Report of the Director of the Observatory at Leiden for the year 1926

Sitter, W. de

BULLETIN OF THE ASTRONOMICAL INSTITUTES OF THE NETHERLANDS.

1927 February 19 Volume III. No. 116.

COMMUNICATION FROM THE OBSERVATORY AT LEIDEN.

Report of the director of the Observatory at Leiden for the year 1926.

1. *General.*

Dr. S. SZELIGOWSKY, who had been working at the observatory from the end of October 1925, left Leiden on May 28, to return to Wilno.

From July 10 to August 15 and from the end of August to September 19 Father F. W. SOHON S. J. has been working at Leiden in the astrophysical department.

Dr. VAN DEN BOS has been at Johannesburg during the whole of the year.

Prof. HERTZSPRUNG left Leiden on October 1, to spend some months in the Harvard observatory, Cambridge, Mass., to measure variable stars on old plates.

The director and Prof. HERTZSPRUNG attended the meeting of the *Astronomische Gesellschaft* at Kopenhagen from 14 to about 20 August.

Amongst the foreign astronomers, who paid a visit to Leiden, were Mr. HARLOW SHAPLEY and Prof. O. BERGSTRAND.

Mr. C. SANDERS, who had formally been making observations for the Leiden observatory at his private observatory in Matuba, Portuguese Congo, joined the staff of the observatory as a chief assistant. He arrived at Leiden towards the end of August.

The total number of persons shown round the observatory, generally on saturday afternoons, during the year was 601, of whom 189 were shown the moon and other objects at night.

Buildings.

The dome of the west tower was repaired and painted.

Also the dome of the photographic refractor underwent some slight repairs.

2. *Instruments.*

Meridian circle. The instrument has been in good working order throughout. The registering micrometer has been cleaned, and the switch for its electric current was renewed.

Chronographs. The worm and wormwheel of the motor of the printing chronograph appeared about the middle of the year to be entirely worn out. They were sent to the *Société Genevoise*, and replaced by new ones of a harder metal. One of the brushes of the motor was renewed.

The chronograph *Mayer and Wolf* was cleaned.

The old *six-inch refractor* of SCHRÖDER, which had not been used for many years, was cleaned and repaired, and given in loan to Mr. KRUYTBOSCH, who uses it for observing variable stars at his private observatory at Wassenaar.

The *Zenith telescope* by WANSCHAFF, which had been dismounted during the building operations, was mounted again in its old building, after being entirely overhauled.

The *universal intrument* by SARTORIUS, which Mr. SANDERS brought back with him from Matuba, was cleaned and mounted in the west tower.

The *double camera with moving plateholder* by ZEISS has still required considerable attention, and many details, especially in the electric arrangements, had to be altered before the instrument worked satisfactorily and reliably. It is now in regular use, and only occasionally gives rise to trouble. It is intended to publish a description of it in one of the next numbers of the *B. A. N.*

The *Schilt microphotometer* has been in regular working order. A resistance, which can be very finely adjusted, has been inserted in the circuit for the lamp, to enable the observer to regulate the current for the lamp very exactly. Also new scales were fitted for the coordinates, the galvanometer scale was improved and some other small improvements were made. The instrument continues to give entire satisfaction.

The *comparator* for four plates, of which the optical part was made by the firm of COOKE, TROUGHTON and SIMMS in York, after designs of Mr. DENNIS TAYLOR, and the mechanical part in our own workshop, was ready for use in February. It has been used for the discovery of variable stars. We hope to publish a description of the instrument in the near future.

An *azimuth instrument*, designed for the special purpose of measuring azimuths for the determination of fundamental declinations by the method outlined in *B. A. N.* **81**, was ordered from the firm of COOKE, TROUGHTON and SIMMS in the end of 1925. On the occasion of a visit of the director to the works of this firm at York in November 1926 it appeared that they had made no progress with the instrument. The instrument is now, however, being constructed and is expected to be ready about August 1927.

Mention may be made here of the fact that a Schilt microphotometer was built for the observatory at Upsala by the firm W. C. 'T HART at Rotterdam, under the supervision of Mr. ZUNDERMAN, and tested at this observatory before delivery. Another instrument for the Harvard Observatory is nearly ready and a third one for the observatory at Lund is under construction.

3. *Observations and reductions.*

Astrometric Department.

Meridian Circle. The work on the programme of reference stars for Prof. SCHLESINGER's photographic plates of the zone 55° to 60° has been much hampered by bad weather. The first two and the last three months of 1926 were especially unfavourable. The total number of zones secured is 66, the distribution over the year being as follows.

