8. COMMISSION DE L'ASTRONOMIE MERIDIENNE

PRÉSIDENT: M. H. R. MORGAN, *U.S. Naval Observatory, Washington, D.C., U.S.A.*

MEMBRES: MM. Armellini, R. Baillaud, Boss, Brouwer, Carnera, Cullen, Danjon, Dyukov, Fayet, Guyot, Gyllenberg, Hins, J. Jackson, Spencer Jones, Meyer, Moreau, Orlov, Procházka, Sémirot, R. M. Stewart, van Herk, Watts, Zverev.

SOUS-COMMISSION POUR LES OBSERVATIONS VISUELLES ET PHOTOGRAPHIQUES DES ETOILES JUSQU'À LA NEUVIÈME GRANDEUR

PRÉSIDENT: M. BROUWER.

MEMBRES: Mlle Barney, MM. Eckert, Martinez, Scott, Shane, Stoy.

The inability to obtain information about work in other countries, under present world conditions, necessarily makes this report incomplete. The conditions since the 1938 meeting have interfered seriously with major programmes of observation, and have delayed reductions, such that there are now several series of observations of the Sun, Moon, and Planets, and many catalogues of stars awaiting final reduction and publication.

The Sun, Moon, and Planets. Fundamental observations of these objects and of the fundamental stars have been carried on regularly at Cape and Washington, and at Greenwich except for part of the time during the war. The Greenwich and Cape results 1925–44 have been reduced; and summaries of the results have been published in reports. The Washington series 1928–32 is published; the series 1925–40 is about reduced; and the series 1935–45 is to be printed this year. The Sun and Planets have been observed also, in shorter series, at Algiers, Besançon, Brussels, Ottawa, Strasbourg, Toulouse, and elsewhere; but much of this work is not reduced, or not available. A complete reduction and publication of such observations is needed. There is a need also for an additional series of continual fundamental observations of the Sun, Moon, and Planets, with 24-hour star work, preferably at a government observatory in the southern hemisphere. There are unsatisfactory discrepancies between different instruments in observations of the Sun.

Beginning probably in 1952, the American *Ephemeris* and the British *Almanac* will give ephemerides of Ceres, Pallas, Juno, and Vesta, with the recommendation that these objects be observed with meridian instruments. Baillaud and Maître suggest a need for additional meridian observations of the Sun and Minor Planets.

Recent observations of the Sun and Planets give a normal correction to Newcomb's equinox, $\Delta N = -0^s.041$ (1936). And a general solution, 1750–1945, gives $\Delta N = -0^s.034 + 0^s.016$ (T–1936). This motion is relative to a small number of bright stars and it should not be confused with precession. Apparently the earlier results, with hand-controlled moving threads, over-corrected the right ascension. The more recent and improved methods, including the synchronous motor control and use of screens, with more study of day terms, uphold the equinox of the *Albany General Catalogue*, ($N - 0^s.040$). For such investigations the results from the reduction of Hornsby's observations, 1774–94, by Jackson and others, have been helpful, as have also the differences between the tables of the Sun by Leverrier and the tables by Newcomb computed for each month of last century by Williams. It should be noted that the ephemerides of the Sun, Moon, and Planets do not include the short-period terms in nutation, whereas these terms are included in the clock corrections for the Washington right ascension since 1903, and the declinations are reduced with nadir observations. The published individual corrections to the ephemerides require, therefore, small corrections (see *Astr. Jour.* **47**, 193, 1939).

Corrections to the Moon's longitude and latitude have been determined both from meridian observations and from occultations. Corrections for irregularities of the Moon's limb have been included in the Washington results, and these show decided improvement with such corrections. A new determination of the limb irregularities is being undertaken at Washington.

