

The Liverpool Meeting of the British Association.

PROGRAMMES OF THE SECTIONS.

THE provisional programmes of the various Sections of the British Association, for the meeting to be held at Liverpool on September 12-19, show that the meeting will be of decided scientific importance and interest. It will be noticed that a number of distinguished men of science from abroad are attending the meeting and taking part in discussions.

We are indebted to the Recorders of the Sections for the subjoined outline of arrangements made for sectional papers, joint discussions, lectures, excursions, and other means of recording progress and promoting critical consideration of methods, results, and principles.

SECTION A (MATHEMATICS AND PHYSICS).

The proceedings in Section A this year give promise of being exceptionally interesting and valuable, mainly because an unusually large number of distinguished foreign visitors are expected to take part. Several countries will be thus represented; France, America, Denmark, and Holland. In addition to this, Canada will have representation in the sectional president, Prof. J. C. McLennan, whose address on "The Origin of Spectra" will form an opening for a series of papers on cognate subjects, "The Correspondence Principle," by Prof. N. Bohr, "Remarks on Quantisation," by Prof. P. Ehrenfest, and "The Structure of Atoms and their Magnetic Properties," by Prof. P. Langevin, whose promised visit will compensate for his inability to attend last year on account of illness. These papers will be taken on Monday, September 17.

On the first working day, Thursday, September 13, there will be a discussion, jointly with the Sections of Chemistry and Engineering, on "Cohesion and Molecular Forces," to be opened by Sir William Bragg. This will be followed by a paper by Prof. C. G. Darwin—who has just returned from Pasadena—in which he will describe the important recent work of Prof. A. H. Compton on the scattering of X-rays. The remaining principal item on the programme will be a sectional discussion on "The Spectra of the Lighter Elements" on Tuesday, September 18. This will be opened by the president, and contributions will be made by Prof. Bohr and Prof. A. Fowler, and, probably, Prof. R. A. Millikan.

Among the individual papers which will be read may be mentioned contributions by Sir O. Lodge on "Matter and Radiation," Prof. R. W. Wood on "The Effect of Weak Magnetic Fields on the Polarisation of Resonance Radiation," and Mr. G. Stead and Miss B. Trevelyan on "The Production of Triatomic Hydrogen."

There will be papers on meteorological subjects by Capt. D. Brunt and Mr. F. J. W. Whipple, and one by Dr. A. T. Doodson on tides in relation to meteorology. Papers relating to the mathematical representation of experimental results have been accepted from Mr. T. Smith, Prof. H. Levy, and Mr. H. W. Moore.

The afternoon of September 14 will be devoted to demonstrations, including Mr. W. M. Mordey's alternating magnetism experiments and Mr. S. G. Brown's "Frenophone" or friction-operated loud-speaker.

SECTION B (CHEMISTRY).

The programme of Section B covers a wide range of subjects. The president, Prof. F. G. Donnan, will deal with the physical chemistry of interfaces, and the same subject will be followed into detail in a joint

discussion between Sections B and I on membranes. A second joint discussion has been arranged with Sections A and G, the subject being cohesion and molecular forces. This will be opened by Sir William Bragg, Dr. Rosenhain, and Dr. A. A. Griffith, and an attempt will be made to bring together the physicists, the metallurgists, and the engineers in a consideration of the processes of rupture of metal test-pieces and similar matters.

There will be a group of papers on the theory of the atom, Prof. G. N. Lewis opening with an account of the chemical applications of the quantum theory, followed by Dr. Sidgwick on the Bohr atom and the Periodic Law, Dr. Coster treating the same subject from the spectroscopic side. Dr. Hevesy will give an account of his most recent work on the chemistry of hafnium. An echo of last year's discussion on photochemistry will be heard in the form of a note on the biochemical effects of polarised light from Prof. Baly's laboratory. Dr. E. F. Armstrong will open a discussion on enzymes, to be contributed to by Dr. K. G. Falk, and there will be notes on certain new points in the chemistry of cotton and of rubber. On the last morning of the meeting, Senator Ginori Conti will give an account, illustrated by slides, of the progress now being made in Northern Italy in the use of volcanic steam for technical purposes.