January	3	July	6
February	5	August	1
March	12	September	4
April	6	October	5
May	6	November	6
June	6	December	6

The observers were

Observer	*Zones*	*Programme stars*	*Fundamental stars*
Mr. HINS	26	856	194
„ GAYKEMA	20	783	162
„ KRIEST	20	656	142
total	66	2295	498

The observers at the circle were

Mr. SWAAK on 20 nights
„ MEKKING „ 20 „
„ VROOM „ 26 „

During the year 25 observations of Polaris were taken.

Determinations of collimation, both with the mercury trough and by reversing on the meridian marks, and of run were regularly made.

The inclination and the azimuth have once been readjusted by a considerable amount. The slow change in the inclination, (west pier lowering), which has been noticed during the last five years, still continues.

Reductions. For all zones of 1926 the equator points have been derived. The correction of the circle readings for run, division errors and refraction, and the reduction to mean places is well in hand.

The means are being formed of the separate printings of the registering micrometer. Dr. HINS has undertaken an investigation of the value of one revolution and of the progressive and periodic errors of the screw of this micrometer, which has now been in use for four years. Both the progressive and the periodic errors are very small and probably negligible. The derivation of final clock errors has been postponed till after the completion of this investigation, and the final reductions of all observations of Polaris.

The final reductions of the observations of the *Selected Areas* have also been taken in hand. Provisional equator points have been derived for all zones observed with the movable wire, the micrometer having been rotated by 90° for these observations. The derivation and discussion of final residuals for the individual fundamental stars must also await the completion of the investigation of the screw which was mentioned above. The circle readings of the programme stars are being corrected for run and division error, and reduced to the adopted zero of the moving wire. By means of the provisional equator points we then derive very approximate zenith distances, which are used for the computation of refraction. This somewhat complicated procedure is made necessary by the fact that no apparent places are available, but only mean places for 1925.0, the observations being made in 1922 and 1923.

Zenith Telescope. Immediately after his arrival at Leiden Mr. SANDERS began to determine the instrumental constants of this instrument, which had been re-erected, as mentioned above, and to make observations of Talcott pairs belonging to a programme drawn up as a part of the series of observations for the determination of fundamental declinations as outlined in *B. A. N.* **81**. From the stars of magnitude 7.0 and brighter in Boss the following number of Talcott pairs could be selected.

Decl. of southern star.	*Number of pairs.*
−6° to 0°	32
0 „ +10°	41
+10 „ +20	19
+20 „ +30	52
+30 „ +40	62
total	206

Of these not more than three pairs can be observed in one hour on the same night.

A new set of wires was put in the micrometer, by which it is hoped to increase the accuracy of the observations, which was not very satisfactory with the old wires, the mean error of one pair being ± 0."17. Also the object glass is not very transparent and has large chromatic dispersion, as a consequence of which the observation of stars fainter than the sixth magnitude is only possible on exceptionally fine nights, and even then difficult.

Universal instrument. After the mounting of this instrument in the west tower Mr. SANDERS determined several of its instrumental constants by making use of an artificial star consisting of a small hole in a piece of tin foil in the focus of a small theodolite mounted on the same pier, of which the object glass served as a collimator, so that the artificial star could be observed with the stellar focus. After observing some Talcott pairs the instrument was used for observing elongations of circumpolar stars. The azimuth is determined by observations of Polaris. A mark, in azimuth 174° 25′ 22", consisting of a metal cone mounted on the roof of a building at a distance of 870 meters, can very conveniently be observed, but only in day light. The reading of this mark appears, however, to change, about 1" between the morning and the afternoon.

Measures of Plates of Pleiades. One pair of plates containing about 1000 stars was measured both by Prof. HERTZSPRUNG and by Mr. PELS. One pair of plates containing about 450 stars was measured and reduced by Mr. VROOM, who is now engaged on the measuring of another pair. Mr. VROOM also completed the reductions of his measures of the coordinates of about 2350 stars and has prepared a chart of these stars.

Parallax of Hyades. Mr. RAIMOND derived the parallax of the group of the Hyades from a discussion of proper motions, eliminating the systematic errors of the catalogues by determining directly the *relative* proper motions of stars occurring in the same catalogues. The results have been published in *B.A.N.* **113** *).

Statistical investigations. Dr. OORT has completed an investigation of the characteristics of stars of high velocity. The aim of this investigation was to collect as completely as possible all observational data, and to summarise the results.