The fluctuation in longitude continues, and being unpredictable it must be studied continually, as variable time is now taken into account in planetary motions. This is

clearly shown in the recent determination of the *Motion of Mercury*, 1765–1937, by Clemence (*Astr. Pap.* vol. **11**, 1943), where the fluctuation in Mercury's longitude is found to correlate closely with that of the Moon. Fluctuation of the Earth's rotation and the secular acceleration of the Sun, Moon, and Planets has been discussed by Spencer Jones (*M.N.* **99**), and by others. Discussions of the solar parallax and of other constants are given by the Astronomer Royal in *Mem. R.A.S.* Vol. **66**, pt. II (1939), and in the *Results from the Cookson Floating Zenith Tube*, 1911–36 (1939). And Jeffreys, Oort, and others have discussed the precession, nutation, and aberration, and related constants. The determinations of the fundamental constants are not satisfactory, but those in use are not far wrong. Newcomb's precession requires a correction of 1″·00. Dr Spencer Jones writes that the values of the solar parallax and of the nutation constant cannot be reconciled. De Sitter and Brouwer have published a classical paper on the subject (*B.A.N.* 1938), with the caution that the system of constants and the motions of the Planets should be revised as a homogeneous whole. Many recent discussions of observations have indicated various discrepancies in the tables, masses, and adopted constants, and in star places; and a comprehensive research programme under the joint direction of Brouwer at Yale, Clemence at Washington, and Eckert at New York has been set up for studying these subjects (see Report, Commission 4). It is urgently recommended that no changes be made in adopted constants until a general solution of the system can be made.

The Fundamental Catalogue. The 1535 fundamental stars—the FK3 catalogue—are being regularly observed in all standard programmes. The results from thirteen recent series, all in good agreement, show the following variation with magnitude in the corrections to the right ascension between $+40°$ and $-30°$:

Mag.	$\Delta\alpha m$	Mag.	$\Delta\alpha m$	Mag.	$\Delta\alpha m$
0·0–2·4	$-0^s·0020$	3·7–3·9	$-0^s·0002$	4·7–5·0	$+0^s·0007$
2·5–3·0	$-0^s·0016$	4·0–4·2	$+0^s·0005$	5·1–5·5	$+0^s·0014$
3·1–3·6	$-0^s·0010$	4·3–4·6	$+0^s·0003$	5·6–6·6	$+0^s·0016$

If these be taken as magnitude errors in the proper motions in the thirty years since mean epoch, then $100\,\Delta\mu = +0^s·0030$ (M $-4·0$). Many instruments are now using screens and reversing-prism eyepieces, and with these and the moving threads there are practically no magnitude equations. Further studies of magnitude errors are being made.

The *Albany General Catalogue* (G.C.) with its large number of stars is being used extensively as a comparison catalogue for reducing catalogues to a standard system; and it is again recommended that all individual catalogues give comparisons with this catalogue. Moreover, the differences for the individual stars derived in such comparisons are very useful to others, especially in proper-motion work; and their publication saves other computers the necessity of duplicate computation. Some catalogues give them, and it is recommended that when possible the comparisons for the individual stars be published. To assist in comparing other catalogues with the *General Catalogue*, this catalogue has been put on punch-cards at the Watson Astronomical Computing Bureau; and by this means the positions in the *General Catalogue* may be carried to any desired epoch.

Results of observations in all the recent fundamental series up to 1945 give normal corrections for periodic errors in the *General Catalogue*, between $+30°$ and $-30°$ declination, as follows (epoch 1936):

$$\Delta\alpha_\alpha = -0^s·0105 \sin\alpha + 0^s·0101 \cos\alpha - 0^s·0008 \sin 2\alpha + 0^s·0058 \cos 2\alpha$$
$$\Delta\delta_\alpha = -0''·114 \sin\alpha - 0''·068 \cos\alpha + 0''·040 \sin 2\alpha - 0''·012 \cos 2\alpha$$

and a general solution of all observations, 1750–1945, gives (1936):

$$\Delta\alpha_\alpha = -0^s·0103 \sin\alpha + 0^s·0108 \cos\alpha - 0^s·0002 \sin 2\alpha + 0^s·0058 \cos 2\alpha$$
$$100\Delta\mu_\alpha = -0^s·0087 \sin\alpha + 0^s·0076 \cos\alpha - 0^s·0000 \sin 2\alpha + 0^s·0048 \cos 2\alpha$$
$$\Delta\delta_\alpha = -0''·106 \sin\alpha - 0''·068 \cos\alpha + 0''·021 \sin 2\alpha - 0''·012 \cos 2\alpha$$
$$100\Delta\mu'_\alpha = -0''·120 \sin\alpha - 0''·114 \cos\alpha + 0''·048 \sin 2\alpha - 0''·023 \cos 2\alpha$$