Other papers deal with the formation of precipitates, the functions of active hydrogen atoms in organic compounds, and the nature of the alumino-silicates. Liverpool being an important chemical centre, there will be a number of excursions of special interest to the Section.

SECTION C (GEOLOGY).

The Section will meet under the presidency of Dr. Gertrude L. Elles, whose address will be entitled, "Evolutional Palæontology in relation to the Palæozoic Rocks," and will, by her desire, be followed by a discussion. Local geology will figure largely in the programme: Prof. Boswell will give an address on the geology of the Liverpool district, and Sir Aubrey Strahan will open a discussion on the changes in the geography of the district during Pleistocene and recent times and their possible bearing on the development of Chester by the Romans and their total neglect of the now much superior waterway of the Mersey estuary. Other local papers are by Mr. C. B. Travis, on recent geological changes on the Northern Shore of the Mersey Estuary; Mr. T. A. Jones, on the Middle Bunter sandstones and their pebbles; and Miss M. Workman, on the Permian rocks of Skillaw Clough.

A discussion on metamorphism will be opened by Dr. J. S. Flett.

Other papers include Prof. Kendall on isostasy and the Pleistocene levels of Britain; Prof. Boswell on the geology of the East Denbigh Moors; Prof. Hickling on the tectonics of the Lancashire coalfield; Dr. R. L. Sherlock on British rock salt deposits; Mr. G. Slater on ice phenomena in Spitsbergen; Mr. K. W. Earle on the geology of the Windward and Leeward Islands; and Mr. C. P. Chatwin on a new gastropod fauna from the Chalk.

Numerous excursions to places of geological interest will take place during the meeting, including an examination of the Upper Ordovician and Lower Silurian rocks of the Vyrnwy district and a whole day excursion to Holywell and other parts of Flintshire.

SECTION D (ZOOLOGY).

Prof. J. H. Ashworth, president of this Section, will take as the subject of his address "Modern Zoology: its Boundaries and Some of its Bearings on Human Welfare."

In drawing up the programme of the Section, Liverpool work in zoology, oceanography, and tropical medicine has been borne in mind. The whole of Friday, for example, will be devoted to marine zoology, comprising contributions from Dr. Johs. Schmidt, of Copenhagen, who will give a popular lecture on the scientific work of the Danish exploration steamer, the *Dana*, illustrated by cinematograph; from Dr. Mortensen and Mr. Kramp, both of Copenhagen; from Prof. Johnstone, on Rhythmic Change in the Plankton; from Prof. Dakin, who will discuss the theory of Pütter regarding animal nutrition; and from Mr. Storrow, Dr. Marie Lebour, Mr. Hardy, Mr. Carruthers, Mr. Clark and Mr. Chadwick.

On Tuesday morning there will be a series of papers bearing on the problem of the determination of sex, the contributors being Dr. Crew, Prof. Dakin and Mr. Burfield, Mr. Huxley and Prof. Carr-Saunders, Dr. Heslop Harrison, Mr. J. R. Baker, and Dr. Parkes. During one of the sessions, Prof. Hickson will open a discussion on the systematic position of the Nematoda, and Profs. MacBride and Goodrich, and Dr. Baylis, will take part in the discussion. Mr. Huxley will give a semi-popular lecture on the physiology of development in the frog; Prof. Ashworth will make a contribution on the life-cycle of Rhinosporidium; Prof. Cole will explain some new points which he has brought to light in regard to the anatomy of Myxine.

Other contributors to the sectional proceedings will be Mr. J. T. Cunningham on the origin of adaptations; Prof. Poulton on a new case of mimicry; Dr. Heslop Harrison on polyhedral disease in the vapourer moths; Miss Dorothy Jackson on the Biology of a Braconid parasite of the pea-weevil; Mr. Peacock on parthenogenesis in saw-flies; Mr. Speyer on complex Aphid life-histories; Mr. Hewer on colour changes in the common frog; Dr. Baylis on the host-range of parasitic nematodes; Prof. Blacklock on two tropical disease-carrying flies; Prof. McIntosh on some points relating to polychaetes; Mr. Graham Cannon on the post-naupliar development of an Estherid crustacean; Dr. Grove on sexual congress in earthworms; Miss Breeze on invasion of the tissues of the higher plants by protozoan parasites.