It has appeared that a sharp limit exists at 62 km/sec. A catalogue of stars having velocities above this limit was made, containing 271 objects. A study of the distribution of these velocities showed a pronounced relation of their directions with the plane of the milky way.

The distribution of spectral types and absolute magnitudes is fundamentally different from that for stars of ordinary velocities. It appears that the greatest number of large velocities are found amongst those types that show the smallest concentration towards the milky way.

A search was also made for a special spectral characteristic distinguishing the high velocity stars from the others, and also the frequency of double stars amongst high velocity stars was compared with that amongst ordinary stars.

With a view to the determination of mean parallaxes the solar velocity relatively to, and the peculiar velocity of, stars of different spectral type and apparent magnitude were derived.

Mr. OORT further undertook some dynamical investigations regarding the velocity of escape from the Kapteyn system and the relation between this system and the globular clusters.

During these investigations some pairs of stars of high velocity were noticed, having very accurately the same velocity. A special investigation led to the discovery of seven well established pairs. An extension of this investigation to all stars nearer than 20 parsecs has been undertaken by DR. OORT with the assistance of Mr. A. DE SITTER.

A third investigation by Dr. OORT refers to the dimensions of the group of the Hyades. STRÖMBERG found that 20 °/₀ of all bright *F* stars and 8 °/₀ of the *A* stars belonged to this group, which would thus extend over the whole sky. Dr. OORT's aim was to verify the reality of this result. In the course of this investigation he found two stars at a distance of 20° from the group very probably belonging to it. The results will soon be published.

Dr. OORT further investigated the galactic distribution of stars with strong galactic concentration, with a special view to testing the possibility of using the mean galactic latitude as a criterion for the distance. The results also will soon be ready for publications.

4. *Astrophysical Department.*

Photographic Refractor. The following numbers of plates were taken:

Object	*Nr. of plates*	*Nr. of expos.*	*total time of exp.*
*Castor *C*	37	553	2501^m
B.D.+75°725.....	16	1221	1563
W Ursae Majoris...	4	248	393
Pleiades	7	14	420

*) Errata in *B.A.N.* 113: p. 225, first column, line 8 from bottom, and p. 226, first column, last line: *for* 607 *read* 667.

Object	Nr. of plates	Nr. of expos.	total time of exp.
*H. D. 25833	2	103	154
*Boss 2484	3	129	47
*Boss 2445	1	1	5
*Boss 3182	7	335	226
*Boss 3644	3	67	66
*H. D. 107760	2	46	97
AK Herculis	2	34	160
Σ 2873	3	199	277
*B. D. + 61°676	4	233	217
N. G. C. 1647 No. 190	2	2	50
RS Orionis	1	11	29
TU Monocerotis	2	15	97
Double stars	9	179	281
total	105	3390	6583

All exposures were made by Mr. VAN GENT.

The stars marked * are spectroscopic doubles which were observed to decide whether they were eclipse variables. This was found to be the case with Castor *C* and *H. D.* 25833. The latter star was also discovered as an eclipse variable at the Washburn Observatory.

B. D. + 75°725 is a W Ursae Majoris variable, pointed out by Dr. SCHILT, of which the light curve was determined. Also Σ 2873 was suspected of W Ursae Majoris variability, but no change of light has so far been found.

Of RS Ori. and TU Mon. plates were taken with a grating before the object glass to determine the relative magnitudes of the comparison stars used by Prof. HERTZSPRUNG in his observations of these stars on old Harvard plates. The plates of the Pleiades were similarly taken for photometric purposes.

The plates of double stars wider than 4″ were also taken with a grating in those cases where the difference of magnitude was considerable.

Double camera. The following 155 plates were taken by Mr. DOORN.

	single	double
Photometry	—	23
Effective wavelength.	2	42
Milky Way	—	4
Experimental	3	6

The plates for effective wavelengths, of stars between 80° declination and the pole, were measured by Mr. DOORN, and the reduction has been commenced.

Microphotometer. The following numbers of images were measured by Mr. VAN GENT.

Castor *C*	2280
W UMa	843
H. D. 25833	306
B. D. + 75°725	1032
Total	4461

As a result of the measures of Castor *C* Mr. VAN GENT determined the elements of this star, his investigation being published in *B. A. N.* **97**.

The instrument was also used by Dr. SZELIGOWSKI, who measured variable stars on plates of Prof. HERTZSPRUNG (published in *B. A. N.* **106**), and by Dr. ÖHMAN from Upsala, who measured some intensities of spectral lines to make himself acquainted with the instrument.

