

## The Liverpool Meeting of the British Association.

## LOCAL ARRANGEMENTS.

AN elaborate programme of excursions to places of interest and visits to works has been arranged by the Local Committee. Dealing first with the general excursions, on Thursday, September 13, it is intended that a visit shall be paid to the biscuit works of Messrs. W. and R. Jacob and Co., Ltd., to the United Alkali Works at Widnes, the flour-mills of Messrs. W. Vernon and Sons, Ltd., and the Liverpool Corporation electric power-station, when some of the largest and most up-to-date plant will be inspected. The White Star Line is also inviting a party to view the s.s. *Adriatic*. On Friday, September 14, visits are arranged to Messrs. Bryant and May's match works, to the dyeing and cleaning works of Messrs. Johnson Bros., Ltd., and to the shipbuilding yards of Messrs. Cammell Laird and Co., Ltd. The Cunard Steamship Co. is inviting a party to inspect the s.s. *Franconia*.

On Saturday, September 15, there will be a whole-day excursion to Chester and the River Dee, including a visit to Eaton Hall, by kind permission of the Duke of Westminster. Another whole-day trip will be to the Dolgarrog works of the Aluminium Corporation, Ltd., the party, after inspecting the works, proceeding to Bettws-y-Coed and the Snowdon district. A visit, also occupying the whole day, has been arranged to the Liverpool Waterworks at Lake Vyrnwy.

Of a more general type there will be a day excursion to the Isle of Man, and also by sea to Llandudno and Beaumaris. There will also be a two-day tour (Saturday and Sunday) to the Lake District. On Sunday, September 16, there will be a general excursion by sea to Llandudno and Beaumaris.

On Monday, September 17, visits will be paid to one of the works of the British Insulated and Helsby Cables Co., Ltd., Messrs. Lever Bros.' Soap Works at Port Sunlight, and to the works of Meccano, Ltd., and to the Union Cold Storage, Ltd. A party will also be shown the Liverpool housing scheme, and the Liverpool Salvage Association is inviting those interested to view their plant. The Booth Steamship Co., Ltd., is inviting a party to inspect the s.s. *Hildebrand*.

On Tuesday, September 18, a party will visit the Gladstone Dock and other works of the Mersey Docks and Harbour Board, the Llay Main Colliery near Wrexham, Planter's margarine works at Bromborough Pool, and the large bobbin works of Messrs. Wilson Bros. at Garston.

Of the sectional excursions at present arranged, Section A will visit the Automatic Telephone Manufacturing Co., Ltd., the British Oxygen Co. (Bootle works), and Stonyhurst College; Section B, the United Alkali Co.'s works at Widnes, the Highfield Tannery at Runcorn, Price's Patent Candle Co. at Bromborough, the lactose factory at Haslingden near Crewe, and Messrs. Joseph Crosfield and Co.'s works at Warrington.

Section C will go to Hall Road and Crosby on the

north of Liverpool, Storeton Quarries, Burton Point and North Wirral, Lake Vyrnwy district, parts of Flintshire, the Lea Green Collieries and Brick Pits, and Scarth Hill and Skillaw Clough.

Section D is proposing to go a dredging expedition in Liverpool Bay, and to Delamere Forest. Section E is visiting the Liverpool Docks, Storeton, Burton Point and North Wirral, and a river trip to the Eastham Locks of the Manchester Ship Canal, and down the Mersey to the Crosby Channel.

Section F intends to visit the Liverpool Docks and the Cotton Exchange. Section G has arranged one excursion only, and that is to the Gladstone Dock. Section H will inspect the Roman remains at Chester, and will also visit Ince Blundell.

Section I has arranged no sectional excursions.

Section J has one excursion only, namely, to Rainhill, where the County Lunatic Asylum is situated.

Section K is planning to visit the Craven limestone district, Mr. Bulley's gardens at Neston, and the West Lancashire sand dunes near Freshfield. Section L has arranged no excursions. Section M will visit Wirral Farms and Messrs. Gartons, Ltd., at Warrington, and Haslington and the Nantwich district.

Large as this list of sectional excursions appears, if one is to judge from the experience of previous meetings it will be found to have increased by the date on which the meeting commences.

A list of all these excursions and visits will be sent, a short time before the meeting, to members who have intimated their intention of coming to Liverpool, and it will greatly facilitate the work of the Local Secretaries if members will intimate in advance which excursions they would wish to join.

At the close of the meeting in Liverpool there will be an excursion to the Isle of Man, leaving Liverpool on Wednesday, September 19, and returning on Monday, September 24. The party will have an opportunity of visiting all places of scientific interest in the island, but probably members of Sections E and H will find most to study. A special committee in the Isle of Man is making all arrangements, and details will, it is hoped, be completed by the opening day of the meeting in Liverpool.

Although perhaps it does not so much concern the actual members of the Association, yet a definite item in the programme of the meeting is the series of public lectures. The number of these it is proposed to give in Liverpool will be greater than in any town previously visited by the Association, and further, one will be given in Bootle, Wallasey, Birkenhead, Runcorn, Warrington, Wigan, and, St. Helens, while two lectures to young people will be given in Liverpool and one in Birkenhead and Warrington. It is the hope of the Local Committee that these lectures will prove a great success, and so develop one of the prime objects of the Association, namely, to promote interest in science and its applications.

ALFRED HOLT.