A whole-day trip on the Lancashire and Western Sea Fisheries Committee's steamer, the *James Fletcher*, should be of interest to marine biologists, and a half-day in Delamere Forest should prove attractive to entomologists.

SECTION E (GEOGRAPHY).

The programme of Section E will open on September 13 with the address of the president, Dr. Vaughan Cornish, who will speak on the geographical position of the British Empire. The remainder of the morning will be occupied by papers explaining the local geography of the Liverpool district. Papers of this nature have been a feature of Section E for some years, and have been appreciated by visitors from a distance. In view of the location of this year's meeting, endeavours have been made to secure contributions dealing with Imperial geography, a question affecting the world-wide interests of Liverpool. Mr. O. H. T. Rishbeth will speak on Australian railway development, Miss B. S. Hosgood will discuss

post-War emigration from the British Isles, and Mr. W. H. H. Arden-Wood will contribute a paper on the alluvial lands in India in relation to man and his activities. Other papers include the historical geography of Belgium, by Prof. L. W. Lyde, the Alps of Chinese Tibet, in which Prof. J. W. Gregory will deal with the important results of his recent journey, and the high plateau of Brazil by Mr. R. R. Walls. Rev. W. Weston will give a lantern lecture on the influence of geographical environment on the characteristics of the Japanese, and Prof. J. L. Myres will lecture on the Marmora region. Two joint discussions have been arranged with Section H, on the place of man and his environment in the study of the social sciences, which will be opened by Prof. J. L. Myres; and with Section L, on geography as a basis for a general science course, which will be opened by Sir Richard Gregory. Several excursions of geographical interest have been arranged, and there will be an exhibition of maps of the district prepared by members of the Liverpool Regional Survey Association.

SECTION G (ENGINEERING).

The subject of the presidential address in this Section is "Transport and its Indebtedness to Science"; a new departure is being made by devoting the remainder of the morning (Friday, September 14) to papers on various branches of the same subject by experts in these several branches; Mr. Berriman, of the Daimler Co., will deal with road transport; Mr. Wall, of Liverpool, with sea transport; Mr. O'Brien, of the L.M. and S. Rly., with rail transport; and Gen. Sir Sefton Brancker with air transport.

On the morning of Thursday, September 13, Section G joins with Sections A and B in a discussion on "Cohesion and Molecular Forces." In the afternoon a joint discussion is being held with the Psychology Section on the subject of "Vocational Tests in the Engineering Trades," to be opened by a paper by Messrs. Fleming and Brocklehurst, of the Metropolitan-Vickers Electric Co.

Monday, September 17, is being devoted mainly to papers on mechanical and general engineering, while most of the papers on electrical engineering will be read on Wednesday, September 19. Tuesday morning begins with a joint discussion with the Education Section, on "The Teaching of Dynamics," opened by Sir J. B. Henderson; the remainder of the morning is to be devoted to the report of the committee on complex stresses, which includes a number of important papers by various members of the committee.

Among the papers to be read on Monday and Wednesday are the following: The conservation and control of our national water resources, by Mr. J. Parry; the recent developments in excavating machinery, by Mr. Barnes, of the Ruston Hornsby Co.; smoke abatement, by Mr. Kershaw; the electric propulsion of ships, by Mr. Clough, of the British Thomson-Houston Co.; and high-power mercury rectifiers, by Mr. Morrison. All these papers deal either with subjects of great importance at the moment or with those on which great advances have recently been made.

Capt. Slee, of the Marconi International Marine Communication Co., will describe the recent developments in the application of wireless telegraphy to shipping; and Mr. Scott-Taggart will read a paper on receiving apparatus for broadcast reception. Prof. W. M. Thornton will read a paper on the mechanism of gas ignition, and will describe a new method of lighting coal mines which greatly reduces the danger of explosion.

