32. COMMISSION DES "SELECTED AREAS"

PRÉSIDENT: M. VAN RHIJN, *Director of the Kapteyn Astronomical Laboratory, Groningen, Holland.*

MEMBRES: MM. Adams, Dyson, A. Kohlschütter, Küstner, Schlesinger, Schwassmann, Seares, Shapley.

INTRODUCTION

The Plan of Selected Areas was suggested by the late Prof. J. C. Kapteyn in 1906.* The aim of the plan is to bring together, as far as possible, all the elements which seem most necessary for a successful attack on the problem of the structure of the sidereal world. The first, second and third reports on the progress of the plan were published by the Kapteyn Laboratory in 1909, 1910 and 1923 respectively, the fourth report appeared in *Bulletin of the Astronomical Institutes of the Netherlands*, No. 211, 1930. Many observatories and astronomers have co-operated on the plan and for the northern hemisphere most of the work has been finished or is now in progress.

The state of things is quite different for the southern hemisphere where a large amount of work has still to be done and several quantities, for instance the radial velocities, are unprovided for (see section 12).

Sections 1–10 summarize the observational work, and section 11 investigations based on this observational material, while section 12 contains a list of desiderata for future work. Section 13 gives a list of publications containing observations on the Selected Areas and section 14 the stars to be observed for radial velocity.

The letters relating to the progress of the work which have been summarized in this respect were written October to December 1934.

1. DURCHMUSTERUNG

Harvard, Groningen

Harvard Annals, **101–103**, giving the positions and photographic magnitudes of the stars in the areas of the systematic plan. The fields measured are as follows:

Galactic latitude	$-20°$ to $+20°$	$40' \times 40'$
	$\pm 20°$ to $\pm 40°$	$60' \times 60'$
	$\pm 40°$ to $\pm 90°$	$80' \times 80'$

The limiting photographic magnitude is 16 on the average. The reduction of the magnitudes to the international system has been derived for Areas 1 to 139 by Seares and his collaborators in *Mount Wilson Contributions*, 289.

Mount Wilson, Groningen

Mount Wilson Catalogue of Photographic Magnitudes in Selected Areas 1 to 139, containing the positions and photographic magnitudes of stars in the areas of the systematic plan on and north of declination $-15°$. The limiting magnitude is 18·0 to 19·0. The field measured at Mount Wilson is a circle 23′ in diameter, at Groningen, $15' \times 15'$ for galactic latitudes between $-40°$ and $+40°$ and $20' \times 20'$ for the rest of the sky.

* J. C. Kapteyn, *Plan of Selected Areas*, 1906.

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Harvard, Groningen

Durchmusterung plates of the special areas, taken at the Harvard Observatory and measured at the Kapteyn Laboratory. The reductions have been finished for most of the areas. Since the publication of the last report* some progress has been made with the determination of the standard magnitudes which are missing for some of the areas. The standards for a few areas are not yet satisfactory however and will be redetermined at the Kapteyn Laboratory on plates taken at the Harvard Observatory. As soon as these magnitudes are finished the Durchmusterung of the special areas will be completed.

The measured field of the special areas depends on the peculiar character of the area. Some of these regions are situated in either very rich or very poor parts of the sky, others were chosen so as to include dark "holes" in the rich clouds of the Milky Way.†

The following table gives the limits of the measured area of each region; x and y denote rectangular co-ordinates positive in the direction of increasing right-ascension and increasing declination, respectively, relative to the central star.

Measured Area of the *Special* Regions

	Central star		Limits	
	1900	1900	x	y
No.	h m s	° ′	′ ′	′ ′
1	18 55 37	− 0 36	−22 to +22	−44 to +66
2	19 8 51	− 0 3	−31 +41	−57 +33
3	18 32 25	+ 7 27	−20 +20	−17 +23
4	18 56 31	+ 4 7	−23 +67	−87 +23
5	19 36 22	+10 27	−29 +31	−27 +33
6	19 19 38	+17 49	−30 +30	−29 +31
7	19 33 31	+29 23	−20 +20	−23 +17
8	19 49 26	+37 8	−20 +20	−18 +22
9	21 3 38	+44 16	−56 +34	−56 +34
10	21 6 14	+45 59	−20 +20	−19 +21
11	21 0 6	+50 24	−30 +30	−34 +26
12	21 56 38	+58 29	−37 +33	−49 +21
13	0 45 49	−74 1	−10 +10	−19 +11
14	1 1 8	−72 47	−10 +10	−13 +17
15	3 31 38	+52 29	−22 +58	−49 +31
16	3 24 18	+43 52	−30 +30	−32 +28
17	3 50 1	+36 52	−86 +14	−22 +38
18	5 13 54	+40 47	−20 +20	−17 +23
19	5 12 25	+27 59	−31 +29	−29 +31
20	5 30 35	− 4 58	−35 +35	−52 +48
21	5 17 40	−69 41	−15 +15	−19 +11
22	5 36 52	−69 27	−20 +20	−23 +27
23	5 49 10	+30 42	−20 +20	−22 +18
24	6 29 55	+10 55	−30 +30	−25 +35
25	6 35 50	+ 9 18	−30 +30	−28 +32
26	6 20 49	− 3 50	−20 +20	−20 +20
27	8 21 1	−40 25	−30 +30	−25 +15
28	9 5 31	−48 53	−30 +30	−27 +33
29	10 38 54	−59 23	−20 +20	−27 +23
30	11 2 33	−61 19	−21 +33	−41 − 1
31	12 49 56	−60 22	−25 +25	−38 +22

* *Bulletin of the Astronomical Institutes of the Netherlands*, No. 211, 1930.

† J. C. Kapteyn, *Plan of Selected Areas*, pp. 64–66, 1906; second impression pp. 64–66, 1923.

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Measured Area of the *Special* Regions (*continued*)

No.	Central star 1900 h m s	1900 ° ′	Limits x ′ ′	y ′ ′
32	12 54 43	+28 36	−30 to +30	−36 to +24
33	14 26 22	−60 22	−15 +15	−18 +12
34	14 46 32	−58 30	−15 +15	−10 +20
35	16 47 40	−28 47	−15 +15	−13 +17
36	16 27 49	−24 5	−40 +40	−35 +45
37	16 38 1	−23 49	−50 +50	−41 +59
38	17 3 54	−27 39	−35 +35	−51 +39
39	17 18 21	−26 50	−40 +40	−40 +40
40	17 50 15	−29 2	−25 +25	−28 +32
41*	17 12 40	−21 29	− 8 +47	−31 −21
			− 8 +46	−21 −11
			−13 +48	−11 − 1
			−18 +40	− 1 + 9
			−40 +23	+ 9 +19
			−30 +13	+19 +29
			−42 −20	+29 +39
42	18 9 20	−28 7	− 5 + 5	− 3 + 7
43*	18 11 37	−18 30	+11 +53	−40 −30
			+11 +53	−30 −20
			+11 +53	−20 −10
			−35 +53	−10 0
			−35 +53	0 +10
			−35 +53	+10 +20
44	18 31 55	−12 46	−40 +40	−44 +46
45	18 45 15	− 7 57	−15 +15	−13 +17
46	18 47 10	− 3 51	−25 +25	−49 +41

* We have varied the limits in x with the value of y in order to measure the most characteristic regions of the area.

2. Photographic and Visual or Photovisual Magnitudes, Colour Indices

Mount Wilson

The photovisual magnitudes in forty-three of the northern Selected Areas, Nos. 1; 2, ... 7; 8, 10, ... 18; 20, 24, ... 40; 45, 49, ... 65; 69, 73, ... 89; 92, 96, ... 112; 116, 120, ... 136, are being investigated by Dr Seares. The limiting magnitude is about 15·5. The colour indices, photographic magnitude minus photovisual magnitude, have been partially checked by means of the colour indices derived from exposure ratios. The investigation has been interrupted in order to extend the list of photographic standard magnitudes near the North Pole.

The photographic scale is being extended by Dr Baade below magnitude 20 in a group of Selected Areas including at present Nos. 51, 57, 61, 68 and 89. The primary purpose is to obtain standards of brightness for the extra-galactic nebulae.

Yerkes

The photographic and photovisual magnitudes of the stars in the zone +45° have been published in *Publications of the Yerkes Observatory*, **4**, part 6, by J. A. Parkhurst. The measured field of each area is 32′ × 40′. The limiting magnitude is 14·0

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photovisual and 14·5 photographic. The magnitudes and colour indices are given for stars whose parallaxes and proper motions have been investigated with the 40 inch Yerkes refractor (see sections 6 and 7).

Greenwich

Sir Frank Dyson has published the photographic magnitudes of stars brighter than $14^m{\cdot}0$ in Selected Areas 13, 30, 31, 32, 51, ... 60, 63, 64, 68, ... 91. The observed area is $40' \times 40'$ (see Publications, section 13, No. 7).

Potsdam

The photographic magnitudes of stars in the areas at declination $+15°$ and in special areas 2 to 7 and 24 and 25 are being determined by Prof. Münch* using the "Halbgittermethode" of Schwarzschild.† The plates have been taken with the 15 cm. Zeiss triplet (focal length, 150 cm.) and the 80 cm. photographic refractor (focal length, 1210 cm.).

The measured area is $3°{\cdot}8 \times 3°{\cdot}8$ for the triplet plates and $0°{\cdot}48 \times 0°{\cdot}48$ for the refractor plates. The limiting magnitudes are 11·5 and 14·5 respectively.

The photographs have all been taken. The triplet plates of the systematic plan and all the refractor plates have been measured and partly reduced. The accuracy of the "Halbgittermethode" will be investigated by means of a number of Pleiades plates.