Recent observations of the Sun and Planets give $+0''·12$ as the correction to the *General Catalogue* equatorial declinations. For a further examination into the errors in present

star systems, a fundamental normal position is now being formed using observations in the last 25 years.

The new *Catalogue of* 3539 *Zodiacal Stars* (1940) contains definitive positions and motions, for the equinox of 1950, of all stars in the zodiac to the 7th magnitude, and of many fainter ones. It is based upon 90 catalogues, and the final positions are reduced quite rigidly to the FK3 system.

Observations of the Brighter Stars. The Cape Observatory has four unpublished catalogues, including: all stars to mag. 7·5 (8400), between −30° and −90°; and all to mag. 7·0 (3267), in the zodiac, 1925–32; all stars to mag. 7·5 (6597), between 0° and −30°, 1932–36; and the PGC and BH stars south of +35° (5373), 1936–44. In the first three catalogues many fainter stars are included for better spacing. Comparisons of all these positions with the fundamental catalogues have been summarized in published reports. At Greenwich the observations, 1931–40, of all stars to mag. 7·5 and fainter (6053), in the zone 0° to +24°, and the PGC stars north of +64° are ready for publication. At Washington, the observations, 1935–45, of the fundamentals north of −35°, and of a spaced list of 3000 standard stars, 0° to −30° (5644), are being printed this year; the observations, 1925–40, of fundamental and standard stars north of −30° (3500), are mostly reduced; and observations since 1940 of the FK3 stars and a list of standard stars +50° to +90° (4800), are being reduced. The stars +50° to +90° are spaced 83 per 100 square degrees, and include a considerable portion of the GC stars. Observations of 3520 zodiacal stars, and declinations of 2094 standard stars were published in 1938.

Melbourne and Ottawa both have long series of observations of standard stars not yet published. At Cordoba a fundamental catalogue was published in 1941. At La Plata the GC stars −35° to −82° are being observed; and a catalogue of 2123 Boss stars −15° to −80° was published in 1936. The observers at La Plata express a desire to co-operate with other southern observers in a programme of fundamental work at their new observatory in latitude −50°. Declinations of the GC stars +24° to +32° have been observed at Leiden; and their azimuth instrument has again been taken to Kenya in Africa for observing the FK3 stars +50° to −50°. In Russia, five observatories completed observations of 1334 geodesic stars to the 6th magnitude +90° to −10°. Four other volumes were published by Pulkovo before it was destroyed: Vol. **53**, *Right Ascensions of* 558 *Fundamental Stars*; Vol. **55**, *Proper Motions of* 18,000 *Faint Stars in the Areas*; Vol. **56**, 8820 *Schjellerup Stars*; and Vol. **57**, *Declinations of* 1904 *Fundamental Stars.*

About 1930, Pulkovo and eight observatories in Germany co-operated in observing the FK3 stars north of −20°. The results are mostly published, and Kopff has combined the observations of each of the BJ stars into mean positions, and published the results with the Anhaltsterne catalogue. Also some 13755 Anhaltsterne +90° to −5° were observed with the FK3 stars at these same observatories, and were reduced rigidly on the FK3 system. These results have been published in *Veröff. Koper. Inst.* No. 55 (1943). A more general circulation of this publication is needed. These positions were used in reducing the plates of the photographic re-observation of the AG catalogues. The stars represent a good spaced list of intermediary standards 6·5 to 9·5 magnitude, and they have been observed at several epochs.