Dr. T. F. Wall will describe a new type of induction motor which, although of the squirrel-cage type, has many of the advantages of a slip-ring motor. Prof. Marchant will read two papers, one on a method of improving the wave-shape of an alternator, and the other on the triple-frequency currents which occur in the earth-return of three-phase cables. A paper on water turbines is being read by Dr. H. Mawson, and another on the strength of forked connecting rods by Mr. W. J. Kearton.

SECTION H (ANTHROPOLOGY).

Mr. Percy E. Newberry's presidential address to the Section will be on "Egypt as a Field of Anthropological Research," and will deal with the origins of Egyptian civilisation, showing that its elements are not all native to the soil. Mr. Newberry will also deal *inter alia* with aspects of Egyptian culture in opening a discussion on "The Origin of Domesticated Plants and Animals." A second organised discussion in a joint session with the Geographical Section will deal with "The Place of Man and his Environment in Sociological Studies," to be opened by Prof. J. L. Myres. Sir Arthur Evans will embody, in a consideration of "Crete as a Stepping-stone of Early Culture," some extremely important discoveries recently made by him in that island. Mediterranean archaeology will also be represented by two communications from Mr. Stanley Casson on "The North Aegean Coast in the Bronze Age" and "Prehistoric Sites in the Dardanelles and Bosphorus."

In British archaeology several papers will deal with Welsh prehistory, including a general survey by Prof. H. J. Fleure, and an account of "The Hill-forts in North Wales and their Historical Background," by Dr. R. E. Mortimer Wheeler. Prof. E. Ekwall, of Lund University, will discuss "The Early History of Lancashire in the Light of its Place-names."

In ethnography, Mrs. Scoresby Routledge, in "Mangarevan Folk-lore," will give an account of some results of her recent expedition to the Austral Islands and Mangareva; Mr. E. Torday will describe the methods of native traders in Central Africa, and will give an account of Hungarian folk-music, with instrumental and vocal illustrations. Mr. Torday has also arranged for a band of Hungarian gypsy musicians to perform at an evening soirée. This will give added interest to Dr. John Sampson's paper on "The Origin and Early Migrations of the Gypsies." The Near East will also be represented by Baron F. Nopsca's account of "House-building and House Implements in Northern Albania." Among a number of other interesting communications, space will permit mention only of an account of the culture of the stone-using peoples of Central Celebes by Dr. A. C. Kruij, who has recently returned from an expedition of scientific investigation in that island.

SECTION I (PHYSIOLOGY).

The scope of Section I, comprising, as it does, physiology, histology, experimental pathology, experimental biology, and a good deal of biochemistry, is very wide, as the list of papers shows. The presidential address by Prof. G. H. F. Nuttall, on "Symbiosis in Animals and Plants," is a good example of this broad outlook. One of the most attractive items on the programme is a lecture on "Insulin and its value in Medicine," by Prof. J. J. R. Macleod, who has been closely associated with this remarkable discovery of the treatment of diabetes, made in his laboratory in Toronto by Prof. Banting

and Dr. Best. On the medical side there are also papers by Dr. S. Monckton Copeman, of the Ministry of Health, on "Diet and Cancer"; by Prof. J. M. Beattie, on "The Action of Finely Divided Particles of Slate, etc., on Toxins"; by Prof. H. E. Roaf and Dr. F. W. Edridge-Green, on colour vision; and by Dr. M. C. Grabham, on "Dental Caries at Porto Santo."

The more academic aspects of physiology are represented by papers by Prof. H. Zwaardemaker of Utrecht, on "Bioradioactivity and Humoral Environment"; Prof. R. Magnus, of Utrecht, on "The Action of Carbon Dioxide and Adrenaline on the Bronchi and Pulmonary Vessels"; Prof. H. E. Roaf, on "The Analytical Mechanism of the Cochlea"; Prof. J. S. Macdonald, and collaborators, on the physiology and energetics of walking; Prof. J. S. Macdonald and Dr. F. A. Duffield, on the physiological cost of cycling; Dr. W. Waller, on the "Red Blood Corpuscles"; and Prof. C. Lovatt Evans, on the "Contraction of Plain Muscle."