Visual estimates of variable stars on photographic plates were made by Father SOHON and published in *B. A. N.* **109**.

Prof. HERTZSPRUNG has so far made about 6700 visual estimates of variable stars on Harvard plates. The following stars were observed

H. D. 154365	:	641 estimates
RS Orionis	:	900 „
R Muscae	:	700 „
X Puppis	:	414 „
XX Carinae	:	396 „
TT Hydrae	:	330 „
C. P. D. —20°2574	:	330 „
X Pictoris	:	230 „
TU Monocerotis	:	570 „
AK Scorpii	:	360 „
C. P. D. —32°4415	:	1040 „
W Geminorum	:	685 „

R Muscae proved to have a period of $7^{d}\cdot51$, of which the reciprocal is 0·133154, against 1·133151 of the period adopted by ROBERTS. The lightcurve fits very well in the sequence of cepheid lightcurves of *B. A. N.* **96**.

5. *Observations at Johannesburg by Dr. VAN DEN BOS.*

Visual observations. 26½-inch, 9-inch and 4-inch refractors.

a. Double stars. From Dec. 1 1925 to Dec. 1 1926 Dr. VAN DEN BOS made 1695 measures, of which 1160 of objects not yet measured, bringing the total since his arrival at Johannesburg to 2187 measures, of which 1456 of objects not previously measured. He discovered 539 new double stars, bringing the total to 677, of which 632 published (*B. A. N.* **107, 111, 114**). Among these 677 are 12 close companions to known pairs and 31 new triple or multiple systems.

The systematic survey was continued on 119 nights with good definition. The total number of stars down to mag. 9·0 (*C. P. D.* or visual) examined up to Dec. 1,

1926 is 14552, amongst whom are 865 double stars within AITKEN'S limits (1 in 16·8), 448 of whom are new (1 in 32·4).

A small number of measures was made with the 9-inch telescope, chiefly on nights when the 26½-inch was used by Dr. STRUVE for his measures of Saturn's satellites. Some measures (about 10) of Mimas and Enceladus were also made by Dr. VAN DEN BOS.

b. Minor planets. On 11 nights 12 observations of Eros were made, see *B.A.N.* **107** *) and **114**.

On 1925 Dec. 19 Mr. FINSEN, observing with the 26½-inch, called Dr. VAN DEN BOS's attention to a 7 mag. star, which appeared to him somewhat hazy, the normal appearance of a very close double with power 420. Power 840 revealed a, not separated, but clearly double, star, estimated distance 1/5", pointings in angle 253°, 247°, (VAN DEN BOS), 260°, 250° (FINSEN), good definition, "certainly double". The star was not in the *C.P.D.* Its position was determined by Dr. VAN DEN BOS relatively to Boss 1374. The star then turned out to be Pallas. The most probable explanation appears to be the existence of dark spots on its surface. The planet was examined on some other subsequent nights, though with less good definition, but the phenomenon was not seen again. It will be interesting to observe Pallas continuously during some hours on a good night in the next opposition.

c. Comets. ENSOR's comet was observed on 4 nights with the 26½-inch, and on 4 nights with the 9-inch; BLATHWAYT's comet on 2 nights with the 9-inch refractor. These observations are published in *Union Observatory Circular* **67**.

d. Jupiter's Satellites. Some eclipses of I and II were observed as an experiment with the 26½-inch refractor. The light grasp of the instrument is so great that the disappearance is only observed at a stage of the eclipse when the change of light is very slow. The instrument seems thus not very suitable for these observations.

e. Various observations. Some occultations were observed with the 26½-inch, 9-inch and 4-inch telescopes. With the last named instrument observations of the undulations of the sun's limb are also regularly made at the request of Prof. HORN D'ARTURO of Bologna. Since Feb. 11, 1926 108 observations have been made.

Photographic observations, 26½-inch refractor and Franklin Adams camera.

With the 26½-inch photographic observations of double stars were made by Prof. HERTZSPRUNG's method. Some alterations had to be made in the plateholder before entirely satisfactory results could be secured. The following plates were taken:

α Cen	: 5 plates on 2 nights	(Ilford screened chromatic)	
γ CrA	: 4 „ „ 3 „	(Cramer isoslow)	
ζ Aqr	: 1 „	(„ „)	
h 5246	: 1 „	(„ „)	

With the Franklin Adams telescope the following plates were taken:

			h
η Car	: 26 plates,	total exp. time	10.5
Crux	: 8 „ , „	„ „	3.6
SX Cen	: 11 „ , „	„ „	1.6
TT Hya	: 7 „ , „	„ „	0.5
Minor Planets	: 6 „ , „	„ „	3.6
total	58 plates,	total exp. time	19.8

Dr. VAN DEN BOS cooperates regularly in the preparation of Dr. INNES's Catalogue of Southern Double Stars.