The Faint Stars. The visual observation of all stars to the 9th magnitude in the southern sky is nearing completion. At Córdoba, the zone −37° to −47° is about completed, and their last zone, −82° to −90°, is being observed and reduced. At La Plata the zone −47° to −52° was published in 1938 (Vol. **13**); and the zone −72° to −80°, the last of their six volumes in the zone −47° to −82°, is being reduced. Some 4800 north galactic stars have been observed in France, and 3700 south stars at La Plata (Vol. **19**, 1943). Stars in the areas have been observed on a number of instruments. At Bergedorf and Königstuhl a list of 3000 stars, 8th to 10th magnitude, is being observed, one purpose of which is to study the magnitude equations in old catalogues. Other observations include thousands of reference stars for plate reduction, and double stars or red stars not suitable for photographic observation.

A large portion of the stars to the 8th magnitude, and of those in the *General Catalogue*

have therefore been re-observed in recent years. Possibly the stars needing observations most are those within 60° of the poles. The BJ and Zusatz stars should be included, especially to the south, and to the north the PGC stars. The GC stars +24° to +32° need observing in right ascension. Jackson recommends that the re-observation of stars in the GC, especially many of those not in the PGC, should be undertaken as soon as possible, while methods for checking the FK3 system will probably be under discussion. Jones suggests that meridian instruments should determine the position of stars to be used on the several new photographic zenith-tubes which are to be brought into use in the next few years, as the observations on such instruments may provide controls on the errors in the fundamental star systems.

Photographic Work. Several extensive programmes for photographic positions of all stars to the 9th magnitude should be mentioned. The Yale programme covers three-fourths of the sky, some of it twice, with plates covering 100° to 150° square degrees. The zones already taken are −70° to −60°, −50° to −40°, −30° to +30°, +50° to +60°, and the zone +60° to +90° is to be taken soon. Since 1938, seven volumes have been published in the zone −30° to +20°, and the reductions are well advanced for the four remaining volumes in this zone. On this extensive work gratings are used, and positions are determined for stars as bright as magnitude 5·5 using the spectral images. It is possible therefore to reduce the plates using positions of the brighter stars taken from regular programmes on standard instruments, without special observations of the reference stars. This is a great saving for meridian observers; and furthermore, it decidedly improves the results by referring the faint stars directly to standard systems. The Yale plates −30° to +20° are being reduced with the Cape and Greenwich observations of all stars to the 7·5 magnitude with fainter stars in sparse places.

A new plan of work covering the northern sky has been initiated by Brouwer at Yale in co-operation with Eckert at the Watson Scientific Computing Laboratory in New York, who has developed a new photoelectric measuring device which, operated by punch-card machines, permits automatic measurement and recording. The plates +50° to +90°, part of which have been taken, will be reduced in this manner. The comparison stars are to be taken from the spaced list of brighter standard stars observed at Washington, where plans are made for covering the sky to −30° with such observations. The Washington observations are to be used also for reducing plates taken at Lick Observatory in a general plan to cover the sky with a series of large plates which with double exposure and the use of gratings will provide means of referring the bright stars to the spiral nebulae.

The Cape Observatory is carrying the photographic observations of all stars to the 9th magnitude south from −30°. The zone −30° to −40° and the zone −52° to −56° have been completed; the zone −56° to −64° is being reduced; and observations for the zone −64° to −80° are being taken. Special observations of reference stars have been taken for all these zones.

For the zone −40° to −52°, positions and proper motions were deduced from astrographic plates for 41,400 stars to 9·5 magnitude. These results have been published.

The photographic re-observation of the AG catalogues, −2° to +90°, carried out, at six or seven observatories in Germany and Pulkovo, about 1930, has been completed; and the publication of the 15 volumes of these results is being delayed partly through lack of paper for printing. It would seem desirable that, if possible, the Union aid in the publication of this work.

Shortly before the war nine Russian instruments began work on a general catalogue of 17,500 stars, 7·5 to 9·0 magnitude, which were to serve as comparison stars for photographic plates giving positions of some 700 extra-galactic nebulae. These faint stars were to be connected with the present system FK3 through an intermediary standard list of 900 stars of intermediate magnitude. The general problem of referring the fundamental system to the nebulae is similar to the one being undertaken at Lick Observatory. What progress was made on this work is not known.

