnification error described in *Astronomical Journal*, 47, 88. It is hoped that the new lens will be free from this error.

In the near future three first-epoch series of plates will be taken of the Selected Areas south of declination -20° (as stated below, the Lick Observatory takes care of the areas at declinations north of -20°):

1. With the 66 cm. refractor two plates of each area. The size of the plates is 25×30 cm. if the images near the corners of these plates appear to be measurable; otherwise the size will be 16.5×21.5 cm. The limiting magnitude will be approximately 15-16. A grating

will be used for the determination of the magnitude error; the grating constant (magnitude difference between the central image and first-order spectrum) will probably be three magnitudes.

With the catalogue camera (new lens) two series of plates will be taken.

2. Two plates of each area, size of the plates 42×42 cm.; limiting magnitude 9.
3. Two plates of each area; size of the plates 20×25 cm.; limiting magnitude approximately 12 to 13.

In both cases a grating will be used; no decision has as yet been taken about the grating constant. The number of exposures on each plate of the series 2 and 3 remains a matter for consideration.

We have decided to take a new series of plates with the 66 cm. refractor because the interval of five magnitudes used in the 1934 series is rather too large for a satisfactory determination of the magnitude error. Otherwise the purpose of three series of plates of the new plan is the same as that contemplated by Schlesinger with the two series of plates that constituted the 1934 programme. This purpose is to obtain absolute photographic positions and proper motions of stars within a wide range of magnitudes by means of an echelon of exposures ranging from the faintest stars to stars of such brightness that they may be referred directly to the fundamental system. Exposure times and limiting magnitudes for each series will depend upon the speed of plates that will be available. The first-order diffraction images will of course be used for the determination of the magnitude error.

Probably a new set of plates will be taken to match the 1927 series and proper motions will be determined at Groningen by means of these plates. The proper motions will not be on an absolute system, and will not be free from magnitude errors, but these requirements are not essential in certain investigations dealing with the dispersion in proper motions. On the other hand, a repetition of the three new series of plates will make it possible to eliminate the magnitude errors in the proper motions. No definite time is planned for this repetition. An interval as short as 10 years between the two new epochs would be sufficient to yield significant results, again in combination with the 1926 series.

LICK OBSERVATORY: AREAS FROM DECLINATION -15° TO THE NORTH POLE

The whole sky north of declination -20° will be photographed in the near future with the new Lick astrograph (aperture 50 cm., focal length 360 cm.) with the purpose of finding the proper motions of faint stars relatively to extragalactic nebulae. The proper motions of the latter being zero, we get a system of absolute proper motions in fields containing a sufficient number of extragalactic nebulae. The proper motions of the bright stars will be determined, referred to the same system and free from magnitude error by means of grating exposures and other means. The proper motions of the stars in the Selected Areas which are not too far from the centre of a plate of the nebular programme can be measured on these plates. If on the other hand this distance is too large for a satisfactory determination of the proper motions, special plates will be taken with the corresponding Selected Area in the centre of the plate. The Lick plates, therefore, are intended to yield the absolute proper motions of bright and faint stars in the Selected Areas between declination -15° and the north pole.

5. TRIGONOMETRIC PARALLAXES

YERKES: AREAS AT DECLINATION $+45^\circ$

The trigonometric parallaxes of the stars in the areas at declination $+45^\circ$ have been published by O. J. Lee, see [18]. The limiting magnitude is 13 to 14 photographic.

6. STANDARDS OF POSITION

LEIDEN, BONN, BABELSBERG, PARIS, STRASBOURG: NORTHERN AREAS

The right ascensions and declinations of approximately ten stars in each area of the northern hemisphere, excepting the polar area, have been determined at the Babelsberg, Bonn, Paris, Leiden and Strasbourg Observatories, see [28], [30], [31]. Final mean places have been derived by C. H. Hins, see [23].

The stars in the polar area have been observed at Babelsberg, Bonn and Leiden, see [32] and [33].

PERTH AND LA PLATA: SOUTHERN AREAS

The positions of the standard stars in the southern areas have been determined by H. A. Martinez, see [29]. The observations at the Perth Observatory have been discontinued.

SOUTHERN AREAS

The positions of the brighter stars in the entire southern hemisphere will be determined jointly by the Yale Observatory (declination 0° to -30°) and the Cape Observatory (declination -30° to -90°). The stars of the Selected Areas occurring in this investigation will serve as standards of position for these areas.

7. SPECTRAL CLASSIFICATION

MOUNT WILSON: NORTHERN AREAS

M. L. Humason classified approximately 35 stars in each area north of and including the equator. The limiting magnitude is 12 to 13, see [36].

HAMBURG: NORTHERN AREAS

The third volume of the *Bergedorfer Spektral Durchmusterung* containing the zone of declination $+30^\circ$ has been published in 1947. The spectral classes of the stars in the zones $+15^\circ$ and 0° have been observed by A. Schwassmann. The results will be published as soon as the photographic magnitudes to be determined at the Groningen Laboratory are available.

HAMBURG: SPECIAL AREA 16

The spectral classes in the Special Area 16 were observed by A. A. Wachmann. The photographic magnitudes and the magnitudes at $\lambda = 5840$ are being determined at present.

