The Total Solar Eclipse of Aug. 31, 1932

By Prof. F. J. M. STRATTON

THE belt of totality of the solar eclipse of Aug. 31, 1932, starts north of Siberia, and, after passing within about 300 miles of the north pole, crosses Canada and New England, and ends in the middle of the Atlantic Ocean. In Canada the track runs from the southern end of Hudson Bay south-east across Quebec, the central line crossing the St. Lawrence River at Yamachiche, where there is a Marconi wireless station (Fig. 1). The south-westerly boundary of the belt of totality passes

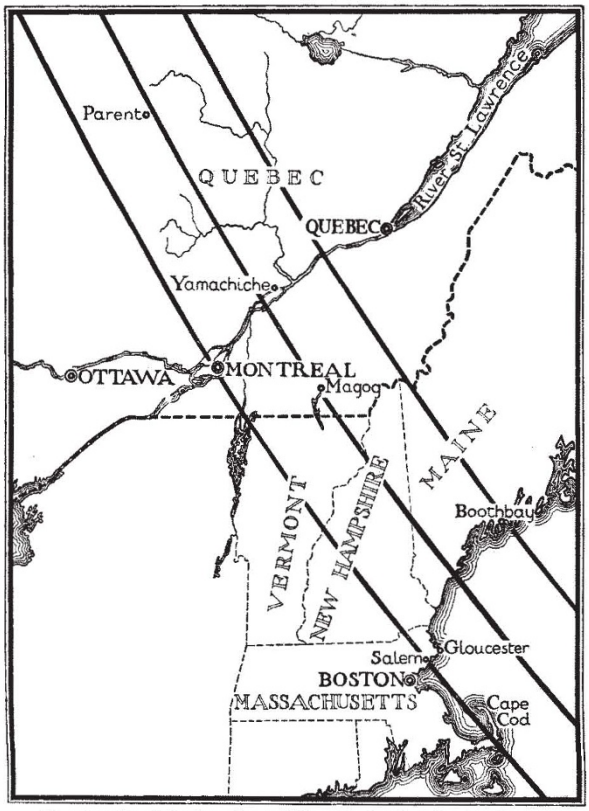

FIG. 1.—Track in Canada and New England of the total solar eclipse of Aug. 31, 1932.

through Montreal, and reaches the Atlantic coast between Salem and Gloucester; Boston is outside the belt, Cape Cod within it; the north-eastern boundary reaches the coast close to Boothbay in Maine.

Observations of the weather conditions between Aug. 16 and Sept. 14 at the hours of the eclipse have been made for a number of years at more than a hundred stations. Prof. F. Slocum, following Prof. D. Todd, has organised this work for the past five years and discussed the results (see NATURE, May 3, 1930, p. 673). There is no very marked difference between conditions in different sections of the track, and everything points to equal chances at any station that may be selected.

No details are available of the plans of the various American eclipse parties which will be distributed through Vermont, New Hampshire, and Maine, but it is understood that Prof. S. A. Mitchell, of the Leander McCormick Observatory, will be stationed at Magog in southern Quebec. Three British expeditions are being sent to Canada under the auspices of the Joint Permanent Eclipse Committee of the Royal Society and the Royal Astronomical Society. Dr. J. Jackson and Mr. C. R. Davidson, from the Royal Observatory, Greenwich, will join Prof. Meldrum Stewart, of the Dominion Observatory, Ottawa, at Parent, a station on the Canadian National Railway north of the St. Lawrence River; Prof. H. Dingle, of the Imperial College of Science, will work at the Macdonald Physics Laboratory of McGill University in Montreal, on the edge of the eclipse belt; Prof. F. J. M. Stratton, Dr. R. O. Redman, and Mr. C. P. Butler, of the Solar Physics Observatory, Cambridge, with Prof. J. A. Carroll, of the University of Aberdeen, will be stationed at Magog in southern Quebec. They will be joined by Dr. J. S. Foster and Miss Douglass (and possibly several others) from McGill University, Prof. G. H. Henderson, of Dalhousie University, Dr. C. S. Beals, of the Victoria Observatory, and by several of those who are making the preliminary tour of Canadian and American observatories, organised by the assistant secretary of the Royal Astronomical Society; among others, the master of Caius, Dr. F. W. Aston, Dr. W. Hall, Dr. Haughton, Dr. H. Knox-Shaw, Dr. W. J. S. Lockyer, Dr. W. H. Steavenson, and Mr. A. D. Thackeray are expected to join the Cambridge party, and to help in the observations of the eclipse.

The programmes of the three British expeditions are as follows:

(1) The Greenwich expedition will take photographs of the corona with the 6-inch lens of 45 ft. focal length lent by Mr. Worthington for use at the eclipse at Alor Star in 1929. Objective prism spectra of the chromosphere and of the corona will be secured with a telescope of 7 in. aperture and 21 ft. focal length, with a 45° prism placed before the object-glass. The range of spectrum on a curved film will be from λ3600 to λ6800. A fourth attempt will be made—the previous attempts having been frustrated by bad weather conditions—to obtain a comparison of the intensities of the *H* and *K* lines with those of the Ca^+ triplet at λ8600 at different heights in the chromosphere. The remaining instrument is to be a grating slit spectrograph, which will be used for a study of the spectrum of the chromosphere and corona from λ4500 to λ9000—the dispersion will be 17 A. to the mm. All the four instruments will be fed with beams from cœlostats.