Quite a number of lists of reference stars have been selected and observed in the past, commencing with those used in reducing the astrographic plates and continuing up to

the present lists for the Cape plates in the south, and the Yale and AG revision plates in the north. In further visual observations of fainter stars, the stars in such lists should be given preference. The reference stars for the astrographic plates have all been re-observed, and it is possible now to improve considerably the plate constants for that work.

Proper Motions. Catalogues of standard stars now give proper motions for all stars, and at Cape, Greenwich, and Washington several thousand proper motions have just been determined for standard stars not in the GC, and for some 4000 stars in the GC. The latter show that the motions for the fundamental stars are not greatly in error, but for the weaker stars the corrections may be rather large. Proper motion work has been continued at Lund, and Prof. Gyllenberg reports that systematic corrections have been determined for 108 old, and more recent, catalogues not used in the GC. These are to be published in 1948. Cincinnati has just published (1946) a catalogue of 2300 proper motion stars. This is the last of a valuable series of catalogues devoted to the proper motion programme inaugurated by Porter. The mass determination of motions of the fainter stars is reported on in Commission 24 and Commission 23. For the *Geschichte* of the southern stars, five of the twenty-four required volumes have been published. It is hoped that the records for this work have been preserved, and that the work may be completed.

A word further should be said in favour of publishing catalogues for a multiple 10-year equinox nearest the epoch of observation. When a position is run to an equinox 10 or 15 years from the epoch without proper motion, as is done generally in observational catalogues, the position becomes quite inaccurate if there is much proper motion; and the precession computed with this inaccurate position is wrong also. The advantage gained in the ease of comparison of many catalogues all at the same 25-year equinox is offset by the inaccuracy in bringing observed positions to that equinox.

The large amount of observational material unpublished is distressing. It is urged that special effort be made to remedy this. The building of new observatories; the construction and testing of new instruments; the completion of reductions; publication; a more exhaustive discussion of observations, for motions in the solar system and for proper motions; and the completion of present programmes, and the continuing of the fundamental work, seem to be our immediate problems.

Instrumental Equipment. The Greenwich Observatory is moving away from the city disturbances at Greenwich to Herstmonceux, where a new transit circle takes the place of the old Airy instrument used since 1851, which is to remain at Greenwich. A horizontal transit instrument has also been constructed; and a mirror transit circle has been designed. The Melbourne Observatory has moved to Canberra. The U.S. Naval Observatory is planning to move away from the city of Washington, and a new 7-inch transit circle is being constructed to replace the 9-inch instrument placed in service by Newcomb in 1865. The Pulkovo Observatory is being rebuilt, and fundamental observations are to be taken up there and at the Nikolaeff, Tashkent, and Engelhardt Observatories, with new instruments. At Pulkovo the photoelectric registration of transits of stars brighter than 5·7 magnitude has been successful (Vol. **59**). At the U.S. Naval Observatory the use of punch-card computing machines for reducing meridian work is proving a great saving of labour. Also the complete photographic registration on the 6-inch transit circle not only saves a very appreciable part of the observer's time and energy, but more especially it makes the records without errors, which observers cannot do.

H. R. MORGAN
President of the Commission

PRÉSIDENT: M. C. B. WATTS, *Astronome au Naval Observatory de Washington.*

PRÉSENTS: G. Armellini, R. d'E. Atkinson, M. Barros, C. S. Beals, D. Brouwer, G. M. Clemence, G. S. da Costa Lobo, A. Couder, R. T. Cullen, A. Danjon, Fleckenstein, A. Gougenheim, E. Guyot, W. Heinrich, C. H. Hins, H. M. Jeffers, A. Kopff, P. Lacroute, W. D. Lambert, M. R. Madwar, G. Meyer, A. A. Mikhailov, M. Maître, F. Moreau, G. F. Mulders, P. Muller, N. E. Nörlund, J. H. Oort, A. Orlov, V. Planelles, A. J. Robertson, G. M. Sisson, H. S. Smith, Sir Harold Spencer Jones, P. Sollenberger, N. Stoyko, W. M. Witchell, M. Zverev.