Harvard, Groningen

Photographic magnitudes of the stars in the northern Selected Areas ($\delta = 0°$ to $+90°$) brighter than 13·0 are being determined at the Kapteyn Laboratory. The measured field is $3°{\cdot}5 \times 3°{\cdot}5$. The spectral classes of the same stars are being investigated by Prof. Schwassmann at the Hamburg Observatory (see section 9). The plates, taken with the 8 inch Draper telescope (focal length, 126 cm.) of the Harvard Observatory and measured at the Kapteyn Laboratory with a thermopile and galvanometer, are in two series, including

(1) Plates containing four exposures, three of 10^m, 10^m and 1^m on the same selected area, and one of 1^m on an adjacent area (Durchmusterung plates);

(2) Photometric plates used for the determination of the scale and zero-point, which for the higher declinations are found by direct comparisons with the polar sequence and for the lower declinations, by comparison with Harvard Standard regions at declination $+15°$. The magnitudes of these regions are being carefully investigated by Dr Bok and Mr McCuskey.

Sixty-five of the 115 Durchmusterung plates have been measured. The magnitudes for areas 1 to 7 are ready for the press and will be published shortly, together with the spectral classes. Comparisons with the *Mount Wilson Catalogue of Photographic Magnitudes in Selected Areas 1 to 115* show that the scale and zero-point of our magnitudes agree with the international system. The remaining Durchmusterung plates and the photometric plates for the areas 8 to 115 are being taken and measured at present.

McCormick, Groningen

Photovisual magnitudes for the areas at declination $+75°$ have been determined at the Kapteyn Laboratory from plates taken with the 26 inch visual refractor of

* The Kapteyn-Pritchard areas are also observed. See *Second Report Selected Areas*, p. 21 footnote.

† *Astronomische Nachrichten*, **183**, 297, 1910.

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the McCormick Observatory (focal length, 990 cm.) (see Publications, section 13, No. 5). The magnitudes were referred to the international photovisual scale* by polar comparisons. The field of each area is a little more than one square degree. The limiting magnitude is 12·5, approximately. According to Seares† the scale differs appreciably from that established at the Mount Wilson Observatory for the same areas by comparison with the same standard magnitudes. The plates were originally measured at the Groningen Laboratory with the thermopile and a galvanometer. The divergences found by Seares led us to remeasure some of the plates for which the divergences were largest. No thermopile was used, the magnitudes being derived by estimates of the size of the images. This second measurement shows only small divergences from the original results.

Harvard

The photovisual scale of the areas 3, 6 and 7 at the declination +75° has been further investigated by Miss Allen at the Harvard Observatory. She finds that the magnitudes of *Groningen Publications*, **44**, are all right between $m=11{\cdot}0$ and 11·5 but that magnitudes 9·0 to 9·5 require a correction of $-0^{m}{\cdot}25$.

The mean corrections for the areas 3, 6 and 7 found by Seares for the magnitudes 11·2 and 9·2 are $-0^{m}{\cdot}03$ and $-0^{m}{\cdot}23$ respectively. Miss Allen's investigation therefore agrees with Seares' result. The scale of the areas 2, 4 and 5 will be examined by Mr Philbrick at the Harvard Observatory.

Mr Gaposchkin and Mrs Payne Gaposchkin are engaged in the determination of photographic and red magnitudes in the southern Selected Areas nos. 92–206. They have sent the following report on their work:

(1) *Photographic magnitudes.* Two years ago a programme of photographing the southern Selected Areas (92–206, in declinations 0° to −90°) was begun at our South African station. The plates were to be taken with the 3 inch Ross lens (RB), scale 1 mm.=386″. This lens is the twin of the 3 inch Ross lens (RH) in use at the Oak Ridge station, with which the Harvard photographic magnitudes of bright stars were determined; it has a good field, and its colour coefficient, relative to the International System, seems to be small.

The plates are taken with 10 minute exposures on Selected Areas and 10 minute exposures on the same plates of Harvard Standard Regions C (+15°), D (−15°) E (−45°) or F (−75°), the latter so distributed as to eliminate systematic errors arising from errors in the Standard Regions. These plates were designed to furnish reliable magnitudes over 16 square degrees each for all the stars whose spectra have been classified by Becker in his work in the extended Selected Areas.

The 3 inch Ross plates are found to extend, on the average, to magnitude 10·5, and to supplement them we have decided to use the extensive available collection of plates taken with the 8 inch Bache telescope (B), scale 1 mm.=179″. These plates were taken "in series" with Harvard Standard Regions, and therefore represent material exactly similar to that furnished by the RB plates. They provide good magnitudes for all the stars classified by Becker, and the measures hitherto made show that they give accordant results and are well suited to the problem.

(2) *Red magnitudes.* It is planned to duplicate the photographic programme by red magnitudes, determined on Eastman I–C plates with a Ciné Red filter. I am

* *Transactions of the International Astronomical Union*, **1**, 71, 1922.
† *Transactions of the International Astronomical Union*, **4**, 143, 1932.

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communicating the details of the system, the method, and the standards (which are in the Harvard Standard Regions) to the Chairman of the Commission on Stellar Photometry. The Selected Areas at 0° and −15° are to be photographed with the 12 inch Metcalf (MA) telescope at Cambridge, the scale of which is 1 mm. = 93″. The Selected Areas south of −15° are to be photographed with the 24 inch Bruce telescope (scale 1 mm. = 60″) at Bloemfontein. All the red magnitudes will be based, by direct comparison on red standards in the Harvard Standard Regions, which are on the road to completion.

All plates described in these two programmes are taken in focus and measured by comparison with a scale of graduated images.

Pulkovo

Visual magnitudes of stars in Selected Areas 68 to 84 and 87 to 91 have been estimated by Dr Okulicz with the 38 cm. refractor (focal length, 690 cm.). The material will be reduced to a uniform system. A preliminary comparison with some photovisual magnitudes sent to Pulkovo by Dr Seares shows that the visual magnitudes as observed with the Pulkovo refractor are sufficiently accurate only to magnitude 12. The final test will be made after publication of the Mount Wilson catalogue of photovisual magnitudes.

Prof. G. A. Tikhov has determined the colours of all B.D. stars in areas 1 to 43 of the systematic plan; their number is 8817. The colours for areas 44 to 91 are being determined now. The diameter of the fields is 4°. The manuscript for areas 1 to 43 is being printed; areas 44 to 91 will be completed in 1935.

3. Photo-electric Magnitudes

Harvard

Photo-electric magnitudes of the brighter stars in the areas on and north of declination −15° are being determined by Dr W. A. Calder and his assistants Mr Evans and Mr Goldberg, with the 24 inch and 60 inch reflectors. The programme refers at present to potassium cell (photographic) magnitudes. Perhaps caesium cell (reddish) magnitudes will be introduced in the future.

4. Star Counts

Harvard

Dr Shapley inaugurated at the Oak Ridge Station of the Harvard Observatory systematic photography of all the Selected Areas in declinations 0° to +90°, inclusive. He sends the following report:

We make an exposure of 1 hour and on another night an exposure of 2 hours. After the whole sky is satisfactorily covered with these two series of plates, we shall continue the 1 hour plates as an indefinitely running patrol. The camera used is a Ross-Fecker 3 inch of 21 inches focal length. A nearly identical lens has just been installed at the Cambridge Station, and its programme will also be chiefly a patrol of the Selected Areas, but the exposures will be basically of 10 minutes' duration (two to each field) and 60 minutes.

The following note by Dr Bok explains his plan to use the Oak Ridge and Cambridge plates, which bear the designation RH and BM, respectively, in a star counting programme; the longer exposure (2 hours) RH plates can be used also in

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the nebular department in the photometry of galaxies brighter than the fifteenth magnitude.

"The best plates of the RH and BM patrols on the Selected Area centers will form the basis for a programme of star counts for the northern Selected Areas. The photographic magnitudes, which are now being determined at Groningen from Harvard plates, will, together with the magnitudes of the *Mount Wilson Catalogue of Selected Areas*, furnish excellent sequences on the international photographic scale for stars with apparent magnitudes from 8 to 9 on to 15±. Each RH plate has a field of approximately seventy square degrees, which is hardly affected by distance correction, and for which star counts with a high degree of accuracy can be obtained. It is our plan to perform the counts for stars with m_{ptg} between 8·5 and 14·5 for successive zones of declination as soon as the magnitudes for the brighter stars become available. We hope that such counts over a large area will eliminate completely the errors arising from a small total number of counted stars per area."

5. Variable Stars

Harvard

The patrol plates described in section 4 are designed eventually to yield material for systematic surveys for variable stars. It will take several years of accumulation before the plates will be very useful in such a programme.

Another survey for variable stars in twenty-six Selected Areas will be made with the 4 inch Ross-Lundin camera; fourteen of these areas are in the northern galactic hemisphere and twelve in the southern galactic hemisphere—all reached from the Oak Ridge Station. The distribution is especially planned so that galactic latitudes will be appropriately represented. The survey will not reach effectively fainter than magnitude 14·5 or 15·0.

6. Proper Motions

Radcliffe

The relative photographic proper motions of the stars in areas 1 to 115 of the systematic plan have been determined at the Radcliffe Observatory (Publications, section 13, No. 8). The measured field is

40′ × 40′	for galactic latitudes	−20°	to +20°
50′ × 50′	,,	,,	±20° to ±40°
60′ × 60′	,,	,,	±40° to ±90°

The limiting photographic magnitude is 15·2 on the average. The probable error of the proper motions is ±0″·004.