MCCORMICK OBSERVATORY

Miss B. A. Mater has completed the classification of *A.G.* catalogue stars in the zones $+10^\circ$ to $+20^\circ$ and $+30^\circ$ to $+50^\circ$ declination. In the course of this work she has tabulated 1171 stars which are found also in the $+45^\circ$ zone of the *Bergedorfer Spektral Durchmusterung* [40]. The discussion of this material will be completed in 1947.

The spectral classes of the stars in the Selected Areas 5, 8, 11, 19, 23, 33, 38, 123, 124, 126, 127, 129, 133, 137, 139 were classified at the McCormick Observatory, the purpose being a comparison* with the Bergedorf [40] and Potsdam spectra [38]. The limiting magnitude of the McCormick material is about 12 photographic. The systematic differences as well as the mean accidental differences between both Bergedorf and McCormick as well as between Bergedorf and Potsdam are given. A comparison has been made between the Mount Wilson spectra [36] and the Bergedorf spectra which both pertain to stars in Selected Areas.

* 'Intercomparison of Various Spectral Classifications of Faint Stars', by A. N. Vyssotsky, *Astrophysical Journal*, **93**, 425, 1941.

POTSDAM: SOUTHERN AREAS

The spectral classes for the areas in declinations -75° , -60° , -45° , -30° and -15° have been published by F. Becker and H. Brück. The limiting magnitude is 12 photographic; the fields vary from 40 to 24 square degrees, see [35], [38] and [39]. The supplementary publication [39] contains the photographic magnitudes of the areas in the zones -75° and -60° ; they could not be determined satisfactorily in the former publication [35]. The spectral classes were determined anew.

8. ABSOLUTE MAGNITUDES AND INTENSITY MEASURES OF FRAUNHOFER LINES

MOUNT WILSON: NORTHERN AREAS

The spectroscopic absolute magnitudes of about 250 A to M stars brighter than the 8th magnitude in the areas 1 to 139 have been published by W. S. Adams and his collaborators, see [42]. The absolute magnitudes of all F to M stars and some A stars observed for radial velocity will be determined in the near future.

BONN: SOUTHERN AREAS

Spectral intensity measures and spectroscopic absolute magnitudes of stars in the southern areas have been published, see [41], [43], [44] and [45].

DAVID DUNLAP OBSERVATORY: NORTHERN AREAS

The absolute magnitudes of the stars in the areas between the north pole and declination $+15^\circ$ are being determined at the David Dunlap Observatory. The same stars are observed as in the radial velocity programme; see section 9.

STOCKHOLM: NORTHERN AREAS

Mr Elvius has undertaken a photometric and spectrophotometric investigation of 14 Selected Areas situated about the Milky Way in the Cygnus and Cepheus region. The numbers of the areas are 1, 2, 6, 7, 15, 16, 17, 18, 19, 20, 40, 41, 42, 43. They are distributed over the declinations $+45^\circ$ to the pole. The field is usually one square degree. Spectra are observed with an objective prism to the photographic magnitude 13.5. All spectra are recorded in a microphotometer. The methods developed for spectrophotometric determination of spectral type and absolute magnitude are applied.

The photographic magnitudes are measured in the spectra as monochromatic magnitudes at $\lambda=4215$ for B to F stars and at $\lambda=4360$ for G to M stars. The Mount Wilson and Bergedorf magnitudes are used for standardization using known reductions from monochromatic magnitudes to the international scale. The reduced monochromatic magnitudes agree well with the Mount Wilson scale. The mean error of a single measured image is 0^m.05. Photovisual magnitudes are measured on plates taken with the visual 50 cm. refractor and the 40 cm. astrographic telescope. The mean error of a single image is 0^m.05. The photovisual work has been started recently and is completed only for area 40.

A comparison between spectral class and colour for giants and dwarfs in the late spectral types shows that the segregation of giants and dwarfs is satisfactory. The spectral classes agree with Bergedorf; the separation into giants and dwarfs shows large deviations from the Bergedorf catalogue. It seems that actual microphotometric measurements are necessary for this purpose. A preliminary account of the work has been published, see [46]. A future enlargement of the work to a greater number of areas is intended and Mr Elvius has taken a considerable number of plates for this enlarged scheme from declination $+45^\circ$ to the pole.

9. RADIAL VELOCITIES

MOUNT WILSON: NORTHERN AREAS AND DECLINATION -15°

The radial velocities of 467 stars in the northern areas and in the zone declination -15° are being observed at the Mount Wilson Observatory. A list of the stars is found in *Transactions of the International Astronomical Union*, 5, 215, 1936. The stars of the list have not been selected on the basis of either large or small proper motion with the exception of the stars given in the quoted *Transactions*, p. 210.

The radial velocities of 168 stars of the list have been published, 112 stars are completed but unpublished and 187 stars are unfinished. For most of the stars the plates have been taken but on account of the war not all of the plates have been measured and reduced.

