

learn, will be occupied by the American astronomers. So far as we know at present, the Lick Observatory will send a party to Chili under the direction of M. Schaeberle, while Prof. Pickering will also direct other observers somewhere about the same spot. To the north of the Argentine Republic, and on the railway which runs up from Buenos Ayres, there seems to be another spot which would be available. This place, Rosario de la Frontera, lies to the north of Tucuman, and to the south of Jujuy, its approximate position being longitude $65^{\circ} 7'$, latitude $25^{\circ} 48' S$. The duration of totality here amounts to 3m. 8s., the local time of its commencement being April 15, 20h. 40m. This place should, if possible, be made use of, for, besides being easily accessible, the probabilities from all accounts seem to be in favour of fine weather. From observations gathered from the nearest meteorological station, Salta, the mean annual temperature is found to be $63^{\circ} 6 F.$, and the rainfall 22.8 inches; the chances for clear weather at this season being estimated at two-thirds.¹

Following the track of the shadow across Brazil, no suitable spots are reached until the coast is approached; the most favourable place here is no doubt Fortaleza or Ceara, the capital of the province of Ceara, and a city of 20,000 inhabitants. Para Curu is also another very favourable point, lying nearly in the centre of the line of central eclipse; its position is longitude $38^{\circ} 30'$, latitude $3^{\circ} 42' S.$, and the local time of the beginning of the eclipse is April 15, 23h. 40m., the time of its duration being 4m. 44s.

With regard to the weather in this neighbourhood, the chances for clear skies seem, unfortunately, very small. The rainfall is reckoned as over 100 inches per annum, while even in April 10 inches has been usually recorded. For the last five years fifteen days on an average in this month have been rainy, the number in one year reaching twenty-one.

Taking into account the easy accessibility of the place, and its important position on the line of totality, it seems desirable that at any rate there should be some observers there.

Following the shadow over the Atlantic Ocean, we arrive at the shores of West Africa, on which probably both French and English expeditions will take up their respective positions. The accompanying map (Fig. 2) shows the coast-line of this region; AB, CD, and EF indicating the line of central eclipse and the northern and southern limits. The places which seem at present to be the most favourable are Joal and Palmerin, on the coast, if observations there are more convenient than others made inland.

The prospect of fine weather seems to be more probable here than in America. December, January, and February are the cloudy months, the weather during March and April being usually fine; the rains begin about May; sometimes tornadoes occur at intervals of five or six days, being accompanied by heavy rain, lasting generally from one to two hours, leaving the atmosphere afterwards bright and clear. The wind called the "Harmattan" during the first three months of the year is generally from the north-east and dry. It comes from the Sahara Desert, and brings with it consequently minute particles of sand, tending to give the atmosphere a yellowish tint. In April the prevailing wind is westerly to north-westerly, and not usually very strong.

The route which the English expedition will take has up the present not been definitely settled. Several lines of steamers run to Teneriffe and Grand Canary, and if one of Her Majesty's ships picked the expedition up at Teneriffe and carried them either to Bathurst or directly to the Salum River, the matter would be simplified; but

failing this the only available route seems to be that by the British and African Steam Navigation Company. These steamers, touching at Madeira, Teneriffe, Grand Canary, Goree, and Dakar, naturally require much time to get to Bathurst. Of the return conditions it seems impossible to get any information at present.

Taking into account the accessibility and proximity to the line of totality, perhaps Palmerin and other places on the same river (River Salum) offer the greatest advantages. The bar at the mouth of the river would prevent a man-of-war of deep draft from proceeding up the river. As the region here is all under French protection, the necessary official letters will of course have to be obtained.

There are one or two other points relating to this region if it should by any chance be ultimately settled upon. Luxuries in the way of tea, sugar, milk (condensed), cocoa and milk, condiments, wine or spirits, flour, biscuits, soups, and preserved meats, should all be brought from England; rice, fowls, sheep, goats, and bullocks being always procurable from the native villages.

Cement and lime should also be taken out, and it seems probable that the huts for the instruments should be constructed at home and carried out there in pieces. The necessary housing of the observers (and escort, if any) would not prove very difficult, for either room could be found in the villages, or bamboo and grass huts could be quickly run up by the natives; it might be advisable to take one or two small tents, as they might prove very serviceable just after landing.