Pulkovo

The areas of the systematic plan on and north of declination +15° and the special areas 9, 12, 17, 24, 25 and 32 have been photographed by Prof. Kostinsky with the 33 cm. astrographic telescope (focal length, 346 cm.) for the determination of the proper motions. The first epoch of the areas having an asterisk in Kapteyn's *Plan of Selected Areas*, p. 59, is 1911 to 1915; two plates were taken of each area with an exposure time of 1 hour.

The plates of zones δ+60° and +75° have been repeated with an interval of twelve years and have been measured in the blink microscope by Dr Deutsch and Dr Perepelkin. The total number of proper motions measured is 3189, the probable error being ±0″·0065. These proper motions will be published at the end of 1934.

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It was decided in 1931 to discontinue the measurement of the other zones and to start new exposures which will double the difference in epoch. The new exposures are taken through the glass and the plates are measured in a Repsold instrument. The measured field of each area is the same as in *Harvard Annals*, **101**; outside these areas are measured only fundamental stars* and stars which according to the investigation with the blink microscope show large proper motions (the plates cover an area of $2° \times 2°$). The limiting magnitude is 14·5, the probable error of the proper motions is $\pm 0''{\cdot}004$. By the end of 1934 the measurement and reduction will be finished for seventeen areas.

The first epoch of the areas without an asterisk is 1915 to 1930. These areas will be repeated after the completion of the first series with an asterisk.

Yerkes

The proper motions of the stars in the areas at declination $+45°$ have been determined with the 40 inch refractor by Dr Lee (see Publications, section 13, No. 10). The limiting photographic magnitude is 13 to 14.

Bonn

The areas of the northern hemisphere between 0° and $+75°$ declination have been photographed with the 30 cm. refractor (focal length, 513 cm.) by Prof. Küstner. Two exposures were made on each plate: one of 60 minutes and one of 1 or 2 minutes. The measured field is $85' \times 85'$, the limiting magnitude, 15. The plates will be repeated in the future for the determination of the proper motions.

Alger, Groningen

The plates enumerated above will yield for each selected area excellent proper motions in a field of approximately one square degree. The spectral classes and photographic magnitudes in fields $3°{\cdot}5 \times 3°{\cdot}5$ will be known in the near future, and it is desirable to extend the measurement of the proper motions to a somewhat larger field. At my request, the late Dr Gonnessiat, until 1931 Director of the Alger Observatory, repeated some of the *Carte du Ciel* plates taken on the equator with a first epoch of 1894, approximately; his successor at the Alger Observatory, Dr Lagrula, has continued this work. The larger part of each plate coincides with a Selected Area field of $3°{\cdot}5 \times 3°{\cdot}5$. Part of the plates have been measured at the Kapteyn Laboratory. Unfortunately, the measurement of the plates has been temporarily interrupted by a reduction of the staff of the Kapteyn Laboratory.

Cambridge (England)

Areas of the systematic plan at $\delta = 0°$ to $+60°$ and the special areas 8, 9, 10, 12, 18, 20 and 24 have been photographed with the Sheepshanks telescope (aperture, 30 cm.; focal length, 590 cm.). The average exposure time is 30 minutes, the limiting magnitude, about 15. The field to be measured is $90' \times 90'$. The areas will be re-photographed after the lapse of a suitable interval.

Mount Wilson

Dr A. van Maanen is investigating the large proper motions of stars as faint as magnitude 18 to 19 with the blink arrangement of the stereocomparator. The field investigated for each area is approximately one square degree. The telescope used is the 60 inch reflector (focal length, 762 cm.). The lower limit of completeness of

* See Nos. 14, 15, and 16 of the list of publications (section 13).

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the proper motions is about 0″·050 annually. The results for forty-two areas have been published (see Publications, section 13, No. 11). The results for 66 other areas will be published at an early date. The other areas have been duplicated but have not yet been measured.

Dearborn

The proper motions of stars in the zone $\delta = 0°$ will be measured at the Dearborn Observatory by Dr O. L. Lee. The telescope used in the 47 cm. refractor (focal length, 703 cm.). Three areas have been finished.

Yale Observatory, southern station, Johannesburg

Dr Schlesinger and Dr Alden report as follows on the proper motion work:

Between March, 1927, and December, 1928, plates were taken on all the southern areas from 116–205, inclusive, with the Yale telescope of 66 cm. aperture, 1100 cm. focal length, scale 18″·8 to the mm. Two exposures of about 10 minutes were taken on each plate, and two plates on each area. Plates were taken only on nights of good seeing.

In addition, similar plates were taken on the centres for the Special Plan south of $-10°$ for which proper motions are desired, namely Nos. 13, 14, 21, 22, 27, 29, 30, 31, 36, 37, 38, 39, 40, 41, 43 and 44.

In February, 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 minutes. These plates are taken with a grating placed in front of the 26 inch lens, giving a difference of about five magnitudes between the central image and the first order spectrum. Two plates centred on the same region are also 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 minutes. The camera plates will be reduced by means of all the *PGC* or *GC* (Albany) stars that appear upon them. The gratings permit the inclusion of stars differing greatly in magnitude without the introduction of magnitude equation.

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

Observations on this programme were begun in the zone $-30°$, plates with the large telescope having been secured on areas 148 to 162 inclusive. Only a few camera plates have been taken thus far, but the two parts of the programme will go forward together.

Only overlapping portions of the plates with the large telescope will be measured, giving an area about 120′ by 45′ as compared with the area 65′ by 45′ on the earlier series of plates.

Radcliffe, Groningen

The proper motions of the stars in the Special Selected Areas 2, 5, 9, 12, 17, 24 and 25 will be determined at the Kapteyn Laboratory by Mr B. Hiemstra by means of plates taken at the Radcliffe Observatory with the 60 cm. photographic refractor (focal length, 690 cm.). The year interval is 15 on the average. All these areas show a black opening surrounded by rich parts of the Milky Way.

The plates of the other special areas are being kept at the Kapteyn Laboratory at Groningen.

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Leiden

The meridian positions of a certain number of stars in each northern area have been recently determined at several observatories (see section 8). The proper motions of these stars have been determined at the Leiden Observatory by Dr C. H. Hins (see Publications, section 13, No. 9). The probable error of an annual proper motion is $\pm 0''{\cdot}007$ on the average. The proper motions are referred to the system of Boss's Preliminary General Catalogue. The catalogue embraces all the northern areas of the systematic plan including the equatorial zone but not the polar area.

7. Trigonometric and Spectroscopic Parallaxes

Yerkes

The parallaxes of the stars in the area at $\delta = +45°$ have been published by Dr Lee (see Publications, section 13, No. 10). The limiting photographic magnitude is 13 to 14; the telescope used is the 40 inch refractor (focal length, 1934 cm.).

Dearborn

The field parallaxes of the stars in the area at $\delta = 0°$ will be measured by Dr Lee with the 47 cm. refractor (focal length, 703 cm.). Three areas have been finished.

Mount Wilson

The spectroscopic absolute magnitudes and parallaxes of all F to M stars observed for radial velocity at the Mount Wilson Observatory (see section 10) have been determined by Dr Adams and his collaborators. In addition approximate values have been found for a considerable number of A-type stars. The work will be published in *Mount Wilson Contributions*, 511.

8. Standards of Position

Leiden, Bonn, Babelsberg, Paris, Strasbourg

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. The results for Babelsberg, Bonn and Leiden have been published (see Publications, section 13, Nos. 14, 15 and 16). The Paris and Strasbourg observations have been sent to Dr Hins, Leiden Observatory, who has finished part of the reduction of the Strasbourg observations and derived final mean places from the available material (see Publications, section 13, No. 9).

The stars in the polar area will be observed at Leiden, Babelsberg and Bonn; at Leiden by Mr P. P. Bruna who observed nearly all the fundamental stars during 1932 and 1933; at Babelsberg by Prof. Courvoisier and at Bonn by Dr Sticker who made four observations of the positions in 1932 and will soon complete his reductions.

La Plata

The positions of the standard stars in the southern areas have been determined by Dr H. A. Martinez (see Publications, section 13 No. 17).

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Perth

The positions of the standard stars in the southern areas are being determined at the Perth Observatory by Dr Curlewis. Each star was observed at least three times. The observations are practically completed, the reductions are now under way.

9. Spectral Classification and Intensity Measures

The Henry Draper Catalogue is complete for stars brighter than magnitude 8·25* approximately. The fainter stars of the selected areas have been classified as follows:

Mount Wilson

Mr Humason (see Publications, section 13, No. 20) classified approximately thirty-five stars in each area north of and including the equator. The limiting magnitude is 12 to 13.

Hamburg Observatory

Dr Schwassmann, assisted by Dr Wachmann, classified 155,000 stars in the northern areas in fields $3°{\cdot}5 \times 3°{\cdot}5$. The limit is fainter than the international photographic magnitude 12·5 in all cases and exceeds 13·0 in 10 per cent. of the areas. Provisional magnitudes were derived from diameter estimates calibrated by means of *Harvard Annals*, **101**. The manuscript is ready for the press. The results of areas 1 to 7 will be published within a few months together with the final magnitudes derived at the Kapteyn Laboratory (see section 2).

Potsdam

The spectral classes for the areas in declinations $-75°$, $-60°$ and $-45°$ have been published by Dr F. Becker (see Publications, section 13, No. 18). The plates were taken at the German station at La Paz. The field varies from 16 to 24 square degrees and the limiting photographic magnitude is 12 on the average. The classification of the zone $\delta = -30°$ has been made by Dr H. Brück and the manuscript is nearly ready for the press. The stars in the zone $\delta = -15°$ will be classified in the near future.