The more physical and chemical side will take the form of a discussion, with the Chemistry Section, of "The Physico-Chemical Properties of Membranes in their Relation to Physiological Science," and papers by Dr. S. C. Brooks (representing the American Association) on "The Electrolytic Conductance of Micro-Organisms"; Dr. E. B. R. Prideaux, on "Membrane Potentials"; Mr. T. C. Angus, on "A Recording Katathemometer"; Prof. W. Ramsden, on "Coagulation of Albumin at Free Surfaces"; Prof. W. Ramsden and Mr. J. Brooks, on "Factors determining which of Two Liquids form the Droplets of an Emulsion"; Prof. W. Ramsden, on "Adsorption Films"; Dr. R. Coope and Prof. W. Ramsden, on clinical chemical tests; and Prof. H. E. Roaf, on "The Oxygen Content of Methæmoglobin." Some of these will be of the nature of demonstrations, and histology will be represented by a cytological demonstration by Prof. Charles E. Walker and Miss F. M. Tozer.

SECTION J (PSYCHOLOGY).

The psychological topics to be discussed this year in Section J are, in the main, similar to those presented last year at Hull. A large number of the papers have a definite and practical bearing on education and industry. Special stress is placed in several papers on the importance of individual differences. This is explicitly so in the presidential address by Mr. C. Burt entitled "The Mental Differences between Individuals—with special reference to Applied Psychology in Education and Industry."

The connexion between psychology and other sciences is again clearly shown by the titles of the joint discussions. With Section F (Economics), "The Inter-connexions between Economics and Psychology in Industry" will be discussed; and an endeavour made to study the psychological factors entering into the economic field. With Section G (Engineering), "Vocational Tests for Engineering Trades" will be described. With Section L (Education), "The Delinquent Child" will be studied—the papers dealing largely with a classification of the commoner delinquencies according to their psychological nature.

A glance at the programme shows that there are two topics of great interest both to education and to industry which receive special treatment, namely, (1) vocational guidance and vocational tests; (2) mental efficiency and fatigue. Important in this connexion will be the results presented by research workers of the National Institute of Industrial Psychology, notably in a paper on "The Conception

of Fatigue," by the director of the Institute, Dr. C. S. Myers.

In addition to the sessional programme, a series of afternoon lectures and lectureries have been arranged; and a Citizens' Lecture entitled "Skill in Work and Play" will be given by Prof. T. H. Pear.

SECTION K (BOTANY).

This Section will meet under the presidency of Mr. A. G. Tansley, whose address will deal with "The Present Position of Botany." Most branches of botany are well represented in the programme, and, as in recent years, papers of a cognate nature will be grouped together so far as possible. The only joint discussion arranged this year is one on "Virus Diseases of Plants," in which Sections K and M will meet. This discussion will be opened by Dr. Paul Murphy, who will be followed by Prof. H. M. Quanjer, the eminent Dutch investigator of these curious maladies. One morning session will be devoted to morphological problems, including papers by Dr. D. H. Scott and Prof. Lang on the organisation of vascular plants considered in the light of fossil history. Prof. Seward will speak on the Cretaceous floras of Greenland. Plant physiology will again be strongly represented, among others, by Dr. F. F. Blackman on "Oxidation and Respiration," by Prof. Dixon on the "Extraction of Sap by means of Compressed Air," and by Prof. V. H. Blackman and his colleagues on "The Effect of Electric Currents on Plant Growth." A discussion will take place on "The Effect of Soil Sourness on Plants," in which most of the chief British ecologists will take part. There will be a considerable number of papers on cytology and mycology, also communications on floral morphology by Miss Saunders and Prof. J. McLean Thompson. In addition, a large number of papers of a miscellaneous nature will be presented. The popular lecture will be given this year by Dr. W. L. Balls on the appropriate subject of "Cotton."

Several interesting excursions have been arranged, including visits to the West Lancashire sand dunes and to Ingleborough. As in the last few years, opportunity will again be afforded for the display of botanical specimens of special interest in one of the rooms of the Section.