DAVID DUNLAP OBSERVATORY: NORTHERN AREAS

The radial velocities of stars in the northern Selected Areas between the north pole and declination $+15^\circ$ brighter than the photographic magnitude 7.59 have been observed at the David Dunlap Observatory. The field of each area is $6^\circ \times 6^\circ$. See [47] and [49].

The work is being extended to an $8^\circ \times 8^\circ$ field for a limited number of areas.

MCDONALD OBSERVATORY: NORTHERN AREAS

The radial velocities, spectral types, magnitudes and colour indices of approximately 40 B-type stars between the photographic magnitudes 9 and 11 in some northern and southern Selected Areas have been determined by C. K. Seyfert and D. M. Popper, see [48].

10. INVESTIGATIONS WHOLLY OR PARTIALLY BASED ON OBSERVATIONAL MATERIAL OF THE SELECTED AREAS

A summary is given of the investigations published since the Stockholm meeting in 1938:

1. 'A study of proper motions of 3189 stars in Kapteyn's areas in zones $+75^\circ$ and $+60^\circ$ and in area 28 of zone $+45^\circ$ ', by A. N. Deutsch, *Bulletin de l'Observatoire Central à Poulkovo*, 15, No. 5, 1937. Although published in 1937 this publication and the next one have not been included in the Stockholm report.

The paper contains an investigation of the solar apex and the vertex of star-streaming. The proper motions are determined at the Poulkovo Observatory. The result is for the apex: R.A. = 280° , D = $+22^\circ$; and the vertex: R.A. = 91° , D = -2° . Further, the mean secular parallaxes of different groups of stars are computed.

2. 'Proper motions of faint stars in Kapteyn's area 80 relative to anagalactic nebula N.G.C. 4262', by A. N. Deutsch, *Bulletin de l'Observatoire Central à Poulkovo*, 15, No. 5, 1937. The relative proper motions derived at the Poulkovo Observatory are reduced to absolute values by means of measurements of the anagalactic nebula N.G.C. 4262, the proper motion of which is supposed to be zero. The result is compared with the reduction to absolute proper motions derived from Hins's catalogue (*Annalen Leiden*, deel 15, vierde stuk, 1934). The differences may probably be explained by accidental errors. Further mean parallaxes, space velocities and absolute magnitudes are derived for the stars of area 80.

3. 'Dark clouds in Kapteyn's Special Areas 2, 5, 9 and 24 and the proper motions of the stars in these regions', by B. Hiemstra, *Publications of the Kapteyn Astronomical Laboratory at Groningen*, No. 48, 1938.

The proper motions of the stars of the areas 2, 5, 9 and 24 have been measured on 16×16 cm. photographic plates taken at the Radcliffe Observatory with the 60 cm. refractor. The probable error of a proper motion is $\pm 0''.005$; the limiting photographic

magnitude is between 14 and 15. All areas show a dark region surrounded by rich parts. The dark regions are ascribed to clouds, the distance and absorption of which have been determined. The results are:

Areas	Distance	Cloud	Absorption
2	600 to 1200 parsecs		0 ^m .5
5	< 300 parsecs		0 ^m .8 to 1 ^m .5
9	600 parsecs		1 ^m .7
24	450 parsecs		≥ 1 ^m .5

4. 'The change of the luminosity function with height above the galactic plane', by J. L. Greenstein, *Astrophysical Journal*, **87**, 577, 1938. The stellar density gradient perpendicular to the galactic plane is determined as a function of absolute magnitude from an analysis of star counts in high latitudes. It is found that giants show much greater concentration towards the galactic plane than dwarfs. The investigation is based on the star counts of the Selected Areas in *Groningen Publications*, No. 43, 1929.

5. 'Absorption and density distribution in the galactic system', by J. H. Oort, *Bulletin of the Astronomical Institutes of the Netherlands*, **8**, 233, 1938.

If the surfaces of equal density are parallel to the galactic plane, it is shown that

$$A_b(m) = \frac{1}{\sin^3 b} A_{90}(m_{90}),$$

where $m_{90} = m + 5 \log \sin b - \Delta a$,
 m = apparent magnitude,
 b = galactic latitude,

Δa = difference between the absorption suffered by the light of the stars at latitude b and that for stars near the pole,

$A_b(m)$ = number of stars per square degree between the apparent magnitudes $m - \frac{1}{2}$ and $m + \frac{1}{2}$ and galactic latitude b .

The absorption is supposed to take place in front of the stars studied. The values of Δa have been estimated with the aid of counts of extragalactic nebulae in neighbouring fields.

It appears that this relation does not hold for the numbers of stars of specified photographic magnitude in the Selected Areas published in *Groningen Publications*, No. 43. Oort concludes from the deviations between the observed numbers of stars and the values derived from the quoted formula that the sun is situated in a region of relatively low density surrounded in all galactic longitudes by regions where the density is at least twice as high. These structural features extend on both sides of the galaxy to distances of 500 or 700 parsecs from this plane. At larger distances from this plane the unevenness in the density distribution disappears; at levels between 800 and 1800 parsecs the equi-density surfaces can be represented by planes inclined about 10° to the galactic plane.