(2) Prof. Dingle's objects at this eclipse are to study the bright line spectrum at the cusp with high dispersion, and the Fraunhofer spectrum at

the limb just before and just after totality. Prof. H. F. Newall and Prof. A. Fowler, from observations made in England at the eclipse of April 1912, showed what interesting results might be expected from observations of a nearly total eclipse or from observations at the edge of the belt of totality, confirming suggestions made by Mr. Evershed in 1903. Hitherto bad weather has frustrated all attempts to carry out such investigations, while the interest of the problem has only been increased by the study of spectral changes in wave-length at the sun's limb. Prof. Dingle is using a Littrow spectrograph with two 60° prisms backed by a plane Rowland grating (used in the first order), working with a 4 in. lens of 16 ft. focal length. The region of the spectrum to be examined will be λλ4200-4400, with an average dispersion of 0·6 A. per mm. The limb will be studied for about five minutes each side of totality, and the cusp for about half an hour beforehand and half an hour afterwards.

(3) The programme of the Cambridge expedition will be mainly a repetition of investigations prevented by clouds at the eclipses of 1927, 1929, in Norway, Siam, and Kedah. The polarisation of the corona will be studied by a double tube camera of 54 in. focal length, with a large nicol prism placed in front of one tube. The dependence of the polarisation on wave-length will be examined by a double-image one-prism spectrograph fed by an image-forming lens of 2 ft. focal length. The Hills quartz spectrograph will be used for a study of the ultra-violet spectrum of the chromosphere, with especial reference to the intensities at varying solar levels of the lines of the Balmer series and of the continuous spectrum at the head of the series. In the case of the corona, the chief study with this instrument will be the distribution of the radiation of the continuous spectrum. The results obtained with this spectrograph will be checked by a spectrum of different dispersion obtained from a 6 in. concave Rowland grating, used in the stigmatic position with a reflecting collimator. The range of spectrum to be covered will be λλ3200-4600.

The continuous spectrum of the outer corona will be studied with a 19-inch Common mirror of 50 in. focal length and a one-prism spectrograph with Aldis collimator and camera lenses of aperture 4 in. working at *f*/3. An objective interferometer will be used to study the wave-length of the green coronal line and movements in the coronal gases, in particular the rotation of the corona. The latter problem will also be attacked with the 4-prism spectrograph mounted on a polar-heliostat and used for that purpose by Prof. Newall in Sumatra in 1901.

A moving plate objective grating spectrograph with a slit in the focal plane radial to the sun's limb will be used for spectrophotometric study of the flash spectrum at different levels over the range λλ4100-4700. The grating will be a 6 in. plane grating fed by a Cooke photovisual lens of 6 in. aperture and 20 ft. focal length. A second objective grating will, it is hoped, be used for plates stained with xenocyanin and sensitive over the range λλ8600-10600, while a slit grating spectrograph will be used with plates stained with mesocyanin for the region centred at λ8600. The various instruments are being fed with beams from two cœlostats and Sir Francis McClean's 21-in. siderostat. The Hills siderostat will be used by the observers from McGill University for a grating spectrograph of high light-gathering power.

Finally, the 8 in. cœlostat of the Royal Irish Academy will feed the 4 in. lens of 19 ft. focal length lent by the same body, to secure direct photographs of the corona, and the 4 in. direct-vision prism of the Royal Observatory, Edinburgh, will be placed in front of the lens at the beginning and end of totality for objective-prism spectra of the flash, while Dr. Lockyer will take direct photographs of the corona with a camera lens of 4 in. aperture and 28 in. focal length.

The Lucasian Professors at Cambridge

THE Lucasian professorship of mathematics at the University of Cambridge, from which Sir Joseph Larmor retires at the end of September after holding it with distinction since 1903, is the third oldest chair of mathematics in Great Britain. The chair of geometry at Gresham College, London, was founded in 1596, the Savilian professorship of geometry at Oxford dates from 1619, while the Lucasian chair was founded in 1663, the same year in which the Royal Society received its second charter. It was founded through a bequest by Henry Lucas, who had studied at St. John's College, Cambridge, and after having served as secretary to the Earl of Holland, chancellor of the University, was elected to represent the University in Parliament. In his will he directed his executors to purchase land to the value of £100 a year to provide for the stipend of a professor of mathematics. Lucas died in London on July 22, 1663, and that same year the deeply learned and much travelled Rev. Isaac Barrow (1630–1677), already professor of Greek and Gresham professor of geometry, and afterwards master of Trinity, was elected first Lucasian professor.

Barrow took his duties seriously from the first, and immediately after his appointment, "the better to secure the End of so noble and useful a Foundation, he took Care that himself and his Successors should be obliged to leave, yearly, to the University ten written lectures". His opening oration was delivered on March 14, 1664, and the lectures he gave during the next five years formed the substance of his "Lectiones Opticæ et Geometricæ", 1669, and his "Lectiones Mathematicæ", published six years after his death. But divinity had stronger claims for Barrow than even mathematics, and having already seen and acknowledged the superior abilities of his pupil Newton, in 1669 he resigned in his favour.

Newton was twenty-seven years of age when