With regard to the packing of the necessary instruments, it may be said that the carriers' loads vary from 40 to 65 pounds; a case capable of being slung on a bamboo can weigh as much as 250 pounds, while to carry a weight of one hundredweight the services of two men would be required. Their wages would, of course, depend on whether they were obtained from Bathurst or the trading wharf on the river at the point of disembarkation, as in the latter case they could be discharged as soon as the selected spot had been reached.

UNIVERSITY OF DUBLIN: TERCENTENARY CELEBRATION.

THE celebration of the tercentenary of the University of Dublin will begin on Tuesday next, and all the necessary arrangements have now been made. Neither the Great College Hall nor the Chapel have been found large enough to hold the number of guests who have accepted the invitation of the Chancellor of the University (Earl of Rosse) and the Provost of Trinity College (Rev. Dr. Salmon), and it has been deemed necessary to hold the Commemoration Service in the Collegiate and Cathedral Church of St. Patrick, and the ceremony of the presentation of addresses in the Leinster Hall, the largest covered area in Dublin. In this hall the College banquet will be given, and the students have also engaged it for a University ball, which is to bring the festivities to a close.

It is expected and hoped that most of the invited guests and delegates will arrive in Dublin in the course of Monday evening, July 4, as the reception by the Provost of Trinity College will be held at 10 o'clock on the Tuesday morning, and immediately after this ceremony the members of the three classes of University officers with the members of the Senate, the other graduates and the undergraduates, will accompany the guests and delegates from the Examination Hall of Trinity College to St. Patrick's Cathedral, a distance of about a mile. Should the weather be fine and the procession properly marshalled, the general effect promises to be as fine as it will in the streets of Dublin be novel.

¹ The information for the most part concerning the American stations is gathered from Mr. H. S. Pritchett's article, "The Total Solar Eclipse April 15-16, 1892," in the June number of *Astronomy and Astro-Physics*.

In the afternoon of the same day there will be a garden party in the College Park, to which upwards of three thousand persons have been invited, and the day will close with the performance by the members of the University Choral Society of an ode written by G. F. Savage-Armstrong, and set to music by Prof. Sir Robert Stewart, and by the civic ball.

On the Wednesday morning there will be a special Commencements for the conferring of honorary degrees. The Grace has already passed the Senate for eighty-three degrees, being a number equal to one-third of the total number of the expected guests and delegates. Among those on whom the degree of Doctor of Letters is to be conferred is Prof. Max Müller. The following will receive the degree of Master of Engineering: Lord Armstrong, Sir Benjamin Baker, Sir Isaac Lowthian Bell, Sir Charles William Wilson. The degree of Doctor of Sciences will be conferred on Prof. J. Burdon-Sanderson, Prof. Michael Foster, Prof. Ludimar Hermann, Sir George Murray Humphry, Prof. Julius Kollmann, Prof. Alexander Macalister, Prof. Richet, Prof. Sir William Turner, Wilhelm Waldeyer, Rev. Prof. Thomas George Bonney, Rev. William Henry Dallinger, Sir Archibald Geikie, Othniel Caleb Marsh, Baron Adolf Eric Norden-skiöld, Abbé Alphonse François Renard, John Hall Gladstone, George Downing Liveing, Lord Rayleigh, Prof. Joseph John Thomson, Prof. Thomas Edward Thorpe, Prof. William Augustus Tilden, Francesco Brioschi, Prof. Luigi Cremona, James Whitbread Lee Glaisher, Paul A. Gordan, Edward John Routh, George H. Darwin, Simon Newcomb, Isaac Roberts, F. Tisserand. The following are those who have been selected for the degree of Doctor of Medicine: H.R.H. Duke Charles of Bavaria, John Shaw Billings, Thomas Bryant, Sir Andrew Clark, Adolf Gusserow, Jonathan Hutchinson, Prof. Thomas Grainger Stewart. On the same day there will be a garden party at the Viceregal Lodge in Phoenix Park, given by His Excellency the Lord-Lieutenant and Lady Zetland, and in the evening the College banquet will be held in the Leinster Hall. Five hundred, including all the guests and delegates, have been invited.

Thursday, July 7, there will, in the morning, be a procession, from the Examination Hall of Trinity College to the Leinster Hall, of the College authorities and the delegates and others, to witness the presentation of addresses to the University by the delegates. A delegate from each country will make a short address, and the following have been invited to take their share in this interesting ceremony:—

Great Britain, her Colonies and Dependencies.—Sir James Paget, Bart., F.R.S.

America.—Prof. O. C. Marsh, of Yale University.

Austria-Hungary.—Prof. A. Vámbéry, of Buda-Pesth.