These conclusions depend to a large extent on the assumption that the absorption takes place mainly in the galactic plane. The distribution of the absorbing material has been investigated by means of colour excesses of stars in Selected Areas as well as from B-star colours. The evidence points to a strong galactic concentration of the absorbing clouds.

6. 'Interstellare Verfärbung in ausgewählten Gebieten der Milchstraße', by W. Becker, *Zeitschrift für Astrophysik*, **17**, 285, 1939. The selective interstellar absorption is investigated for the Selected Areas nos. 1, 19, 26, 40, 42, 194 and some other fields not contained in the list of Selected Areas. The distances of the stars are found by means of the apparent magnitudes and assumed absolute magnitudes of stars of a specified spectral type. It is concluded that in most cases the differential absorption does not increase regularly with the distance but that the absorption is due to separate clouds of interstellar matter.

7. 'Red Indices in southern Selected Areas', by C. Payne-Gaposchkin, *Astrophysical Journal*, **90**, 321, 1939.

The Potsdam and Harvard systems of spectral classification are compared. It appears that the differences are systematic and depend on the apparent and absolute magnitude.

The red indices of 5000 stars in the Selected Areas at declination -60° , for which spectral classifications have been made at Potsdam, furnish material for a discussion of spectrum and colour in relation to galactic structure. The normal colours of stars of a specified spectral class are derived from the six areas at latitudes exceeding 20° where obscuration is probably negligible. The six low-latitude areas appear to differ in spectral make-up and in degree of obscuration. The importance of standardizing both spectral classification and magnitude systems is emphasized.

8. 'A determination of the longitude of the vertex and the ratio of the axes of the velocity ellipsoid from the dispersions of the proper motions of faint stars measured at the Radcliffe Observatory', by A. Blaauw, *Bulletin of the Astronomical Institutes of the Netherlands*, **8**, 305, 1939.

The longitude of the vertex and the ratio of the axes of the velocity ellipsoid are determined by means of the dispersions of the proper-motion components. It is assumed that one of the axes of the velocity ellipsoid is directed toward the galactic pole. The mean without regard to sign of the residual proper-motion components parallel to the galactic plane $|\bar{\mu}_l|$ is computed for the stars in each area and between specified limits of apparent magnitude. Residual proper motion = difference between the observed and average component. The mean values are corrected for various errors and the dependence of the reduced values $|\bar{\mu}_l|$ on the galactic longitude towards which they point is considered. The longitude of the vertex is indicated by the largest values of $|\bar{\mu}_l|$ and the variation with the longitude yields the ratio of the axes. The values of $|\bar{\mu}_l|$ computed in the same way from the proper-motion components in the direction of increasing latitude give information about the size of the third axis in zones of low latitude.

The longitude of the vertex is found to be 323° , differing appreciably from the value 336° derived by Knox-Shaw and Scott Barrett from the same material, see [22]. Blaauw's value agrees nearly with the direction towards the galactic centre. The ratio of the axes parallel to the galaxy is found to be 0.58, and the ratio of the axis perpendicular to the galactic plane and the greater axis in the plane is 0.55.

9. 'Das Verteilungsbild der Spektralklassen in den Selected Areas des Südhimmels', von F. Becker, *Zeitschrift für Astrophysik*, **17**, 148, 1939.

The numbers of stars in eleven subdivisions of spectral class and in intervals of half a unit of magnitude are derived from the *Potsdam Spectral-Durchmusterung*. The percentages of stars of each of the spectral classes B₀ to B₄, B₅ to A₄, A₅ to F₄, F₅ to G₄, G₅ to K₄ and K₅ to M is computed for stars between specified limits of apparent magnitude, galactic latitude and galactic longitude. The main features of the distribution can be explained by the increasing number of stars along the main sequence from B to M, a decrease of the density at a large distance from the Sun and the spheroidal form of the stellar system.

10. 'The stellar distribution in high and intermediate latitudes', by B. J. Bok and D. A. MacRae, *Annals of the New York Academy of Sciences*, **42**, art. 2, p. 219, 1941.

The observational data used are partly derived from the Selected Areas as, for instance, the counts to various limits of apparent photographic magnitude in *Groningen Publications*, No. 43, the mean parallaxes derived by Oort in *B.A.N.* 290 from the Radcliffe Catalogue of proper motions, the spectral data by Schwassmann and van Rhijn in *Zeitschrift für Astrophysik*, **10**, 161.

The rate of decrease of the star density in a direction perpendicular to the galactic plane for different values of the absolute magnitude is found from the luminosity curve in the galactic plane, the star counts and the mean parallaxes in the direction of the north galactic pole for stars of all spectral classes together. This rate of decrease exceeds the value found by Schwassmann and van Rhijn in *Zeitschrift für Astrophysik*, **10**, 161, and by Oort quoted in the latter paper.