6. *Theoretical department.*

Jupiter's Satellites. The corrections to the longitudes derived from the Cape plates of 1924 were published (*B. A. N.* **93**). This completes the series begun in 1913 at the Cape and continued at Greenwich and Leiden. A first approximation to corrections to some of the elements, especially the equation of the centre of satellite II, was then made from the results of this series.

The positions of the orbital planes were derived from those series in which the y-coordinates had been measured (Greenwich 1918—19 and Cape 1924) combined with the Cape heliometer observations of 1891 and 1901—2, Cape photographs of 1902—04, and the Berlin observations of 1907—9. The results were very satisfactory, the inclinations and nodes and the motions of the nodes being determined with great accuracy. The results were published in *B. A. N.* **102**.

In January the volume of the *Publications* of the observatory at Pulkovo (printed in 1916) containing the reduction of the plates taken there from 1904 to '10 was received at Leiden. Corrections to the longitudes were at once derived from these and published in *B. A. N.* **105**.

Mr. BROUWER has continued the discussion of Dr. INNES's observations of eclipses and other phenomena from 1908 to 1925. The attempt to derive from the series 1908—13 a system of corrections to the elements met with great difficulties, the various unknowns being very badly separated. The observations of "first speck" and "last speck" of the eclipses appeared to be of much higher accuracy than the other observ-

*) Errata in *B.A.N.* 107, page 194:
α Eros, June 11: for $6^s.40$ read $7^s.40$
α *C.P.D.* 31°5946: „ 6.32 „ 6.22

ations. A separate discussion of these observations from 1908—25 was therefore undertaken, and provisional corrections to some of the elements were derived from these. These agreed well with the first approximation from the plates 1913—24, which was mentioned above. A second approximation was then taken in hand, and was, at the end of the year, completed for the satellites I and II. It is hoped that final results will now be soon available.

It was decided to keep the discussion of these visual observations of phenomena by Dr. INNES separate from that of the photographic and heliometric observations, and to defer the comparison until final results from both kinds of observations should be available.

The longitudes derived from extra-eclipse observations from 1891 to 1925 at the Cape, Greenwich, Helsingfors, Pulkovo, Washington and Leiden were combined with the longitudes for 1750 derived from DAMOISEAU's tables and the mean longitude and equation of the centre of satellite III for 1783 derived from a new discussion of old eclipses (*B. A. N.* 4) and corrections to the mean longitudes, mean motions, proper excentricities and perijoves, the great inequalities and the libration were derived from these. It appears that all four satellites show very clearly fluctuations of the same phase and period as the moon, which must consequently with great probability be ascribed to the rotation of the earth. The size of these fluctuations is, however, not equal to those in the moon increased in the ratio of the mean motions, but much larger. The factor Q by which the fluctuations in the moon's longitude must be multiplied to give those in the satellites is, for the four satellites:

Satellite	I :	$Q = 2.79$
„	II :	2.59
„	III :	3.26
„	IV :	1.85
	mean :	$Q = 2.62 \pm 0.20$

The probable error is derived from the deviations of the four individual results from the mean.

A summary of these results will soon be published in the *B.A.N.*, and it is intended to publish the details of the discussion in the *Annals* of the Observatory.

Hyperion. Mean elements have now been formed for each of the epochs of observations. The year 1887 (Washington) has been added to those already reduced, in order to secure a better connection with the observations at Pulkovo.

Other investigations. Dr. WOLTJER has investigated the distribution of intensity in the continuous spectrum of the corona. The results were published in *B. A. N.* **94** and **103**.