Bonn

Spectral intensity measures on 1393 stars in 31 fields of the southern hemisphere have been made by Dr F. Becker and Dr A. Kohlschütter on plates taken at the German station at La Paz with a Zeiss Triplet (aperture, 30 cm.; focal length, 150 cm.) and two objective prisms. The lines $H\gamma$, $H\delta$, 4227 *Ca* and G have been measured, together with the intensity of the continuous spectrum at $\lambda = 4430$, 4267 and 4045 (see Publications, section 13, No. 19).

The observations are being continued at the Bonn Observatory. The next publication will include the areas at $\delta = -15°$ and those in the zones at 0° and $-30°$ with odd numbers, which have not yet been investigated.

* *Proceedings of the American Academy of Arts and Sciences*, **59**, 216, 1924; *Harvard Reprint*, 6.

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10. Radial Velocities

Mount Wilson

The radial velocities of 437 stars in the northern areas and in the zone $\delta = -15°$ are being observed at the Mount Wilson Observatory. Dr Adams reports that for

195 stars 3 or more spectrograms have been taken
26 ,, 2 spectrograms have been taken
61 ,, 1 spectrogram has been taken
155 ,, no spectrograms have been taken

The work will be continued.

A list of the stars is in section 14. The B.D. numbers 89°, no. 13; 74°, no. 184; 75°, no. 752; 59°, nos. 1221 and 1223; 45°, no. 404; 30°, no. 3425; 15°, nos. 39, 2321 and 4815; 14°, no. 550; +0°, nos. 3075 and 3387; −0°, nos. 1462, 1866, 2075, 2710, 3788, 4084 and 4407, have been put on the observing list because of their large proper motions. The other stars of the list have not been selected on the basis of either large or small proper motion.

11. Investigations wholly or partially based on the Observational Material of the Selected Areas

1. The density function in the Milky Way by E. A. Kreiken. *Monthly Notices of the Royal Astronomical Society*, **85**, 499, 1925. The density distribution in low galactic latitude is found from the numbers of stars of each apparent magnitude derived from *Harvard Annals*, **101–103**, and the distribution of the absolute magnitudes given in *Astrophysical Journal*, **52**, 289. The result is that the system of stars is elongated mainly in the direction of galactic longitude 270°.

2. Mean distribution of stars according to apparent magnitude and galactic latitude by F. H. Seares, P. J. van Rhijn, Mary C. Joyner and Myrtle L. Richmond, *Mount Wilson Contributions*, 301, 1925. The distribution is found from the *Mount Wilson Catalogue of Selected Areas*, $m = 13{\cdot}5$ to $18{\cdot}5$; thirty-three zones of the *Astrographic Catalogue*, $m = 9{\cdot}0$ to $13{\cdot}5$; and the results of *Groningen Publications*, **27**, corrected for scale error, $m = 4{\cdot}0$ to $9{\cdot}0$. Systematic deviations in longitude and between northern and southern galactic hemisphere have been disregarded. The values of $\log N_m$ (N_m = number of stars per square degree brighter than m) extrapolated to $m = 21{\cdot}0$ are given.

3. 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*, 390, 1927. A number of stars in Selected Areas 8, 9, 18, 19, 40 and 64 have been classified by the author. The density appears to decrease with increasing distance, beginning at a distance of 200 to 600 parsecs. The mixture of giant stars is found to vary with distance, the relative frequency of the A stars increasing and that of the K stars decreasing with increasing distance.

4. Systematic deviations from the mean stellar distribution by F. H. Seares and Mary C. Joyner, *Mount Wilson Contributions*, 346, 1928. The deviations between the actually observed value of $\log N_m$ (N_m = number of stars per square degree brighter than m) and the mean distribution table of the preceding publication have been formed for 10° intervals in galactic longitude in latitudes 0°, 5°, 10°, ... 70° north and south. The data are from the *Mount Wilson Catalogue of Selected Areas*, from numerous zones of the *Astrographic Catalogue* and from the *Harvard-Groningen Durchmusterung*. Most of the irregularities in the numbers are explained on the

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assumption of an approximately symmetrical stellar system and an eccentric position of the sun in the galactic plane.

The discussion is continued in:

5. Some structural features of the galactic system by F. H. Seares, *Mount Wilson Contributions*, 347, 1928, a rather extensive paper which cannot be summarized here. The main conclusion is that the galactic system is a vast organization from 60,000 to 90,000 parsecs in diameter, resembling the highly resolved spiral nebulae, and that the local cluster is an aggregation of many million stars perhaps corresponding to one of the knots or condensations in the arms of a spiral.

6. Distribution of stars according to apparent magnitude, galactic longitude and galactic latitude by P. J. van Rhijn, *Publications of the Kapteyn Astronomical Laboratory*, **43**, 1929. The distribution is derived by means of Boss' *Preliminary General Catalogue* ($m=5{\cdot}50$), Pannekoek's countings of the *Bonn and Cordoba Durchmusterung* reduced to a photographic scale, the Durchmusterung of the Selected Areas in *Harvard Annals*, **101–103**, and the *Mount Wilson Catalogue of Photographic Magnitudes in Selected Areas* 1 *to* 139. The position of the galactic pole has been found from the counted numbers.

7. Proper motions of some very faint stars by A. van Maanen and H. C. Willis, *Mount Wilson Contributions*, 412, 1930, in forty-two selected areas.

About 60,000 stars were examined with the blink arrangement of the stereocomparator on plates taken with the 60 inch reflector (focal length, 762 cm.) at intervals of about 18 years; 122 stars ranging in magnitude from 6·7 to 20 were found to have proper motions between $0''{\cdot}041$ and $0''{\cdot}925$. The apex of the solar motion found by means of these stars is $\alpha=18^h\,43^m$, $\delta=+28°$. The mean parallax seems to depend very little on the magnitude but is strongly correlated with the amount of motion.

8. A study of colour indices of faint stars in five Selected Areas in the Milky Way by L. F. Slocum, *Lick Observatory Bulletin*, 434, 1931. Colour indices of about 1500 stars between photographic magnitudes 12·0 and 18·5 were determined from direct photographs taken with the Crossley reflector (aperture, 93 cm.; scale, 1 mm.$=38''$) in Selected Areas 8, 9, 18, 19 and 64. The coefficient of differential absorption was found from fifty-three stars for which both colour indices and spectral types were available. It amounts to 0·34 mag. per 1000 parsecs. The general absorption is about $2\frac{1}{2}$ times as large as the differential absorption. The density of the absorbing medium decreases with increasing distance from the sun. Space density curves are derived for area 64 and for the areas 8, 9 and 19 combined; both show a maximum between 2000 and 2500 parsecs.

9. Zur Struktur des lokalen Sternsystems: (i) Die Spektra der Klassen A bis K in der Deklinationszone $-60°$ von Dr F. Becker, *Sitzungsberichte der Preussischen Akademie der Wissenschaften, Phys. Math. Klasse*, 1930. (ii) Die Verteilung der Spektren von Sternen bis zur 12 Grösze in 43 Eichfeldern des Südhimmels von Dr F. Becker, *Sitzungsberichte der Preussischen Akademie der Wissenschaften, Phys. Math. Klasse*, 1932. Die räumliche Verteilung der Sterne verschiedener Spektralklassen von F. Becker, *Zeitschrift für Astrophysik*, **5**, 274, 1932.

The distribution of the stars according to apparent magnitude, galactic latitude and spectral class is derived by means of the spectra in forty-three southern Selected Areas (see Publications, section 13, No. 18). Dr Becker finds that the relative frequency of the early type spectra decreases with decreasing apparent brightness and that the galactic concentration of stars of the main sequence is independent of the spectral class for stars at the same distance from the sun.

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The distribution of the space density is found for each spectral class by means of a number of areas in the zone at $\delta = -45°$. The densities are found from the distribution of the apparent magnitudes on the assumption that the absolute magnitude for stars of each spectral class is constant. The resulting density decreases with increasing distance from the sun. The decrease in the direction of the Milky Way is so rapid that it must be at least partially real and cannot be completely explained by absorption of light.

10. The analysis of star counts by B. J. Bok, *Harvard Circular*, 371, 1931. The density distribution in low galactic latitude is found from the numbers of stars of each apparent photographic magnitude given in *Groningen Publications*, **43**, and the distribution of photographic absolute magnitudes of *Groningen Publications*, **38**, 1925.

The solution is by a numerical method, no formulae for the distribution of the densities or the absolute magnitudes being assumed. Dr Bok concludes that real density gradients near the sun exist; otherwise we would be forced to postulate an absorbing cloud with a strong central condensation in close proximity to the sun. The existence of a local cluster is indicated. A uniform interstellar absorption of 0·40 mag. per 1000 parsecs gives the most probable densities for the galactic system. The results for the density can be read from the two plots on pp. 30 and 31 of Bok's paper.

12. Desiderata for Future Work

It appears from the preceding summary that much of the work in the northern hemisphere has been done or is now under way, and that the discussion of the observational data has yielded important results bearing upon the problem of the structure of the stellar system. But some more observational data are wanted especially in the southern hemisphere:

1. The Durchmusterung of stars as faint as magnitude 19 which for the zones in declinations $+90°$ to $-15°$ has been published in the *Mount Wilson Catalogue* should be extended to the south pole.