It is shown that the function $\phi(M, z) dM$ giving the numbers of stars per cubic parsec with absolute photographic magnitude between M and $M + dM$ at a height z above the

galactic plane is applicable to the entire polar cap between galactic latitudes 40° and 90° . A table ($m, \log \pi$) is constructed giving the numbers of stars per square degree between specified limits of apparent magnitude and logarithm of the parallax for all spectral classes together and in the direction of the north galactic pole. By means of this table the ratios:

$$D(M, z) = \frac{\text{density for abs. magn. } M \text{ and height above galactic plane } z \text{ at gal. lat. } b}{\text{density for abs. magn. } M \text{ and height above galactic plane } z \text{ at gal. lat. } 90^\circ}$$

are computed for areas between galactic latitudes $\pm 10^\circ$ to $\pm 30^\circ$ for which the absorption of light in interstellar space and the distribution of apparent magnitudes are known. It appears that the values of $D(M, z)$ are generally smaller than the values found by Oort in *B.A.N.* 308. The conclusion of the latter author that the density of stars in space at some distance from the Sun exceeds the values in the neighbourhood of the Sun is not confirmed by Bok's investigation.

11. 'The surface brightness of the Milky Way', by E. A. Kreiken, *Astrophysical Journal*, **94**, 259, 1941.

The amount of integrated starlight L for photographic and visual light is computed from the observed numbers of stars as a function of the photographic magnitude in the Selected Areas given in *Groningen Publication*, No. 43, p. 5, and the colour indices of the stars of a specified visual magnitude given in *Groningen Publication*, No. 43, p. 5. The observed values of the surface brightness are derived from Pannekoek's work in *Annalen Leiden*, **11**, pt. III, 1920; *Annalen Bosscha Observatory*, **2**, pt. I, 1923; *Publications Astronomical Institute Amsterdam*, No. 3, 1933.

It appears that the surface brightness of an area at latitude $\leq |5^\circ|$ is ten times larger than that of an area with the same value of L at higher latitude. Therefore, the integrated starlight is not the only source from which the surface brightness of the Milky Way originates. The effect just described can be explained either by an increase of space absorption near the Milky Way or as the result of increasing mean distance of the stars toward the galaxy.

12. 'The stellar distribution of two southern fields', by B. J. Bok and F. W. Wright, *Astrophysical Journal*, **101**, 300, 1945.

One of the fields investigated in this paper is Selected Area no. 193, galactic longitude 261° , galactic latitude $+1^\circ$. It is found from colour data that the region is probably free from obscuration for distances up to 1600 parsecs. The densities are derived from the distribution of apparent magnitudes and the luminosity function for stars of different spectral types separately. The density of the B8 to A0 stars increases somewhat up to 500 parsecs and remains constant for distances 500 to 1000 parsecs. The density of the A1 to A7 stars drops to 35% of the value near the Sun at a distance of 500 parsecs. The F stars show rather steep negative gradients. The g_{Go} to g_{M} stars yield slowly decreasing star densities.

The general luminosity function in the direction of Selected Area no. 193 appears to depend on the distance of the stars from the Sun.

II. PUBLICATIONS CONTAINING OBSERVATIONAL DATA ON THE PLAN OF SELECTED AREAS

DURCHMUSTERUNG, MAGNITUDES AND VARIABLE STARS

1. Durchmusterung of Selected Areas, by E. C. Pickering, J. C. Kapteyn and P. J. van Rhijn. *Harvard Annals*, **101-103**, 1918 to 1924.

2. Reduction of the Harvard-Groningen Durchmusterung to the International System of Magnitude and Colour, by F. H. Seares, Mary C. Joyner and Myrtle L. Richmond. *Mount Wilson Contributions*, No. 289; *Ap. J.* **61**, 303, 1925.

3. Photographic and photovisual magnitudes of the stars in the zone $+45^\circ$, by J. A. Parkhurst. *Publications of the Yerkes Observatory*, **4**, pt. 6, 1927.