1ère Réunion (12 août 1948). SECRÉTAIRE: G. M. CLEMENCE.

Le Président donne, d'après les travaux du Dr H. R. Morgan, un aperçu des corrections systématiques des catalogues GC et FK 3. Ces considérations sont résumées à la page 91 du rapport. M. C. B. Watts ajoute que, d'après les observations modernes, il faudrait corriger, d'une manière assez sensible, la constante de la précession. Le Prof. A. Kopff mentionne la publication récente des comparaisons entre le FK 3 et le *General Catalogue.*

Le Président invite les membres de la Commission à exposer leurs travaux d'astronomie méridienne.

Sir Harold Spencer Jones signale que l'on poursuit, en ce moment, à Greenwich, l'étude du cercle méridien de 7 pouces. Aucun programme d'observation ne sera entrepris avant l'étude de cet instrument qui sera installé à Herstmonceux. L'un des premiers programmes à réaliser avec ce cercle méridien sera la détermination des positions des étoiles observables avec le P.Z.T. (Photographic Zenith Tube). En réponse à une question du Président, M. Cullen répond qu'aucune variation saisonnière de la distance focale n'a été constatée.

Le Prof. A. Danjon mentionne les travaux d'astronomie méridienne qui sont entrepris à l'Observatoire de Paris: catalogue d'étoiles de repère de la zone de la Carte du Ciel $+32°$ à $+36°$, en collaboration avec les observatoires de Besançon et d'Uccle. Le Directeur de l'Observatoire de Paris présente un oculaire nadiral qui permet d'observer les fils brillants sur fond sombre. (Cet oculaire a été décrit dans le *Bulletin Astronomique.* Paris, 1946.)

Après avoir rappelé les travaux d'astronomie méridienne réalisés ou entrepris à l'Observatoire Royal de Belgique M. Moreau dit que le Service Méridien d'Uccle envisage l'acquisition d'une lunette zénithale et exprime le vœu que des renseignements soient fournis au cours de cette séance par les astronomes qui construisent ou utilisent la lunette zénithale. En réponse à ce vœu, M. P. Sollenberger expose les avantages du P.Z.T.

Le Prof. A. Kopff signale qu'à l'Observatoire de Bergedorf, on a entrepris l'observation d'étoiles faibles du catalogue Küstner. On envisage surtout les étoiles faibles dont les mouvements propres n'ont pas pu être déterminés à cause des erreurs systématiques. Le Prof. Kopff recommande l'observation de ces étoiles, dont les magnitudes sont comprises entre 8 et 10. Grâce à l'observation de ces étoiles, on pourra déterminer l'équation de grandeur du *Albany General Catalogue.* Sir Harold Spencer Jones souligne l'importance de ce travail, particulièrement en vue du rattachement des étoiles zénithales au système FK 3 et il recommande aussi l'observation d'étoiles faibles de l'hémisphère austral.

Le Prof. Kopff attire l'attention sur l'importance de l'observation des étoiles supplémentaires du catalogue FK 3. Le Président annonce la formation d'une sous-commission, sous la présidence du Prof. D. Brouwer, en vue d'étudier les questions relatives aux étoiles faibles.

Le Dr C. S. Beals mentionne les travaux méridiens réalisés à l'Observatoire d'Ottawa et il propose d'observer les étoiles qui seront utilisées aux lunettes zénithales et qui devront être rattachées au système FK 3. Il insiste sur la nécessité des observations d'étoiles de types B et O de manière à faire la liaison entre les étoiles galactiques et les objets extragalactiques.

2ème Réunion (13 août 1948). SECRÉTAIRE: F. MOREAU.