2. The scale of magnitudes in the southern hemisphere used in *Harvard Annals*, **102**, **103**, is rather uncertain and should be reduced to the international photographic system. Mr Gaposchkin and Mrs Payne-Gaposchkin are now actively engaged in the determination of the scale in these areas for stars brighter than magnitude 13 approximately (see section 2). The problem of the scale for the fainter stars will probably be attacked by them in the near future.

3. The meridian observation of the positions in the southern areas has been undertaken by the La Plata and the Perth Observatories. At least one more determination of the meridian positions seems desirable.

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

Further the radial velocities of a number of stars fainter than magnitude 9 would be very valuable, even if the probable errors were as large as 8 or 9 km./sec. The sun's velocity relative to faint stars and the galactic rotation could be investigated by means of such velocities. In point of fact, an increase from 2 to 7 km./sec. in the probable error of the velocities would not impair the sun's velocity seriously because the peculiar velocities of the stars which are neglected in deriving the solar velocity represent in any case a "cosmical probable error" exceeding 7 km./sec. Attention may be called to a paper by Dr P. van der Kamp on the sun's velocity relative to stars of magnitudes 9 to 10 in *Lick Bulletin*, **12**, 88, 1926.

As stated in the introduction, the aim of Kapteyn's plan was to bring together

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all the elements which seem most necessary for a successful attack on the problem of the structure of the sidereal world. The density distribution in the direction perpendicular to the galactic plane can be found from the data at present available,* but the densities in the galactic plane are very imperfectly known on account of our lack of knowledge of the interstellar absorption of light within the galaxy. It has repeatedly been pointed out that the density function is very materially changed by an absorption of a few tenths of a magnitude per 1000 parsecs, and an accurate determination of the visual and photographic absorption in different directions and at different distances from the sun is an urgent desideratum of science. Several recent investigations of the differential and photographic absorption within the galaxy are summarized in *Groningen Publications*, **46**, 29–35. Further, I wish to mention the very important researches by J. Stebbins and C. M. Huffer on the differential absorption found from photo-electric colour indices† and by Joy on the photographic absorption derived from the magnitudes and radial velocities of Cepheid variables.‡

Investigators of the galactic absorption of light are requested to pay special attention to the regions of the Selected Areas. As soon as the absorption for these areas has been determined the densities can be found from the known distribution of apparent and absolute magnitudes.

13. Publications containing Observational Data on the Plan of Selected Areas

Durchmusterung and Magnitudes

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*, 289, *Ap. J.* **61**, 303, 1925.

3. *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.

4. Photographic and Photovisual Magnitudes of the Stars in the Zone $+45°$, by J. A. Parkhurst. *Publications of the Yerkes Observatory*, **4**, part 6, 1927.

5. Photovisual Magnitudes for the Selected Areas at $\delta = +75°$, by P. J. van Rhijn and B. J. Bok. *Publications of the Kapteyn Astronomical Laboratory at Groningen*, No. **44**, 1929.

6. Study of Colour Indices of Faint Stars in five Selected Areas in the Milky Way, by L. F. Slocum. *Lick Observatory Bulletin*, 434, 1931.

7. *Photographic Magnitudes of Stars brighter than* $14^{m}{\cdot}0$ *in* 40 *of Kapteyn's Selected Areas determined at the Royal Observatory, Greenwich*, under the direction of Sir Frank Dyson, Astronomer Royal, 1931.

* J. H. Oort: The force exerted by the stellar system in the direction perpendicular to the galactic plane and some related problems, *Bulletin of the Astronomical Institutes of the Netherlands*, **6**, 249, 1932. H. Shapley: A contribution to the study of galactic dimensions, *Proceedings of the National Academy of Sciences*, **19**, 29, 1933. See also a paper by A. Schwassmann and myself forthcoming in one of the next numbers of *Zeitschrift für Astrophysik*.

† Space reddening in the galaxy from the colours of 733 B stars. *Publications of the Washburn Observatory*, **15**, part 5, 1934.

‡ Annual report of the director of the *Mount Wilson Observatory*, 1932–1933, 156, 1933.

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Proper Motions. Trigonometric and Spectroscopic Parallaxes

8. *Radcliffe Catalogue of Proper Motions in the Selected Areas* 1 *to* 115, compiled by H. Knox-Shaw and H. G. Scott Barrett, 1934.

9. 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.

10. Parallaxes and Proper Motions of 1041 Stars in the Zone +45°, by O. J. Lee. *Publications of the Yerkes Observatory*, **4**, part 4, 1926.

11. Proper Motions of some Very Faint Stars, by A. van Maanen and H. C. Willis. *Mount Wilson Contributions*, 412, 1930.

12. Faint Stars in the Selected Areas (zones +75° and +60°) with Large Proper Motion, by A. N. Deutsch. *Poulkovo Observatory Circular*, No. 8, 1933.

13. Proper Motions of the Special Area No. 12, by W. M. Smart. *Cambridge Observations*, **26**, 1928.

Meridian Positions

14. Katalog von 1885 Sternen für das Äquinoktium 1925, von R. Prager. *Veröffentlichungen der Universitäts-Sternwarte zu Berlin-Babelsberg*, **5**, Heft 3, 1924.

15. Katalog von 1172 Sternen in Kapteyn's "Selected Areas" auf Grund der Beobachtungen am Repoldschen Meridiankreise, von C. Mönnichmeyer and J. Hopmann. *Veröffentlichungen der Universitäts-Sternwarte zu Bonn*, No. 21, 1930.

16. 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*, **15**, derde stuk, 1930.

17. Estrellas Kapteyn para las areas seleccionadas australes observadas, por H. A. Martinez. *Publicaciones Observatorio astronomico La Plata*, **11**, No. 1, 1927.

Spectral Classification and Spectral Intensity Measures

18. 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.

19. Spektrale Intensitäts-Messungen an 1393 Sterne des Südhimmels, von F. Becker and A. Kohlschütter. *Veröffentlichungen der Universitäts-Sternwarte zu Bonn*, No. 27, 1933.

20. Spectral Types of Faint Stars in Kapteyn's Selected Areas 1 to 115, by M. L. Humason. *Mount Wilson Contributions*, 458, *Ap. J.* **76**, 224, 1932.

21. 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*, 390, 1927.

Variable Stars

22. Observations of Variable Stars in the Selected Areas 1 to 115, by H. Knox-Shaw. *Astronomische Nachrichten*, **253**, 217, 1934.

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14. List of Stars to be Observed for Radial Velocity at the Mount Wilson Observatory

Figures in italics in the *m* column are from the *Astronomische Gesellschaft Catalogue* or the *B.D.*

B.D. Number	H. Draper Catalogue *m*	H. Draper Catalogue Sp	α_{1930}	δ_{1930}	Remarks
			Area 1		
°			h m s	° ′	
88 39	8·9	F0	7 35 05	+87 52	—
89 13	7·0	A0	8 28 22	+88 51	—
88 60	8·7	F8	10 29 51	+88 14	—
			Area 2		
75 4	7·6	Ma	0 10 05	+75 38	—
75 5	7·9	G5	0 10 25	+75 38	—
75 7	7·1	B9	0 14 21	+75 53	—
75 901	7·7	A0	23 54 03	+75 56	—
75 904	9·0	K5	23 58 13	+75 47	—
			Area 3		
74 184	7·3	F8	3 58 35	+75 00	Groom 762
75 167	8·6	F2	4 06 10	+75 39	—
			Area 4		
74 348	8·2	K0	8 03 02	+74 34	—
74 350	8·5	K5	8 08 00	+74 43	—
75 334	6·5	K0	8 13 50	+75 34	—
74 360	8·6	K2	8 16 26	+74 40	—
			Area 5		
75 473	7·5	K0	12 29 15	+75 12	—
75 479	8·1	K2	12 37 20	+74 48	—
			Area 6		
75 585	8·4	(M5)	16 13 02	+74 50	—
75 586	6·5	K2	16 14 17	+75 23	Boss 4157
			Area 7		
74 854	8·5	Ma	20 15 22	+75 11	—
74 859	8·9	K0	20 23 52	+75 13	—
75 739	8·0	K2	20 24 17	+75 49	—
75 752	7·6	G5	20 38 15	+75 20	—
			Area 8		
59 161	7·2	G5	0 55 44	+60 08	—
59 163	8·8	A0	0 56 16	+60 04	—
60 143	8·9	F5	0 57 05	+60 40	—
60 157	5·9	F0	0 59 16	+60 42	—
59 199	7·9	K0	1 07 12	+60 08	—
			Area 9		
59 588	7·2	F5	2 58 18	+60 02	—
60 651	8·0	B8	3 09 57	+60 52	—
59 616	7·8	K0	3 10 34	+59 52	—
60 636	7·5	A0	3 05 55	+60 22	—