7. *Staff.*

The staff of the observatory is at the present moment constituted as follows:

Director: Prof. Dr. W. DE SITTER.
Adjunct-director: Prof. Dr. E. HERTZSPRUNG.
Conservators: Dr. J. WOLTJER.
Dr. J. H. OORT.
Observators: Dr. C. H. HINS.
Dr. W. H. VAN DEN BOS.
Chief Assistant: C. SANDERS.
Assistants: D. BROUWER.
H. VAN GENT.
N. W. DOORN.
Chief of computing department: D. GAYKEMA.
Computer highest grade: G. PELS.
Computers 1st class:... J. C. GAYKEMA.
J. M. KRIEST.
M. D. SCHEPPER.
Computers 2nd class:.. E. W. DE ROOY.
Miss C. H. DE NIE.
H. M. SWAAK.
B. G. MEKKING.
H. VROOM.
Chief-instrumentmaker: H. ZUNDERMAN.
Instrumentmaker:..... J. H. KASTEN.
Stoker and Carpenter:. P. DE HAAN.

In addition to these three supernumerary computers have been employed throughout the year.

Mr. OORT is engaged in theoretical researches in the departement of fundamental astronomy.

Mr. HINS is in charge of the observations with the meridian circle. The regular observations are made by Messrs HINS, D. GAYKEMA and KRIEST, while Messrs SWAAK, MEKKING and VROOM read the circle microscopes.

Mr. SANDERS is in charge of the zenith telescope and the universal instrument.

Mr. D. GAYKEMA is in charge of the reductions. The established computers with the exception of Messrs PELS, DE ROOY, SCHEPPER and VROOM, as well as two of the supernumerary computers, work under his direct supervision.

Prof. HERTZSPRUNG is in charge of the astrophysical department. The observations with the photographic refractor are mostly made by Mr. VAN GENT, while Mr. DOORN observes with the ZEISS double camera. Mr. VROOM is also attached to his department.

Dr. WOLTJER is in charge of the theoretical department. Messrs PELS, DE ROOY and SCHEPPER are attached to this department.

Mr. OORT is in charge of the library, assisted by Mr. KRIEST.

Mr. ZUNDERMAN has the general direction of the instrumentmakers workshop, and is in charge of the photographic refractor and the double camera.

Mr. KASTEN is in charge of the other instruments, and has the general care of the buildings.

Mr. D. GAYKEMA assists the director in his administrative duties.

Dr. W. E. KRUYTBOSCH has continued to work in the observatory as a volunteer assistant.

8. *Publications.*

The following numbers of the *B. A. N.* contain communications from the observatory at Leiden. When more than one paper by the same author is contained in one number, the number of papers is added in parentheses.

B. A. N. **92.** Report of the director.
93. W. DE SITTER and G. PELS [*679*].
94. J. WOLTJER [*561*].
95. E. HERTZSPRUNG (6).
96. E. HERTZSPRUNG [*660*].
97. H. VAN GENT [*699*].
98. W. H. VAN DEN BOS (2) [*682, 692*].
99. W. DE SITTER and G. PELS (2) [*680*].
100. G. P. KUIPER [*696*].
101. W. H. VAN DEN BOS.
102. W. DE SITTER [*880*].
103. J. WOLTJER [*888*],
105. W. DE SITTER and G. PELS [*886*].
106. ST. SZELIGOWSKI (3).
B. A. N. **107.** W. H. VAN DEN BOS (2).
109. E. HERTZSPRUNG (3).
F. W. SOHON.
111. W. H. VAN DEN BOS.
113. J. J. RAIMOND. [Dutch not yet published].

It does not appear necessary to repeat here the full titles of these communications.

Some of these communications have also been published in the Dutch language in the *Verslagen van de Koninklijke Akademie van Wetenschappen te Amsterdam*, Vol. XXXV. The pages of this volume are in those cases added in italics to the name of the author above.

In addition to the above the following papers were published by members of the staff during the year.

W. DE SITTER. De eenheid der wetenschap, oration at the anniversary of the University of Leiden.

J. H. OORT. The stars of high velocity, *Groningen Publications* **40**.

Niet-lichtgevende materie in het sterrenstelsel, inaugural oration.

Asymmetry in the Distribution of Stellar Velocities, *The Obervatory*, XLIX, 302.

Sterren met groote snelheid, *Hemel en Dampkring*, **24**, 338.

W. H. VAN DEN BOS. Orbital elements of binary stars, *Union Obs. Circ.* **68**, 654.

Effect of motion of a binary in space on elements, *Union Obs. Circ.* **68**, 360.

ERRATA IN REPORT FOR 1925 (*B. A. N.* **92**).

p. 93, first column, line 32: *for* ± 0^s·24 *read* ± 0^s·024.
„ 36: „ Is „ It
second „ „ 3: „ systematic „ accidental.
p. 95, first „ „ 15 from bottom: *for* AITKIN *read* AITKEN.