Le Président a reçu de M. R. Brisse, de l'Observatoire de Paris, une demande de subvention pour la publication de tables classant les étoiles fondamentales d'après les déclinaisons, les grandeurs et d'autres arguments. La Commission reconnaît la valeur, l'intérêt et l'importance de ces tables, mais elle regrette que la situation financière de l'U.A.I. ne permette pas de recommander au Comité Exécutif l'attribution d'une subvention permettant de publier ces tables; la Commission espère qu'il sera possible de reproduire ces tables, par exemple par microfilms.

Le Prof. A. Kopff signale que la pénurie, en Allemagne, de papier de bonne qualité met certains observatoires de son pays dans l'impossibilité de publier des catalogues stellaires. La Commission recommande, sur la proposition du Président et de Sir Harold Spencer Jones, la publication de la revision photographique de l'*A.G. Catalogue*, publication qui a été retardée par suite du manque de papier. La Commission espère que les fonds nécessaires seront alloués par l'U.A.I. pour l'achat du papier.

M. Watts expose brièvement le système d'enregistrement photographique aux micromètres en ascension droite et en déclinaison du cercle méridien de 6 pouces du Naval Observatory de Washington. Il décrit ensuite l'appareil utilisé pour l'enregistrement photographique des lectures aux cercles de déclinaison, ainsi que le dispositif à cellules photoélectriques pour la mesure automatique des films. Le premier de ces dispositifs a été décrit dans l'*Astronomical Journal*, no. 1148 (1946).

Le Prof. A. Danjon demande si ce dispositif à cellules photoélectriques pourrait être appliqué directement au cercle divisé, sans passer par l'intermédiaire d'un film photographique. M. Watts répond qu'il est préférable d'utiliser un film.

M. A. Couder, de l'Observatoire de Paris, décrit brièvement la lunette zénithale visuelle qu'il est en train de construire. Cette description vient de paraître dans le volume publié, à Paris, à l'occasion du centenaire de la découverte de Neptune.

La Commission estime qu'il est important de poursuivre—au delà du volume 7—la publication de la partie sud de la *Geschichte des Fixsternhimmels*; elle espère que les moyens financiers seront trouvés pour continuer ce travail.

3ème Réunion (17 août 1948). SECRÉTAIRE: F. MOREAU.

Le Président demande s'il n'y a pas de remarques à faire au sujet du rapport du Dr Morgan sur l'astronomie méridienne, rapport publié dans les 'Draft Reports', pp. 42–6. Ce rapport est adopté.

Le Dr M. Zverev fait rapport sur les travaux d'astronomie de position en U.R.S.S.: (1) Observation des étoiles supplémentaires du catalogue FK 3 à Poulkovo et Nikolaev. (2) Catalogue de 1334 étoiles du catalogue Poulkovo 1925 d'après 5 observatoires: Poulkovo, Nikolaev, Moscou, Kazan et Tachkent. (3) Catalogue de 2957 étoiles (les étoiles du catalogue 1925 + étoiles Backlund-Hough dont les déclinaisons sont $> -10°$). (4) Recherches du Prof. Pavlov de Poulkovo sur l'application des cellules photoélectriques aux observations de passage. C'est pour ces recherches que le Prix Staline 1947 a été décerné au Prof. Pavlov. (5) Construction par M. Sucharev, d'après l'idée de Ilinic (1935), d'un instrument méridien horizontal semblable à celui présenté, par l'Observatoire de Greenwich, à l'exposition de ce congrès. (6) Une lunette zénithale visuelle qui vient d'être mise en service à l'Observatoire de Poulkovo. (7) Construction près de Kiev d'un grand Observatoire pour l'astronomie de précision. (8) Catalogue d'étoiles faibles; ce catalogue comporte 4 parties: (*a*) Catalogue fondamental de 900 étoiles; (*b*) Catalogue Général de 18 000 étoiles; (*c*) Catalogue de 300 nébuleuses extra-galactiques dont la magnitude $< 13^m$, les positions étant rapportées au système du catalogue général; (*d*) Observations méridiennes de petites planètes spécialement choisies.