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B.D. Number	H. Draper Catalogue *m*	H. Draper Catalogue Sp	α_{1930}	δ_{1930}	Remarks
			Area 10		
°			h m s	° ′	
60 870	7·2	F5	5 11 12	+60 07	—
			Area 11		
59 1053	7·6	K0	7 05 11	+59 11	—
60 1034	7·3	K0	7 05 17	+60 21	—
60 1038	7·3	K0	7 09 25	+59 54	—
59 1071	6·9	K2	7 13 50	+59 23	Boss 1881
			Area 12		
59 1217	6·2	A0	9 01 19	+59 38	—
59 1218	7·6	K0	9 02 04	+59 10	—
59 1221	7·2	K0	9 04 30	+59 26	—
59 1223	8·2	F5	9 05 04	+59 33	—
			Area 13		
59 1351	7·3	G5	11 04 47	+59 36	—
59 1353	7·3	G0	11 07 36	+59 17	—
			Area 15		
59 1632	7·6	K5	15 09 44	+59 19	—
			Area 16		
60 1754	5·7	A2	17 24 48	+60 06	Boss 4432
59 1823	8·4	K0	17 29 05	+59 44	—
			Area 17		
59 2038	7·8	K5	19 27 32	+59 37	—
			Area 18		
59 2387	7·5	B8	21 27 51	+60 04	—
59 2395	5·5	B0	21 29 03	+60 09	Boss 5535
			Area 19		
59 2701	6·7	F2	23 17 14	+59 53	—
60 2540	6·7	A3	23 23 11	+60 42	—
58 2595	7·4	A0	23 24 42	+59 19	—
59 2740	9·2	A2	23 28 29	+60 08	—
59 2744	7·3	K0	23 30 02	+60 01	—
59 2746	7·4	K0	23 30 20	+60 05	—
60 2582	*8·9*	—	23 32 13	+60 32	—
			Area 20		
45 181	7·4	K5	0 38 57	+45 33	—
45 187	7·5	F5	0 40 17	+45 51	Double
44 162	7·8	A3	0 42 34	+45 03	—
45 199	7·6	G5	0 42 57	+45 59	—
45 202	8·4	K0	0 43 48	+45 52	—
			Area 21		
44 341	6·3	A0	1 34 18	+45 03	—
45 404	6·7	G5	1 35 18	+45 32	—
44 347	8·2	K0	1 36 36	+44 40	—
44 352	8·8	K	1 37 39	+45 13	—
44 354	6·5	K0	1 38 59	+44 58	—
45 432	6·5	K5	1 40 00	+45 47	—

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B.D. Number	H. Draper Catalogue *m*	H. Draper Catalogue Sp	α_{1930}	δ_{1930}	Remarks
			Area 22		
°			h m s	° ′	
44 558	8·4	F8	2 37 09	+45 12	—
44 573	8·1	A0	2 41 42	+45 10	—
			Area 23		
44 782	7·8	K5	3 39 14	+44 40	—
44 790	7·7	F2	3 40 40	+45 08	—
45 808	7·5	A0	3 40 58	+45 23	—
45 811	5·6	B9	3 41 04	+45 28	Boss 853
44 797	7·7	A5	3 43 10	+45 09	—
44 801	5·8	G0	3 45 12	+44 46	Boss 876
			Area 24		
44 1013	7·8	A5	4 39 32	+44 38	—
45 987	7·7	A0	4 42 47	+45 22	—
			Area 25		
44 1270	7·7	A2	5 37 53	+44 49	—
44 1278	7·8	A0	5 41 03	+44 45	—
			Area 26		
44 1501	7·8	F2	6 33 22	+44 22	—
45 1330	8·8	K5	6 33 35	+45 08	—
44 1509	6·8	G5	6 35 08	+44 24	—
44 1518	5·2	K5	6 38 10	+44 36	Boss 1707
44 1525	6·8	G5	6 39 42	+44 35	—
44 1528	7·8	G0	6 40 23	+44 19	—
			Area 28		
45 1620	7·9	F2	8 36 59	+45 07	—
44 1783	8·5	F8	8 40 19	+44 26	—
45 1641	7·6	G0	8 45 00	+45 14	—
45 1642	7·7	A0	8 45 03	+44 58	—
45 1643	8·6	F5	8 45 20	+45 14	—
			Area 30		
45 1857	8·8	A3	10 39 19	+45 19	—
45 1860	8·1	K0	10 41 09	+45 20	—
44 2012	8·0	F8	10 42 28	+44 28	—
			Area 31		
44 2110	5·5	F0	11 34 39	+44 01	—
45 1949	8·0	G0	11 35 25	+44 41	—
45 1951	8·2	G5	11 36 01	+44 54	—
44 2115	7·8	A2	11 37 38	+44 24	—
45 1955	7·8	Ma	11 37 58	+44 35	—
44 2118	8·0	F8	11 38 52	+44 11	—
45 1961	7·8	F5	11 40 37	+44 53	—
			Area 32		
44 2238	8·0	F5	12 54 17	+44 12	—
			Area 33		
44 2312	7·6	G0	13 54 04	+44 37	—

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B.D. Number	H. Draper Catalogue *m*	H. Draper Catalogue Sp	α_{1930}	δ_{1930}	Remarks
			Area 34		
°			h m s	° ′	
45 2229	7·8	G0	14 48 56	+45 13	β G.C. 7044
44 2393	9·4	G0	14 45 49	+44 30	—
			Area 35		
44 2511	7·6	A0	15 47 33	+44 44	—
			Area 36		
45 2449	*8·1*	—	16 43 19	+45 45	—
45 2453	8·7	G0	16 46 52	+45 19	—
			Area 37		
44 2777	7·7	A2	17 48 25	+44 30	—
45 2620	8·2	G5	17 52 40	+45 34	—
45 2621	8·0	A0	17 52 44	+45 14	Groom 2487
45 2626	6·8	B9	17 54 42	+45 00	—
45 2627	6·2	Mb	17 54 48	+45 21	—
			Area 38		
44 2983	7·8	F2	18 42 19	+44 49	—
45 2777	6·8	F0	18 46 34	+45 11	—
45 2779	8·6	K0	18 47 05	+45 14	—
44 3003	7·2	B9	18 49 26	+45 03	—
			Area 39		
44 3234	3·0	A0	19 42 47	+44 58	Boss 5048
44 3265	8·3	K0	19 47 47	+44 58	—
45 3001	7·8	K0	19 51 34	+45 17	—
			Area 40		
45 3275	6·7	K5	20 44 56	+45 19	—
44 3617	5·6	K0	20 50 52	+44 55	Boss 5376
44 3621	8·3	A0	20 51 05	+44 53	—
			Area 41		
44 3980	8·5	A0	21 51 31	+45 13	—
45 3721	8·3	A0	21 52 05	+45 28	—
44 3985	7·8	B9	21 52 43	+44 37	—
			Area 44		
30 59	7·6	Ma	0 23 26	+30 48	—
30 60	8·4	G5	0 23 42	+30 30	—
			Area 45		
29 240	8·5	F0	1 23 34	+30 09	—
29 243	6·9	F5	1 24 23	+30 12	—
30 230	8·3	F5	1 25 31	+30 32	—
30 233	8·2	G5	1 25 53	+30 39	—
29 252	*8·5*	—	1 26 10	+29 47	—
29 256	8·4	K0	1 27 50	+30 16	—
29 260	8·1	A3	1 29 41	+30 02	—

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B.D. Number	H. Draper Catalogue *m*	Sp	α_{1930}	δ_{1930}	Remarks
			Area 46		
°			h m s	° ′	
29 434	7·8	K0	2 29 00	+29 39	—
30 414	8·5	K0	2 31 13	+30 23	—
30 417	7·9	G0	2 31 44	+30 50	—
29 444	7·4	A0	2 33 01	+30 06	—
30 421	7·2	G0	2 34 23	+30 32	Lal. 4855
			Area 47		
29 566	7·1	B3	3 24 28	+30 08	—
29 568	7·5	A0	3 25 58	+29 48	—
29 571	8·0	A0	3 27 51	+29 46	—
			Area 48		
30 665	6·3	F5	4 24 27	+30 12	Double
29 716	8·4	F2	4 27 11	+29 47	—
			Area 49		
30 898	5·7	B9	5 22 39	+30 09	Boss 1310
29 897	8·0	K5	5 22 41	+29 52	—
29 909	6·2	F5	5 25 11	+29 08	—
29 911	7·2	G5	5 25 38	+29 30	—
29 921	8·6	G5	5 27 21	+29 23	—
29 923	7·8	F5	5 27 47	+29 09	—
			Area 50		
29 1231	7·6	K5	6 23 36	+29 17	—
30 1240	*8·5*	—	6 24 15	+30 20	—
29 1241	8·0	A2	6 24 56	+29 32	—
30 1245	*8·4*	—	6 25 47	+30 30	—
29 1248	8·1	F0	6 26 17	+29 53	—
30 1256	8·0	A2	6 28 35	+30 23	—
29 1264	*8·2*	—	6 29 04	+29 44	—
			Area 51		
29 1535	7·4	A5	7 23 48	+29 34	—
			Area 52		
29 1759	8·3	A0	8 24 59	+29 42	—
30 1719	8·2	F2	8 27 34	+29 57	—
29 1772	7·1	G5	8 28 00	+29 34	—
29 1770	*8·5*	—	8 28 01	+29 42	—
			Area 53		
29 1903	8·9	K0	9 23 15	+29 32	—
			Area 54		
30 2014	7·8	F2	10 23 04	+30 02	—
30 2021	6·7	K0	10 25 06	+30 05	—
30 2022	*8·5*	—	10 25 29	+30 02	—
30 2031	7·8	G0	10 28 06	+30 06	—
			Area 55		
29 2179	7·8	F5	11 28 44	+29 26	—
30 2180	*8·1*	—	11 34 56	+30 09	—