4. Photovisual magnitudes for the Selected Areas at $\delta = +75^\circ$, by P. J. van Rhijn and B. J. Bok. *Publications of the Kapteyn Astronomical Laboratory at Groningen*, **44**, 1929.
5. Mount Wilson Catalogue of photographic magnitudes in Selected Areas 1 to 139, by F. H. Seares, J. C. Kapteyn and P. J. van Rhijn. *Carnegie Institution Publication*, No. 402, 1930.
6. Study of colour indices of faint stars in five Selected Areas in the Milky Way, by L. F. Slocum. *Lick Observatory Bulletin*, No. 434, 1931.
7. Photographic magnitudes of stars brighter than $14^m.0$ in 40 of Kapteyn's Selected Areas determined at the Royal Observatory, Greenwich, under the direction of Sir Frank Dyson, Astronomer Royal, 1931.
8. Observations of variable stars in the Selected Areas 1 to 115, by H. Knox-Shaw. *Astronomische Nachrichten*, **253**, 217, 1934.
9. Photographische Beobachtungen von Veränderlichen auf dem Kapteyn Eichfeld 41, von A. A. Wachmann. *Astronomische Abhandlungen der Hamburger Sternwarte in Bergedorf*, **4**, No. 5, 1935.
10. Théorie du spectrographe longitudinal et catalogue des couleurs des étoiles de la Bonn Durchmusterung dans les aires 1-43 du plan systématique de Kapteyn, par G. A. Tikhov, *Publications de l'Observatoire Central à Poulkovo*, Série II, **50**, 1937.
11. Variables in Kapteyn's Selected Areas 2 to 19, by E. A. Baker. *Monthly Notices of the Royal Astronomical Society*, **97**, 541, 1937 and **98**, 65, 1937.
12. Photographic magnitudes in Selected Areas at -15° , by Cecilia Payne-Gaposchkin and Sergei Gaposchkin. *Harvard Observatory Mimeographs*, Series II, No. 1.
Photographic magnitudes in Selected Areas at -45° and -60° , by Cecilia Payne-Gaposchkin and Sergei Gaposchkin. *Harvard Observatory Mimeographs*, Series II, Nos. 2 and 3.
13. Photovisual magnitudes for the Selected Areas at $\delta = +75^\circ$, by B. J. Bok and W. J. Swann. *Harvard Annals*, **105**, 371, 1937.
14. Standards for Selected Areas 140-206, by S. Gaposchkin. *Harvard Annals*, **89**, No. 9, 1937.
15. Farbenindices in den offenen Sternhaufen N.G.C. 1027 und IC 1805 und den Kapteynschen Eichfeldern 26, 35 und 40, von Martin-Christopher Clasen. *Astronomische Abhandlungen der Hamburger Sternwarte in Bergedorf*, **4**, No. 10, 1937.
16. Over kleuraequivalenten van sterren in Selected Areas 40 en 41 van Kapteyn, door A. Velghe. *Mededelingen van de Koninklijke Vlaamse Academie voor Wetenschappen, Letteren en Schone Kunsten van België, Klasse der Wetenschappen*, **3**, No. 5, 1941.
17. Magnitudes and colours in the globular cluster Messier 12 and Selected Area 108, by J. J. Nassau and J. A. Hynek. *Astrophysical Journal*, **96**, 37, 1941.

PROPER MOTIONS AND TRIGONOMETRIC PARALLAXES

18. Parallaxes and proper motions of 1041 stars in the zone $+45^\circ$, by O. J. Lee. *Publications of the Yerkes Observatory*, **4**, pt. 4, 1926.
19. Proper motions of the special area no. 12, by W. M. Smart. *Cambridge Observations*, **26**, 1928.
20. Proper motions of some very faint stars, by A. van Maanen and H. C. Willis. *Mount Wilson Contributions*, No. 412, 1930.
21. Faint stars in the Selected Areas (zones $+75^\circ$ and $+60^\circ$) with large proper motion, by A. N. Deutsch. *Poulkovo Observatory Circular*, No. 8, 1933.
22. Radcliffe Catalogue of Proper Motions in the Selected Areas 1 to 115, compiled by H. Knox-Shaw and H. G. Scott Barrett, 1934.
23. General Catalogue of Positions and Proper motions of 1190 Standard Stars in the Areas 2 to 115 of Kapteyn's Plan of Selected Areas, by C. H. Hins. *Annalen van de Sterrewacht te Leiden*, deel **15**, vierde stuk, 1934.
24. Eigenbewegungen von 3189 Sternen in den Kapteynschen Arealen $\delta = +75^\circ$ und $+60^\circ$ und in dem Areal 28, von A. N. Deutsch und E. J. Perepelkin. *Publications de l'Observatoire Central à Poulkovo*, Série II, **45**, 1935.

25. Proper motions of 651 stars in 97 Selected Areas, by P. Th. Oosterhoff. *Ap. J.* **83**, 340, 1936.
26. Dark clouds in Kapteyn's Special Areas 2, 5, 9 and 24 and the proper motions of the stars in these regions, by B. Hiemstra. *Publications of the Kapteyn Astronomical Laboratory at Groningen*, No. 48, 1939.
27. The proper motions of 18,000 stars in 74 Kapteyn's Areas from $+75^\circ$ to $+15^\circ$ declination, by A. N. Deutsch. *Publications de l'Observatoire Central à Poulkovo*, Série II, **55**, 1940.

MERIDIAN POSITIONS

28. Katalog von 1885 Sternen für das Aequinoxtium 1925, von R. Prager. *Veröffentlichungen der Universitäts-Sternwarte zu Berlin-Babelsberg*, **5**, Heft 3, 1924.
29. Estrellas Kapteyn para las areas seleccionadas australes observadas, por H. A. Martinez. *Publicaciones Observatorio Astronómico La Plata*, **11**, No. 1, 1927 and **15**, 1939.
30. Katalog von 1172 Sternen in Kapteyn's 'Selected Areas' auf Grund der Beobachtungen am Repsold'schen Meridiankreise 1, von C. Mönlichmeyer und J. Hopmann. *Veröffentlichungen der Universitäts-Sternwarte zu Bonn*, No. 21, 1930.
31. Catalogue of 1172 reference stars in the areas 2 to 115 of the Systematic Plan of Selected Areas. Observations of the Leiden Observatory, by C. H. Hins and J. J. Raimond, Jr. *Annalen van de Sterrewacht te Leiden*, deel **15**, derde stuk, 1930.
32. Bestimmung der Oerter von 10 Polarsternen im Kapteyn Feld 1, von B. Sticker. *Astronomische Nachrichten*, **256**, 349, 1935.
33. Ortsbestimmung von zehn Polsternen, von L. Courvoisier. *Astronomische Nachrichten*, **261**, 5, 1936.