Belgium.—Prof. V. D'Hondt, of Ghent.

Denmark.—Prof. M. H. Saxtorph, of Copenhagen.

France.—Prof. Lannelongue, of Paris.

Germany.—Baron Ferdinand von Richthofen, of Berlin.

Holland.—Prof. Tiele, of Leyden.

Italy.—Prof. Gaudenzi, of Bologna.

Norway.—Prof. Hagerup, of Christiania.

Russia.—Prof. Wedenski, of St. Petersburg.

Switzerland.—Prof. Kollmann, of Basle.

Cambridge.—Dr. Peile, Vice-Chancellor.

Oxford.—Rev. Dr. Boyd, Vice-Chancellor.

On the evening of this day there will be a dramatic performance by the students of the College, the piece selected being Brinsley Sheridan's comedy, "The Rivals." In the afternoon there will be a garden party at the Royal Hospital, Kilmainham, given by the Right Hon. the Commander of the Forces in Ireland and Lady Wolseley.

The ceremonies will be brought to a close on Friday,

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on which day the following have been asked to address the College students: Profs. W. Waldeyer, Berlin; F. Blass, Kiel; A. Vámbéry, Buda-Pesth; F. Max Müller, Oxford; L. Cremona, Rome; B. J. Stockvis, Amsterdam; Léon Say, Paris; and General F. A. Walker, Massachusetts. The Athletic Union will hold their annual sports in the College Park and the University ball will be given in the afternoon and evening of this day.

On Saturday, July 9, the Royal Society of Antiquaries of Ireland have organized an excursion to Kells, the many objects of great antiquarian interest of which can easily be inspected within the limits of a short day from Dublin; the excursionists will leave the Great Northern Railway Station at 9 o'clock a.m., and return by the train reaching Dublin by 5.30.

Every information can be obtained on writing to the Hon. Secretaries of the Tercentenary Committee, Trinity College, Dublin.

EXHIBITION AT NÜRNBERG BY THE GERMAN MATHEMATICAL ASSOCIATION.

THE following prospectus will show the scope and object of this Exhibition:—

Deutsche Mathematiker-Vereinigung.

München, Mai 1892.

From September 12 to 18, 1892, the meetings of the "Deutsche Mathematiker-Vereinigung" and of the "Gesellschaft deutscher Naturforscher und Aerzte" will be held at Nürnberg.

At the proposition of the "Mathematiker-Vereinigung" the arrangement for an exhibition of models, drawings, apparatus, and instruments used in pure and applied mathematics is proposed. The project has secured the support of the Royal Bavarian Government.

The undertaking already enjoys the co-operation of a number of competent men of science, of several mathematical institutes of our colleges, besides that of various prominent publishers and well-known technical establishments, and thus we may hope that the exhibition will answer the expectations of its founders, viz.:

To open to wider spheres the various auxiliaries used in the instruction and investigation of both pure and applied mathematics in the shape of models, apparatus, and instruments and to forward the interests of this kind of scientific work.

At the request of the committee of the Mathematiker-Vereinigung I have the honour to invite you to participate in the exhibition, and to recommend to your special attention the following directions:—

I. Die mathematische Ausstellung gelegentlich der Versammlungen der "Deutschen Mathematiker-Vereinigung" und der "Gesellschaft deutscher Naturforscher und Aerzte" in Nürnberg will last from September 10 to 18, 1892. It comprises mathematical models, drawings, apparatus, and instruments serving both for teaching and research in pure and applied mathematics.¹

II. The local committee of the Gesellschaft deutscher Naturforscher und Aerzte resp. the direction of the Bayerische Gewerbemuseum attends to the gratuitous granting of space required by the exhibitors.

III. The Deutsche Mathematiker-Vereinigung takes charge of all furniture, tables, screens, &c., attends to the opening and packing, also for supervision and care during the exhibition and

¹ In what belongs to the applications, we include only those having principally a mathematical interest. Concerning the experimental part of physics and those instruments, &c., which are of more practical use, it should be mentioned that all those more practical than theoretical relations will be displayed in a second exhibition, separate from ours, which comprises likewise the other branches of natural philosophy and the medicine.

That exhibition, entitled "Fachtechnische Ausstellung," under the authority of the "Gesellschaft deutscher Naturforscher und Aerzte" is arranged by the "Bayerischen Gewerbemuseum in Nürnberg," under the direction of Mr. Th. von Kramer, who has issued special programmes for that exhibition, and from whom further information may be obtained.