SECTION L (EDUCATIONAL SCIENCE).

The president of the Education Section for the meeting at Liverpool is Dr. T. P. Nunn, principal of the London Day Training College, who is taking as the subject of his address "The Education of The People"; following the examples of his two predecessors, Dr. Nunn wishes the address to be followed by a discussion, and this will be opened by Prof. Campagnac. The first paper on Thursday, September 13, will be read by Prof. O. Jespersen, of Copenhagen, a scholar of wide reputation, upon "Grammar and Logic," and a large audience is expected to hear him. The morning of Monday, September 17, will be devoted to a joint meeting of psychologists and educationists to discuss the subject of "The Delinquent Child." The chair at this meeting will be taken by Mr. C. Burt, psychologist to the London County Council and president of the Psychology Section, who has made a special study of the problem; he will be followed by Dr. Gordon, of Bath, Dr. Potts, and Miss Crossland. This discussion, which arises out of that upon psycho-analysis last year at Hull, is expected to be one of the most popular of the meeting. On the afternoon of the same day, there will be a joint discussion with the Section of Geography on geography as a basis for

a general science course. The report of a committee appointed last year upon this subject will be presented.

On Tuesday, September 18, Bishop Welldon, Dean of Durham, will raise the question in a paper as to how far the value of education in elementary schools has corresponded with the increase of expenditure upon it, and it is probable that a very animated discussion will follow the paper.

During the past two years, several Sections have tried the experiment of having semi-popular lectures in the afternoons. The Education Section is following this example at Liverpool, with a paper upon "The Education of Children in Music," by Dr. C. S. Grundy, who will be assisted by a full professional orchestra, kindly arranged by Messrs. Rushworth and Dreaper, of Liverpool. There will also be a paper by Miss Margaret Einert upon "Rhythmic Dancing," illustrated by a demonstration. Each of these papers will be read at 5 o'clock, the former on the Thursday, the latter on the Tuesday afternoon.

Other topics to be considered are education and business life, the older children in elementary schools, literary appreciation in elementary schools, and the teaching of dynamics.

SECTION M (AGRICULTURE).

The meetings of Section M will be held under the presidency of Dr. C. Crowther, principal of the Harper Adams Agricultural College, whose address on "Science and the Agricultural Crisis" will be given in the morning of Thursday, September 13. Two papers from Dr. Stenhouse Williams and his co-workers at the National Dairy Research Institute at Reading will precede the president's address. After the address Mr. Hay will read a paper on agricultural economics and the development of agricultural education.

On Friday, September 14, the work of the Section will begin with two papers on frit-fly problems by Dr. Fryer and Mr. N. Cunliffe, and these will be followed by a joint discussion with Section F (Economics), in which the subject will be "The Economic Outlook for British Agriculture." The speakers in this discussion will include Mr. Forrester and Mr. A. W. Ashby.

On Saturday it is proposed to visit the Lactose Factory at Haslington, and typical cheese-making farms of that area later in the day.

The following Monday morning will be devoted to papers dealing with problems of interest from the side of physical science. The local sectional secretary, Mr. E. Rideout, will speak on the soils of Wirral, and Prof. Sven Oden, of Stockholm, on his apparatus for the mechanical analysis of soils. Different aspects of the soil water and of the soil solution will be dealt with by Mr. E. A. Fisher, of the University of Leeds, and by Prof. Hoagland and Prof. Burd, of the University of California. In the afternoon an excursion will be made to farms of the Wirral peninsula.

The concluding day of the meeting will be devoted to a discussion with Section K (Botany) on the virus diseases of plants, at which the principal speakers will be Dr. Murphy, Dr. Quanjer and Dr. Brierley, followed by a paper by Mr. G. D. Miln, of Messrs. Gartons, on the commercial value of indigenous strains of pasture grasses. Mr. Atkins and Mr. Fenton will discuss the relation of soil acidity to the natural distribution of certain pasture plants. The work of the Section will conclude with a visit to Messrs. Gartons' seed establishment at Warrington, which should form a fitting conclusion to what promises to be a sectional meeting of exceptional interest.