SPECTRAL CLASSIFICATION

34. The space distribution of the stars of different spectral classes as determined from studies in the Cygnus region of the Milky Way, by A. D. Maxwell. *Lick Observatory Bulletin*, No. 390, 1927.
35. Spektral-Durchmusterung der Kapteyn-Eichfelder des Südhimmels, I. bis III. Teil enthaltend das Polfeld und die Zonen -75° , -60° und -45° , von Friedrich Becker. *Publikationen des astrophysikalischen Observatoriums zu Potsdam*, **27**, 1931.
- 35a. Spektral-Durchmusterung der Kapteyn'schen Eichfelder des Südhimmels, IV. Teil, Zone -30° , von H. Brück. *Publikationen des astrophysikalischen Observatoriums zu Potsdam*, **28**, 1935.
36. Spectral types of faint stars in Kapteyn's Selected Areas 1 to 115, by M. L. Humason. *Mount Wilson Contributions*, No. 458, *Ap. J.* **76**, 224, 1932.
37. Revised spectral types of a group of stars in Kapteyn area 98, by M. L. Humason. *Mount Wilson Contributions*, No. 560, 1937.
38. Spektral-Durchmusterung der Kapteyn-Eichfelder des Südhimmels Zone -15° , von F. Becker. *Publikationen des astrophysikalischen Observatoriums zu Potsdam*, **28**, Heft 2, 1938.
39. Spektral-Durchmusterung der Kapteyn'schen Eichfelder des Südhimmels, VI. Teil. Ergänzungen zu den Zonen -75° und -60° von F. Becker. *Publikationen des astrophysikalischen Observatoriums zu Potsdam*, **28**, Heft 3, 1938.
40. *Bergedorfer Spektral-Durchmusterung der 115 nördlichen Kapteyn'schen Eichfelder*, von A. Schwassmann und P. J. van Rhijn, Band I, Eichfeld 1 bis 19, 1935; Band II, Eichfeld 20 bis 43, 1938.

SPECTROSCOPIC ABSOLUTE MAGNITUDES AND INTENSITY MEASURES OF FRAUNHOFER LINES

41. Spektrale Intensitäts-Messungen an 1393 Sternen des Südhimmels, von F. Becker und A. Kohlschütter. *Veröffentlichungen der Universitäts-Sternwarte zu Bonn*, No. 27, 1933.
42. The spectroscopic absolute magnitudes and parallaxes of 4179 stars, by W. S. Adams, A. H. Joy, M. L. Humason and A. M. Brayton. *Mount Wilson Contributions*, No. 511, 1934.

43. Spektral-photometrische Parallaxen von 533 G und K Sternen, von F. Becker. *Zeitschrift für Astrophysik*, **10**, 311, 1935.
44. Spektral-photometrische Parallaxen von 205 G und K Sternen, von F. Becker. *Zeitschrift für Astrophysik*, **11**, 148, 1935.
45. Spektrale Intensitäts-Messungen an 1984 Sternen des Südhimmels, von F. Becker und A. Kohlschütter. *Veröffentlichungen der Universitäts-Sternwarte zu Bonn*, No. 29, 1936.
46. Preliminary report on a spectrophotometric investigation in Kapteyn's Selected Areas 2, 6, 7, 15, 16 and 19, by Tord Elvius. *Stockholms Observatorium Annalen*, Band **14**, No. 8, 1945.

RADIAL VELOCITIES

47. The radial velocities of 500 stars, by R. K. Young. *Publications of the David Dunlap Observatory, University of Toronto*, **1**, No. 3, 1939.
48. Studies of faint B-type stars, by Carl K. Seyfert and Daniel M. Popper. *Ap. J.* **93**, 416, 1941.
49. The radial velocities of 374 stars by R. K. Young. *Publications of the David Dunlap Observatory*, **1**, No. 13, 1942.

12. DESIDERATA FOR FUTURE WORK AND THE EXTENSION OF THE LIST OF SELECTED AREAS

1. The Durchmusterung of stars as faint as magnitude 19, which for the zones in declination $+90^\circ$ to -15° has been published in the *Mount Wilson Catalogue*, should be extended to the south pole. A re-examination of the scale of photographic magnitudes of the fainter stars in the southern hemisphere is urgently needed.

2. An extremely valuable addition to our knowledge of the galactic system could be furnished by the measurement of accurate colours down to the 17th or 18th magnitude.

3. The radial velocities of the areas south of declination -15° are unprovided for.

The radial velocities of a number of stars in both hemispheres fainter than magnitude 9 would be very valuable even if the probable errors were larger than the values holding for the brighter stars.

4. An evaluation of the absorption of light in the Selected Areas is urgently wanted. This could be done by statistics of the numbers of extragalactic nebulae on the Selected Areas outside the zone of avoidance and for the other areas by a determination of the colour excesses and absolute magnitudes of B and A stars.