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B.D. Number	H. Draper Catalogue *m*	H. Draper Catalogue Sp	α_{1930}	δ_{1930}	Remarks
			Area 56		
°			h m s	° ′	
29 2245	8·5	F8	11 57 12	+29 35	—
30 2212	8·4	F2	11 58 08	+29 56	—
29 2251	8·5	K2	11 59 43	+29 31	—
30 2217	7·7	Mb	11 59 58	+30 04	—
30 2223	8·5	K2	12 03 07	+29 53	—
			Area 57		
29 2365	6·4	A2	13 02 50	+29 24	—
30 2371	8·6	G0	13 05 16	+29 46	—
29 2374	8·8	K0	13 06 37	+29 11	—
30 2372	8·6	G5	13 07 01	+29 49	—
29 2379	8·8	F8	13 08 10	+29 14	—
			Area 58		
29 2483	7·9	A2	13 58 10	+28 45	—
29 2486	8·2	Ma	14 01 19	+29 29	—
29 2493	7·0	K0	14 03 48	+28 46	—
			Area 59		
29 2618	7·8	A2	15 01 19	+29 21	—
29 2621	8·0	(K1±)	15 03 08	+29 16	—
29 2622	*8·5*	—	15 03 11	+29 42	—
30 2611	*8·3*	—	15 03 59	+30 17	—
			Area 60		
29 2748	7·2	K0	15 56 16	+29 38	—
30 2735	8·6	K0	15 57 23	+29 50	—
30 2736	8·7	K0	15 57 26	+30 18	—
30 2738	4·9	A0	15 58 38	+30 02	Boss 4080
30 2742	8·7	K5	15 59 58	+30 22	—
29 2758	8·7	K0	16 00 06	+29 09	—
			Area 61		
29 2915	7·8	A0	16 56 51	+29 39	—
29 2924	7·5	A2	16 59 47	+29 24	—
30 2925	*8·4*	—	17 00 00	+29 56	—
29 2927	8·0	K2	17 00 19	+29 35	—
29 2933	*8·0*	—	17 02 05	+29 46	—
29 2935	7·6	A2	17 02 55	+29 43	—
			Area 62		
30 3093	4·5	F0	17 55 50	+30 12	Boss 4542
30 3096	6·9	G0	17 56 23	+30 03	β G.C. 8279
29 3165	7·2	G5	17 57 59	+29 34	—
30 3106	7·1	K5	17 58 45	+30 39	—
			Area 63		
29 3444	6·6	A0	18 58 35	+29 25	—
30 3392	*8·5*	—	18 59 28	+30 20	—
30 3409	6·4	Ma	19 02 17	+30 38	—
29 3472	6·6	K5	19 03 04	+29 49	—
30 3413	8·2	K0	19 03 27	+30 20	—
30 3425	8·1	G0	19 04 50	+30 08	—

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B.D. Number	H. Draper Catalogue *m*	Sp	α_{1930}	δ_{1930}	Remarks
			Area 64		
°			h m s	° ′	
29 3829	7·4	F8	19 55 48	+29 45	—
29 3838	7·3	A0	19 57 27	+29 44	—
29 3844	8·2	B9	19 57 48	+29 42	—
29 3871	*8·5*	—	20 00 35	+29 45	—
29 3872	5·7	K0	20 00 42	+29 43	Boss 5144
29 3873	6·8	K2	20 00 55	+29 47	—
29 3875	*8·5*	—	20 01 00	+29 52	—
30 3874	8·2	A3	20 01 28	+30 20	—
			Area 65		
29 4283	*8·5*	—	20 58 51	+30 16	—
29 4284	7·8	A2	20 59 19	+30 15	—
30 4299	7·8	K2	21 00 45	+30 47	—
30 4307	*8·3*	—	21 01 44	+30 38	—
30 4314	*8·5*	—	21 02 48	+30 30	—
29 4307	*8·5*	—	21 02 52	+29 56	—
30 4322	7·5	B8	21 04 11	+30 19	—
			Area 66		
30 4587	8·7	A2	21 57 52	+30 25	—
30 4591	8·2	A3	21 59 42	+30 26	—
29 4568	7·0	B9	22 00 05	+29 52	—
30 4594	8·2	A0	22 00 13	+30 39	—
29 4570	7·4	B9	22 00 15	+29 42	—
29 4585	8·7	F0	22 03 22	+30 14	—
29 4586	7·4	K0	22 03 58	+29 58	—
			Area 67		
30 4867	8·1	A2	23 00 17	+30 43	—
30 4869	6·8	F2	23 01 14	+30 56	—
29 4855	8·3	K0	23 02 23	+30 21	—
29 4858	8·0	F0	23 03 08	+30 14	—
30 4875	8·4	K0	23 03 12	+30 38	—
29 4863	7·5	K5	23 04 25	+30 04	—
29 4867	*8·5*	—	23 04 55	+29 50	—
30 4885	*9·0*	—	23 05 21	+30 29	—
			Area 68		
15 30	8·2	A5	0 12 57	+15 27	—
15 39	7·4	F5	0 14 10	+15 57	—
15 43	8·8	F5	0 15 04	+15 36	—
15 47	6·8	K0	0 16 18	+15 52	Boss 54
			Area 69		
14 204	7·5	G5	1 16 56	+15 20	—
14 210	8·3	G0	1 18 13	+14 49	—
15 198	7·5	F5	1 18 17	+15 26	—
			Area 70		
14 383	7·9	A0	2 17 57	+15 12	—
15 331	8·1	F5	2 18 09	+15 41	—
14 392	7·8	F0	2 20 37	+15 13	—

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B.D. Number	H. Draper Catalogue *m*	H. Draper Catalogue Sp	α_{1930}	δ_{1930}	Remarks
			Area 71		
°			h m s	° ′	
15 450	7·3	A0	3 10 14	+15 20	—
14 550	7·7	G5	3 14 33	+14 56	—
			Area 72		
15 592	7·2	A0	4 06 56	+15 46	—
15 603	6·4	F5	4 11 48	+15 14	Boss 980
15 612	3·9	K0	4 15 48	+15 28	Boss 1000
14 682	5·3	F0	4 16 37	+14 56	Boss 1007 β G.C. 2210
			Area 73		
15 787	7·9	A0	5 15 38	+15 43	—
14 881	8·2	B9	5 16 36	+14 59	—
15 790	7·7	A5	5 16 42	+15 34	—
			Area 74		
14 1247	6·0	K5	6 16 05	+14 41	Boss 1596
14 1260	8·4	G5	6 18 19	+14 54	—
15 1176	7·7	B5e	6 19 25	+15 08	—
			Area 75		
14 1628	7·7	B9	7 14 42	+15 31	—
15 1537	8·3	A2	7 15 28	+15 20	—
15 1541	6·5	A0	7 16 08	+15 17	—
15 1544	*8·5*	—	7 16 39	+15 02	—
14 1644	8·6	K0	7 18 02	+14 47	—
14 1649	8·3	F5	7 18 48	+14 26	—
			Area 76		
14 1872	8·2	G0	8 15 18	+14 25	—
14 1878	7·9	K0	8 17 54	+14 33	—
15 1809	8·4	A2	8 19 23	+15 30	—
			Area 77		
14 2048	8·9	R5	9 09 59	+14 30	—
14 2057	8·3	G0	9 12 16	+14 24	—
			Area 78		
15 2188	8·5	K2	10 15 31	+15 01	—
15 2192	6·1	B9	10 18 05	+15 20	Boss 2752
			Area 79		
15 2321	6·6	G0	11 15 20	+14 40 40	β G.C. 5739
15 2326	8·3	K0	11 19 16	+14 42	—
14 2382	8·1	K0	11 20 38	+14 17	—
			Area 80		
15 2436	5·1	A2	12 12 27	+15 17	Boss 3192
15 2441	8·1	F8	12 14 04	+14 50	—
15 2443	8·3	F8	12 14 19	+15 24	—
15 2445	6·7	K0	12 15 47	+14 56	—
14 2489	6·9	K0	12 16 32	+14 15	—

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B.D. Number	H. Draper Catalogue *m*	H. Draper Catalogue Sp	α_{1930}	δ_{1930}	Remarks
			Area 81		
°			h m s	° ′	
14 2591	5·4	K2	13 13 48	+14 03	Boss 3495
14 2593	7·3	G0	13 14 11	+14 08	—
			Area 82		
15 2690	6·0	Ma	14 14 07	+15 35	—
15 2695	8·1	K0	14 16 05	+15 15	
			Area 83		
14 2850	8·4	F8	15 10 31	+14 42	—
			Area 85		
14 3206	8·1	F5	17 11 10	+14 38	—
15 3141	8·3	K0	17 12 15	+14 59	—
14 3213	8·0	G5	17 13 22	+14 45	—
15 3149	8·3	A2	17 13 53	+15 21	—
14 3215	8·4	F8	17 13 54	+14 45	—
15 3153	8·3	A0	17 14 07	+15 15	—
			Area 87		
14 3830	7·4	K2	19 10 07	+14 49	—
14 3831	7·8	K5	19 10 10	+14 30	—
15 3739	8·3	A0	19 11 21	+15 15	—
14 3845	7·8	A0	19 12 03	+14 58	—
14 3846	5·7	G5	19 12 09	+14 58	Boss 4898
14 3849	*8·1*	—	19 12 38	+15 06	—
15 3752	*8·2*	—	19 13 26	+15 13	—
15 3762	7·7	A0	19 15 29	+15 33	—
			Area 88		
14 4223	8·5	K0	20 09 33	+15 07	—
15 4089	7·6	F8	20 09 39	+15 53	AG. Berlin 8022
14 4227	5·0	A0	20 11 03	+14 59	Boss 5182
14 4240	8·5	A2	20 12 20	+15 13	—
15 4120	7·3	B9	20 13 57	+15 39	—
15 4124	8·6	K5	20 14 45	+15 47	—
			Area 89		
14 4550	8·1	K2	21 07 10	+14 58	—
14 4552	9·2	G0	21 07 39	+15 10	—
15 4362	8·7	K0	21 07 52	+15 36	—
14 4556	8·1	F8	21 09 35	+15 18	—
15 4375	6·2	A5	21 10 11	+15 42	—
			Area 90		
14 4764	8·6	F5	22 12 25	+15 05	—
15 4604	8·2	F8	22 12 43	+15 40	—
15 4617	6·9	A0	22 15 29	+15 54	—
15 4618	*8·4*	—	22 15 38	+15 35	—
14 4772	7·2	K5	22 16 00	+15 12	—
15 4620	8·6	A5	22 16 17	+15 49	—
15 4622	*8·8*	—	22 16 30	+15 29	—

