

*Field of work.* After discussion of the suggestions of Drs Minnaert and Babcock, Prof. Dingle pointed out that the field of work of Commission 14 was well defined and large enough to work on. On the other hand Commission 14 would always have the need to continue its work in its well-determined field. Prof. H. H. Plaskett suggested, and the Commission agreed, that questions of technique of spectrophotometry should be left to Commission 36, while Commission 12 should also treat theoretical questions about the outer layers of both sun and stars.

### COMMISSION 13. (SOLAR ECLIPSES.)

PRESIDENT: Prof. F. J. M. STRATTON.

SECRETARY: Dr M. MINNAERT.

#### (a) *Coming Eclipses*

At the request of the President, Prof. Sotome gave some information about the possibilities of observing in Japan and offered to give any additional details to all those who were interested. In the best central part there was about 40% probability of a clear sky.

No Russian astronomer being present, Prof. Carroll reported that scientific workers in Russia were anxious to give all possible cooperation; he intended to go himself to Russia this summer, in order to prepare an expedition to Siberia, and he was prepared to get all questions answered which any one should wish to put. Letters about this subject must reach him before the end of August.

This offer was gladly accepted by the President and the whole Commission. To a proposition that the Commission should try to get meteorological and other information and transmit it to the members, Prof. Stratton objected that there was already a commission of the Russian Academy of Sciences, and that we should not anticipate the pamphlet which would shortly appear.

Dr Jackson reported about the weather conditions in South Africa for the eclipse of 1940; these were decidedly excellent; the eclipse came in the nicest part of the year, just after the rain. The only difficulty would be the water supply. For meteorological information one should write to Mr Wood, of the Union Observatory; other information would be gladly given by the speaker himself.

#### (b) *Expeditions notified for 1936*

In addition to the information already printed in the report of the Commission the following observers notified their intention to organize an expedition: Prof. Donitch would travel to the coast of the Black Sea in Asia Minor; the sun is not high there ( $20^\circ$ ), but weather prospects are very good. Information should be obtained from the director of the Meteorological Institute at Ankara. Prof. Donitch would travel himself to Turkey in order to prepare this expedition, and would be glad to ask for any information which other expeditions would like to have.

Prof. Stratton thanked Prof. Donitch, and added that information could probably also be obtained from Prof. Freundlich at Istanbul.

Dr Waterfield was not yet sure whether he would go to Russia or to Japan. He would have 6 Ross lenses of short focal distance and great luminosity, so that he would be able to take about 15 photographs of the corona through varying filters.

The exposures would not be longer than 9 seconds, but could stand a magnification of one hundredfold, and would show practically all the details which are generally recorded only with a very long camera.

Dr Slouka intended to observe in Russia.

Prof. Abetti intended to go to Turkey or to Siberia.

Prof. Carroll would examine the chromospheric lines by interferometer methods, and asked any one having information concerning the widths or the profile of these lines to communicate with him; he was especially interested in the region near *H $\gamma$* .

Prof. Sotome would observe the Einstein effect and study the solar corona.

Prof. Stratton added to the data put in the report, that Drs Royds and Aston intended to join the British expedition.

### (c) *Outstanding Problems*

At the request of Dr Minnaert, Prof. Mitchell reported that the work of Prof. Menzel on the last eclipse was nearly finished, and would appear before long in the Proceedings of the National Academy. Persons interested in it in view of the observations for the next eclipse could probably get advanced proofs.

Prof. Mitchell himself had two reports in preparation: the supplement of his work in the *Handbuch der Astrophysik*, completed up to 1934; and the 4th edition of his book on *Eclipses of the Sun*.

Dr Minnaert explained how Dr Grotrian's theory starts from the hypothesis, that the spectrum of the outer corona is due (1) to light scattered by the electron atmosphere of the sun; (2) to light scattered by the particles at greater distances from the sun and responsible also for the zodiacal light. Any change in the relative importance of these two constituents should appear at the same time in two phenomena: (1) the polarisation and (2) the depth of the Fraunhofer lines in the outer corona. Such changes may occur in streamers, or during the cycle of solar activity.

Prof. Donitch drew attention to the proposition made by him about the distribution of the chromospheric work among various observers, all of them working with a uniform set of instruments, the same dispersion, etc. The idea of this organisation had been proposed long ago by M. de la Baume Pluvinel, and is analogous to the scheme of the *Carte du Ciel*. He had published a paper on the subject in the *Bulletin of the Roumanian Academy*.

Prof. Mitchell thought that as the eclipses are so few it would be hardly useful to develop such an organisation.

Mr Davidson thought that individualism in eclipse work was still very great and that it would not be advisable to interfere with it. Eclipse observers mostly work with apparatus borrowed and collected from different institutes, and it would therefore be very difficult to standardize these.

Prof. Donitch asked if any one could give him an explanation of the dark crescents observed by him on objective-prism spectrograms. But no one of the persons present had noticed the phenomenon or could explain it.

A second meeting of the Commission was held later to hear Prof. Gerasimovič who had in the meantime arrived from Russia.

At the request of the President, Prof. Gerasimovič gave an account of the work done by the Russian astronomers. Already two years ago an eclipse commission had been formed and new instruments had been bought, partly in Russia and partly abroad. Five or six parties investigated the conditions for observation along

the different parts of the belt of totality; geodetical and other parties were asked to communicate all possible details. The Meteorological Institute at Leningrad prepared a meteorological study which was not yet published, but on which the pamphlet written by Profs. Gerasimovič and Ščerbakova was based. There would be about 10 or 12 official expeditions; money had been granted, coelostats had been constructed in Russia; 6 coronagraphs of the same type would be used along the belt of totality, each of them having a focal distance of about 5 m., so that it would be possible to detect small changes taking place in the corona during totality.