Les étoiles observées au cercle méridien ont des magnitudes comprises entre 7·5 et 9·0. Celles observées photographiquement ont des magnitudes comprises entre 8·5 et 10·0. On a choisi les étoiles de type G 5, K et quelques étoiles de type M dont le mouvement propre $< 0''·04$.

Les observations au cercle méridien de Tachkent sont terminées. Celles de l'Observatoire d'Odessa seront bientôt achevées. Les observations photographiques sont faites à Poulkovo, Tachkent et Moscou. La qualité des images des nébuleuses dépend des caractéristiques de l'instrument et de la durée de la pose. Pour les nébuleuses choisies la précision est 20% plus faible que pour les étoiles. M. Zverev exprime le vœu que les autres observatoires entreprennent aussi l'observation des mêmes nébuleuses en utilisant les lunettes photographiques dont ils disposent actuellement, soit des lunettes à grand champ, soit des lunettes à grande distance focale. Il estime que si ces observations étaient répétées à 25 ans d'intervalle, elles seraient fécondes en résultats intéressants.

M. Kopff demande la liste de ces 300 nébuleuses. M. Zverev répond que cette liste a été donnée dans les publications de l'Observatoire de Kazan.

Le Prof. G. Armellini pense qu'il est difficile de déterminer avec précision la position des nébuleuses extra-galactiques. M. Mikhailov répond qu'il y a des nébuleuses à noyau dont la position peut être déterminée photographiquement avec précision; il importe donc de choisir les nébuleuses qui conviennent le mieux.

M. Jeffers parle des travaux entrepris au Lick Observatory où l'on fait des poses photographiques de 2 heures sur des plaques qui couvrent $6 \times 6°$. Le choix des nébuleuses n'est pas encore fait. La distance focale de l'instrument photographique utilisé est 3·50 m. M. Watts demande si ces projets du Lick Observatory sont semblables à ceux de l'U.R.S.S. M. Mikhailov répond qu'effectivement ces projets sont semblables.

La Commission constate avec satisfaction que ces programmes sont en voie de réalisation aux Etats-Unis d'Amérique et en U.R.S.S.; elle espère que ces travaux conduiront à une liaison entre le système des nébuleuses extra-galactiques et celui des étoiles fondamentales. La Commission considère ce travail comme ayant une grande importance pour l'astronomie de position.

M. Atkinson suggère de déterminer la position des amas globulaires. On choisira dans chaque amas quelques étoiles brillantes qui serviront d'étoiles de repère; elles seront choisies de telle façon que leurs mouvements propres relatifs soient négligeables.

Le Prof. Armellini présente ses observations en ascension droite des grosses planètes. Ces observations ont été effectuées avec la lunette coudée Bamberg (90 mm.–95 cm.). Il estime qu'il est avantageux d'éliminer l'influence de la collimation par le retournement de la lunette à chaque passage. M. Moreau fait remarquer que, dans ce cas, les observations sont différentielles; il estime qu'un cercle méridien de plus grande ouverture est mieux approprié pour l'observation des grosses planètes, particulièrement pour Mars et les planètes inférieures qui exigent une bonne définition de l'image à cause de la phase.

Le Président présente un rapport de l'Observatoire de Tokio (1938–47): Observations méridiennes de la Lune, des grosses et de petites planètes—Catalogue de 3000 étoiles zodiacales—Catalogue de 500 étoiles zénithales—Etude comparative des 2 lunettes de passage Bamberg.

Report of combined meeting of Commissions 8 (MERIDIAN ASTRONOMY), 19 (VARIATION OF LATITUDE) *and* 31 (TIME), August 21. 9.30 a.m.

PRESIDING: Sir HAROLD SPENCER JONES.

SECRETARY: PAUL SOLLENBERGER.

The President outlined the history of the Ross photographic zenith tube, saying that it was originally designed for measurement of the variation of latitude by Dr Ross, and later adapted to the determination of time by Dr Littel. The success of the instrument and its possible application to various problems in positional astronomy made it of interest to all three commissions attending the combined meeting.

Dr Schilt said that the zenith tube could not determine fundamental positions, but that it could determine fundamental proper motions in declination with a high degree