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B.D. Number	H. Draper Catalogue *m*	H. Draper Catalogue Sp	α_{1930}	δ_{1930}	Remarks
			Area 91		
°			h m s	° ′	
14 4967	8·2	F8	23 14 39	+15 13	—
14 4974	7·6	A2	23 17 14	+14 40	—
15 4815	8·6	G5	23 19 34	+15 41	—
			Area 92		
−0 145	8·0	F0	0 53 23	+0 05	—
−0 146	7·7	G5	0 53 37	−0 02	—
+0 148	8·0	A3	0 53 40	+0 59	—
			Area 94		
−0 450	6·7	K0	2 51 14	−0 20	—
−0 451	7·2	K0	2 51 38	+0 09	—
−0 460	6·7	A5	2 53 35	+0 10	—
			Area 96		
−0 785	7·4	K0	4 47 14	−0 13	
			Area 97		
+0 1239	5·3	A0	5 55 13	+0 33	Boss 1488
−0 1137	7·7	B9	5 56 33	−0 30	—
			Area 98		
−0 1462	5·8	F2	6 47 15	−0 27	—
			Area 99		
−0 1864	7·0	A0	7 53 51	−0 27	—
−0 1866	8·3	K2	7 54 24	−0 38	—
			Area 100		
−0 2075	8·6	F8	8 47 21	−0 24	—
−0 2087	8·4	K2	8 50 24	−0 21	—
			Area 101		
+0 2582	8·1	Ma	9 51 25	+0 09	—
−0 2270	8·1	K0	9 52 00	−0 45	—
+0 2588	8·3	K5	9 53 04	−0 08	—
			Area 102		
−0 2392	8·1	A3	10 53 05	−0 48	—
+0 2718	6·9	F5	10 53 34	+0 04	—
			Area 103		
−0 2507	8·5	K2	11 50 27	−0 39	—
+0 2858	8·3	F2	11 51 26	−0 10	—
			Area 105		
+0 3075	7·4	K0	13 30 42	+0 03	β G.C. 6530
−0 2710	7·0	F8	13 32 40	−0 31	—
+0 3082	8·5	A5	13 33 54	+0 08	—
			Area 106		
+0 3223	8·1	K0	14 37 51	+0 24	—

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B.D. Number	H. Draper Catalogue *m*	H. Draper Catalogue Sp	α_{1930}	δ_{1930}	Remarks
		Area 107			
°			h m s	° ′	
−0 2988	6·5	F5	15 32 58	−0 20	Boss 3966
−0 2990	8·1	K2	15 33 52	−0 39	—
+0 3387	7·6	F8	15 35 27	−0 05	—
−0 2997	8·3	K0	15 36 48	−0 41	—
+0 3389	7·4	A0	15 38 27	+0 41	—
		Area 109			
+0 3763	8·1	F2	17 40 35	+0 23	—
−0 3352	8·5	A0	17 41 15	−0 06	—
		Area 110			
+0 3989	8·2	K0	18 36 05	+0 05	—
+0 3993	7·8	K2	18 37 52	+0 30	—
+0 3995	9·1	K5	18 38 43	+0 05	—
−0 3540	7·9	A0	18 40 18	−0 18	—
−0 3543	6·8	B9	18 41 20	−0 27	—
−0 3546	8·3	B9	18 42 09	−0 21	—
		Area 111			
−0 3788	7·9	G5	19 32 25	−0 03	—
−0 3789	7·1	A2	19 32 26	+0 06	—
−0 3801	7·4	A5	19 33 57	−0 17	—
+0 4265	7·4	A2	19 34 47	+0 11	—
+0 4270	7·9	K2	19 37 23	+0 32	—
		Area 112			
−0 4064	5·4	K0	20 35 50	+0 14	Boss 5305
−0 4076	8·7	A0	20 39 58	+0 13	—
−0 4084	7·4	G5	20 41 21	+0 02	—
		Area 113			
−0 4245	6·8	F8	21 35 54	−0 22	—
−0 4249	7·7	F5	21 38 21	+0 02	—
−0 4257	7·1	G5	21 40 04	+0 13	—
		Area 114			
−0 4406	6·9	F0	22 39 14	−0 08	—
−0 4407	8·0	G5	22 39 22	+0 02	—
+0 4912	6·9	A3	22 39 23	+0 51	—
		Area 115			
−0 4547	7·7	K0	23 37 06	+0 02	—
−0 4561	8·0	F8	23 40 43	+0 19	—
−0 4563	8·2	F8	23 42 25	−0 08	—
−0 4566	7·4	G5	23 43 00	+0 08	—
		Area 116			
−15 30	7·0	F5	0 10 54	−14 49	—
−15 32	6·9	G5	0 11 05	−15 12	—
−14 29	6·9	A2	0 11 14	−14 34	—
−15 38	8·6	F8	0 12 45	−14 53	—

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B.D. Number	H. Draper Catalogue *m*	Sp	α_{1930}	δ_{1930}	Remarks
			Area 117		
°			h m s	° ′	
−14 252	8·1	G5	1 15 15	−13 46	—
−14 258	7·0	G5	1 17 13	−14 15	—
			Area 118		
−14 423	*8·0*	—	2 14 47	−14 27	—
−14 434	7·4	F0	2 18 29	−14 36	—
			Area 119		
−15 554	7·9	K0	3 08 31	−15 11	—
−14 629	7·5	G5	3 11 46	−14 05	—
−14 646	7·9	K0	3 15 25	−14 30	—
			Area 120		
−15 754	8·1	K0	4 12 52	−15 06	—
−14 866	6·9	K0	4 15 02	−14 49	—
−15 765	8·9	A5	4 16 23	−15 20	—
			Area 121		
−14 1080	7·7	B9	5 12 50	−14 35	—
−15 1001	6·7	B8	5 14 26	−15 18	—
−14 1094	8·2	G0	5 16 15	−14 50	—
−14 1103	8·0	G0	5 18 01	−14 13	—
−14 1105	7·2	B8	5 18 11	−14 37	—
−14 1117	7·9	K0	5 20 09	−14 54	—
			Area 122		
−15 1314	6·9	K0	6 10 16	−15 22	—
−15 1328	7·9	K0	6 13 41	−15 06	—
−14 1399	8·3	G5	6 15 38	−14 49	—
−14 1400	6·3	K5	6 15 39	−15 00	—
			Area 123		
−14 1810	8·1	F5	7 13 54	−14 43	—
−14 1843	9·1	K2	7 17 26	−14 44	—
			Area 124		
−15 2351	7·3	K0	8 12 59	−15 28	—
−14 2456	7·3	K2	8 13 39	−14 56	—
−14 2460	8·0	B8	8 14 46	−14 45	—
			Area 125		
−14 2793	6·2	A0	9 12 06	−14 44	—
−15 2763	5·9	K0	9 16 15	−15 32	Boss 2505
−14 2828	6·3	F5	9 17 36	−15 19	—
			Area 126		
−14 3093	7·0	F8	10 17 27	−15 08	—
			Area 127		
−14 3289	8·1	F0	11 10 34	−15 03	—

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B.D. Number	H. Draper Catalogue m	H. Draper Catalogue Sp	α_{1930}	δ_{1930}	Remarks
			Area 128		
°			h m s	° ′	
−15 3450	7·8	K0	12 15 41	−15 53	—
14 3500	6·7	K0	12 18 40	−15 10	—
			Area 129		
−14 3683	6·7	K0	13 13 49	−15 11	—
−14 3708	8·6	K5	13 19 26	−15 03	—
			Area 130		
−15 3817	5·1	Ma	14 07 01	−15 58	Boss 3632
			Area 131		
−14 4182	7·5	K0	15 17 03	−15 07	—
−15 4083	6·1	F5	15 17 07	−15 18	Boss 3902
			Area 132		
−14 4383	6·1	A0	16 11 55	−14 40	—
−14 4389	7·4	F0	16 13 23	−15 09	—
−14 4398	6·1	K0	16 15 04	−14 42	—
			Area 133		
−15 4502	6·8	K2	17 12 17	−15 09	—
−15 4511	7·2	K0	17 14 17	−15 43	—
			Area 134		
−15 4889	7·3	K0	18 10 58	−15 24	—
−15 4911	6·6	B0	18 13 37	−15 28	—
			Area 135		
−15 5290	7·9	B9	19 11 43	−14 58	—
−15 5310	6·3	K2	19 15 01	−15 40	Boss 4915
−14 5387	8·3	G5	19 15 36	−14 17	—
			Area 136		
−15 5606	7·8	K0	20 12 50	−15 24	—
−14 5708	7·4	K0	20 15 07	−14 31	—
			Area 137		
−15 5908	6·4	A5	21 07 50	−14 46	—
−15 5938	8·0	A0	21 12 45	−15 07	—
			Area 138		
−15 6174	8·0	K0	22 12 14	−14 47	—
−15 6180	7·1	F8	22 13 10	−15 00	—
			Area 139		
−14 6429	7·6	K0	23 11 41	−14 24	—
−14 6437	8·3	F8	23 13 30	−14 12	—
−14 6441	6·8	K0	23 14 18	−14 11	—

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