The Pulkovo Observatory would have two expeditions: (1) Near Orenburg, where the chromosphere would be studied by a quartz spectrograph, and by two other spectrographs also for the infrared part of the spectrum; a prismatic camera would be used for the investigation of the microstructure of the chromosphere. (2) Near Omsk, where the corona would be photographed by two or three Ross lenses, a coronagraph and two spectrographs for spectrophotometric and polarisation work.

The Abastuman Observatory and the Kharkov Observatory will work in the Caucasus.

In the lower Volga, there would be an expedition from Moskva Observatory and a smaller one from the Moskva Astronomical Society: at Kustanai, an expedition of the Engelhardt Observatory for spectrophotometry of the chromosphere and photometry of the corona; at Kansk and Tomsk, expeditions from the Leningrad Institute; at Krasnoyarsk, a second Moskva expedition; at Bratsk, an expedition from Leningrad under Prof. Noumerov; at Alexandrovsk an expedition from Moskva for the Einstein effect; at Khabarovsk, a normal coronagraph.

Prof. Stratton thanked the Russian astronomers for the enormous amount of work they had done on behalf of all eclipse observers, and was glad to learn that so many Russian expeditions would be sent out. Many would envy the amount of money put at their disposal. The coronal observations along the belt of totality would be completed by the work of Horn d'Arturo in Greece and of others in Japan.

At the request of Prof. Shapley, Prof. Abetti, Mr Davidson and others, Prof. Gerasimovič gave some information concerning travelling in Russia. The Trans-siberian railway and the Orenburg line are quite reliable: from Moscow to Omsk takes 69 hours. On August the 1st, a young astronomer would go to Orenburg in order to see the place and speak with local authorities; eight possible sites had been selected along the railway line; all scientists wishing to have questions answered, should give them at once to Prof. Gerasimovič, who would send them directly to Russia. The Russian astronomers had asked the Academy of Sciences to obtain a reduction of the railway fares for eclipse expeditions, and although he could not say anything definite, he was pretty sure that a great reduction would be obtained. The railway fares indicated in the pamphlet could be reduced to American dollars by dividing by a factor of about 4. It would be advisable that expeditions should associate with Russian expeditions, especially in view of language difficulties. The Russian astronomers would try to have some agreement with Intourist, but every expedition should write to Prof. Gerasimovič or the Russian Eclipse Commission, not to Intourist. The main thing was that a complete list of persons should be communicated, with all details necessary for a passport; indications about baggage, assistants wanted for the work etc. were also necessary. In the trains, second class was recommended.

Near the Black Sea, morning fogs might occur. The conditions are excellent at the lower Volga, slightly less good at Orenburg and slightly less still at Omsk, but

these differences are small. Towards the East, the conditions grow worse. In winter time, however, the eastern part has a good clear sky.

Prof. Stratton again thanked the speaker and his Russian colleagues, and closed the meeting.

#### COMMISSION 14. (WAVE-LENGTHS.)

PRESIDENT: Prof. A. FOWLER.

SECRETARY: Dr W. F. MEGGERS.

Prof. Fowler expressed regret at the absence of Messrs Babcock, Burns, Kayser and Nagaoka.

In opening the discussion on sources of the primary standard, Prof. Fowler presented the following extracts from a communication which had been forwarded by Mr Babcock:

"The preliminary specifications adopted by the I.A.U. in 1925 are a simplified description of the Michelson lamp, naming the conditions which were at that time considered necessary and sufficient by Prof. Fabry himself. Even by implication they do not suggest a substitute for the original lamp. It goes without saying that a vacuum tube provided with internal electrodes is not intended for use with high frequency, but rather with the customary well-known type of excitation. In any case, before amending our specifications so as to prohibit high frequency excitation, at least three laboratories should agree that this is necessary."

"Dr Meggers has stated that it has not yet been demonstrated that the simplified specification of 1925 will yield a wave-length identical with the primary standard, and has criticised the selection of 200,000 waves as the limit. But the experience both of Fabry and Pérard has shown that, regardless of theoretical considerations concerning the width of the red line, any Michelson lamp that yields well-measurable fringes at 200,000 waves retardation is in fact sufficient for reproducing the primary standard well within the limits of our knowledge of its value."

"Since the cadmium line is decidedly more difficult and troublesome to reproduce with extreme accuracy than are certain lines in the spectra of the rare gases, and since its absolute value is not known with such high precision as can be attained in comparative measures of suitable lines, and since we have such excellent secondary standards in neon and krypton, there is no justification *at present* for attempting to refine the specifications for the primary standard beyond such a limit as will insure its reproduction within about 1 part in 10 million. For such higher accuracy as may be reached in *relative* measurements the rare gases are practically always used anyway."

"Even under normal conditions of operation Pérard has found that Michelson lamps show a self reversal of the red line which is observable with retardations a little greater than 200,000 waves. This is a sufficient basis for the choice of that number as a criterion."

"As regards the specifications adopted in 1927 by the I.C.W.M., which Dr Meggers advocated as a description of Michelson's lamp, we find that continuous current excitation is permitted. This is a definite departure from Michelson's procedure. As a matter of policy, precise agreement by at least three laboratories would seem to be required before the I.A.U. should adopt such a change, particularly since the results obtained at the Reichsanstalt and by Pérard seem not to be in complete