5. It was generally agreed among the members of the Commission at the Stockholm meeting that the present Selected Areas in the Milky Way are too far apart for a study of galactic structure and that a number of additional areas in or near the galaxy should be selected. The Sub-commission, which was appointed to consider this matter, came to the conclusion that the new Selected Areas should preferentially be taken in places where the absorption of light is inconsiderable, if these could be found (the so-called galactic windows). A search for these galactic windows can be performed according to two methods:

(i) By looking for areas in and near the Milky Way with a sufficient number of extragalactic nebulae. Mount Wilson astronomers intend to photograph the whole sky north of declination -30° with the 120 cm. Schmidt telescope at Mount Palomar, in blue as well as in red light and to undertake a search for extragalactic nebulae in and near the Milky Way on these plates. The limiting magnitude of the nebulae will be 19 approximately. This work has of course been delayed through the war, but the survey will probably be ready within a few years.

(ii) Probably a new attack will be made on the structure of the galaxy by an investigation of the B stars brighter than say the 12th magnitude. The density of B stars in space can be found from the distribution of apparent magnitudes and absolute magnitudes, if the absorption of light in interstellar space is known. The latter can be found from the

colour excesses, adopting a constant ratio between the total absorption at some definite wave-length and the differential absorption found from the colour excess. The mean distances of the stars investigated can be found from the absolute magnitudes determined spectroscopically. Hence the absorption may be derived as a function of the distance.

This plan has been discussed with various astronomers. Plates for this programme are now being taken at the Tonanzintla Observatory, while the Tonanzintla astronomers are planning, in collaboration with the Yerkes Observatory, to determine accurate types and luminosity classes according to the scheme developed by W. W. Morgan. It is hoped that other observatories will eventually share in this investigation, and in particular that it will be extended to the southern parts of the Milky Way.

Any galactic windows which may be found in either of these investigations may be added as new Selected Areas to the original list prepared by Kapteyn.

It seems to me that a decision about the new Selected Areas must be postponed until some more progress has been made in the search for galactic windows. This point will be discussed at the Zürich meeting.

P. J. VAN RHIJN
President of the Commission

Report on meeting

ACTING PRESIDENT: Prof. J. H. OORT.

SECRETARY: Dr A. BLAAUW.

The Acting President, Dr Oort, forwarded to the members of the Commission the greetings of Dr van Rhijn who was prevented by illness from attending the meeting. He next invited the members of the Commission and other astronomers present to comment on the Report or make suggestions for changes.

Dr R. E. Wilson of Mount Wilson Observatory informed the Commission that good progress had been made with the determination of radial velocities of 300 stars in the Selected Areas (systematic plan), and that about 200 of these will soon appear in a general list of radial velocities of 1500 stars. Preliminary data will be sent to Dr Fehrenbach in connection with his programme of radial velocities determined by means of an objective prism, which has been recently started at the Observatory of St Michel (France). Stars brighter than apparent magnitude 10.5 in regions $3^\circ \times 3^\circ$ will be observed. The Commission agreed with Dr Fehrenbach that the new radial velocities are most urgently needed for the areas in the galactic zone. Dr Fehrenbach has already obtained the observational material for Sel. Area 41. Mr Velghe announced that for this area and area 40 measurements of effective wave-lengths have been made at the Astronomical Institute at Gent.

Dr Kharadze gave an account on work in Russia. In addition to the proper motions of 18,000 faint stars in the areas of the systematic plan measured by A. N. Deutsch, referred to in the Draft Report, about 3200 proper motions have been measured in the areas 9, 12, 17, 24, 25 of the Special Plan by Deutsch and Labadofsky, and a discussion of the interstellar absorption in these areas based on this material is under way. The determination at the Abastumani Observatory of colours of stars of magnitudes 10–13.2 in the Selected Areas of the systematic plan (see the Draft Report) has been completed for 14,000 stars in areas 1–43. The recent publication of the third volume of the *Bergedorfer Spektral-Durchmusterung* (areas 44–67) will render possible the extension of this work to the zone $+30^\circ$ declination. The Abastumani Observatory considered the desirability of extending this work to the total areas of $3.5^\circ \times 3.5^\circ$. The Commission expressed the opinion that such an extension would be very valuable indeed for the areas at low galactic latitude, and this holds also for at least part of the areas at high galactic latitude. The President mentioned that photoelectric colours of A-type stars brighter than $m = 13$ in the northern selected areas will be determined by Dr Walraven in co-operation between the Leiden Observatory and the Observatoire de Haute Provence at St Michel.

Dr F. Becker communicated to the Commission that the Bonn Observatory intends to repeat the plates of Selected Areas taken by Küstner 40 years ago in order to determine the proper motions. Dr Hins suggested that in the first place those areas be measured which do not occur in the Pulkovo catalogue.

Dr Schilt reported on the proper motion programme of the southern Yale telescope, referred to in the Draft Report. The Commission discussed whether a repetition of the 1927 series of plates (taken without a grating) is desirable, notwithstanding the fact that it will be impossible to correct the resulting proper motions for magnitude errors. The question will be studied in detail by the President and Drs Schilt and Brouwer.

Dr Lindblad summarized the photometric and spectrophotometric investigation of selected areas by Mr Elvius at the Stockholm Observatory.