## International Hydrography.

MANY abortive attempts were made before the War to found an international hydrographic organisation, but success was not achieved until after the War, when a conference was held in London, in 1919, at the invitation of the British Admiralty, with the cordial support of the French hydrographic office. Twenty-one states were represented at the conference, invitations having been sent to all countries likely to

be interested, with the exception of the Central Powers, Russia, and Turkey. As a result an International Hydrographic Bureau was instituted in 1921, and all the States represented at the conference have now associated themselves with it. The Bureau has its official seat at Monaco. Soon after its institution it became affiliated to the League of Nations, and it uses the official languages of the League, namely,

English and French. Its three chief officials are Sir J. D. Parry (Great Britain), Admiral Phaff (Netherlands), and Captain Müller (Norway), the first-named being president. It confines itself to hydrography in the strictly nautical sense of the word, and one of its chief objects at present is the international standardisation of practice in relation to many maritime matters. For example, in relation to charts, among the questions which arise are those of the type of projection, the scale, the choice of units for depth and distance, the mode of delineation of soundings, the symbols and abbreviations, and the geographical names to be used. Lists of lights, sailing directions, and distance tables are other matters on which more uniformity and co-operation would be advantageous. It may be noted that most countries now use metric units for depth, Japan being one of the latest formally to adopt this system, though it has not yet actually introduced it. Great Britain and America are now the only States which exclusively use the fathom and foot, but the change to

the metric system is one which they are as yet unwilling to make, because of the great difficulty and cost of altering the copper plates from which are printed the exceptionally large number of charts which these countries produce.

The Bureau has recently started a journal, the *Hydrographic Review*, of which the first number appeared in March last. It is bilingual, all its contents being duplicated in English and French, on opposite pages. A large part of the first issue is devoted to the history of the inception of the Bureau, and other official matters. The chief original articles consist of two reports on aerial photography as applied by the French and Netherlands services to hydrographic surveying and the discovery of shoals and covered rocks. There is also a discussion of the visibility of lights, considering the chances which a sailor has of sighting a given light in different circumstances at various distances, and a brief report on echo sounding as practised by the United States hydrographic department.

### The Age of the Earth.<sup>1</sup>

SINCE the advent of our knowledge of radioactive processes, the old controversy over the age of the earth has been revived, and although there is now a marked change of opinion in favour of the longer estimates, it remains unfortunately true that there still appear to be tantalising discrepancies between the results from different methods. These discrepancies may be mitigated or exaggerated by special pleading, but they still stand in the way of an unequivocal settlement of the problem.

Twenty years ago various attempts were made to squeeze geological history into the narrow limits imposed by Kelvin and Tait. The discovery of radioactivity, and more recent advances in the study of stars and tidal friction, have destroyed the value of the older physical evidence, leaving various geologists committed to what are now seen to be absurdly low figures. In the last decade the geological methods have in turn been widely criticised, and the present tendency is greatly to extend the estimates formerly favoured. All the methods adopted depend on the rate of processes at present in operation. In order that the different lines of evidence should converge, it is necessary to suppose either that the rates of geological processes are at present too high, or that those of radioactive processes are too low, to justify integration over the whole duration of geological time.

In the symposium under consideration, held in Philadelphia on April 22 last year, the chief feature of interest is Chamberlin's spirited attempt to show how the geological estimates may be brought into harmony with the revised deductions from radioactivity and astronomy. The period required for the deposition of the whole of the sedimentary column or for the accumulation of salt in the oceans is easily arrived at from existing data on the assumption that present rates provide a characteristic average. There is now little doubt that this assumption is deceptive, and it certainly can no longer be admitted. De Geer's work on the yearly deposits from glacial waters in Sweden, though an exceptional case, suggests to Chamberlin a Glacial epoch fully twenty times as long as that assigned by the old methods. He further expresses the conviction that breaks in the continuity of more normal sediments, the time-values

of which are best judged by comparison of the faunas above and below, must, when finally interpreted, greatly extend the simple arithmetical estimates. It has frequently been shown how denudation and deposition must be quickened up by human activities, and the effects of cultivation and excavation have been ably analysed by Dr. Sherlock in his recent "Man as a Geological Agent." Existing conditions also naturally favour a high rate of denudation, since continental elevation and breadth are both exceptional, and to these may be added the further consideration that broad areas are strewn with easily removable glacial deposits. So variable are the factors involved that there is no means of arriving at average rates which would properly include long periods of sea-transgression and base-levelling, periods when denudation was brought almost to a standstill.

The validity of the method based on the accumulation of salt in the oceans depends partly on the rate at which the present streams are carrying sodium down to the sea—a rate which must be too high for reasons already mentioned—and partly on the irreversibility of the process. It has, of course, been generally recognised that sodium returns to the land in interstitial solutions held by sediments and as wind-borne salt, but other possibilities have been less emphasised. Actually it is found that the data used are inconsistent among themselves unless other cyclic processes are involved. The most serious discrepancy is found in the ratio of sodium to chlorine, which in igneous rocks is about 30 : 1 and in the oceans about 1 : 1.8. When volcanic exhalations are taken into consideration this enormous difference is reduced but by no means wiped out. Clarke and Washington have given figures which include the whole of the atmosphere and hydrosphere, and the discrepancy still remains as high as 20 : 1.

There can be only one explanation: that chloridised sodium plays a far greater part in cyclic action than has yet been detected. In the case of potassium such circulation is all-important and is effected by its greater retention by muds and soils. Dr. Milton Whitney writes, "Ocean shore deposits would undoubtedly absorb NaCl up to the point where the colloids were in equilibrium with sea water," but as to the relative efficiency of this and analogous processes there is still no exact knowledge. The sodium method is thus, as Chamberlin says, "not yet ready to render a verdict." As to the sedimentation method,

<sup>1</sup> From the Geological View-point. By T. C. Chamberlin. From the Paleontological View-point. By J. M. Clarke. From the Point of View of Astronomy. By E. W. Brown. The Radioactive Point of View. By W. Duane. (Proc. Amer. Phil. Soc., vol. lxi., No. 4, pp. 247-88, 1922. Philadelphia.)