The programs of our meetings always announce some papers which have a scientific bearing on agriculture, forestry or some kindred line of business. As our members are specialists, it is fitting that we have each year a number of addresses of a general nature, such as summaries of progress, methods of experimenting, methods of teaching certain subjects, short syllabi of courses of study, and new points of general interest. These will be understood and will interest all, and will be likely to provoke a general discussion by the members.

The work of this Society during the past twenty years has apparently had a marked influence on the selection of subjects for discussion in some of the societies of this country. As an instance of the practical tendency of these subjects, if I may so express it, I cite you the admirable address of Vice-President Gage a year ago before Section F, of the A. A. A. S. at the Columbus meeting on 'The Importance and Promise in the Study of Domestic Animals.' Here are two sentences: "It is most earnestly believed, however, that in the whole range of zoology, no forms offer a greater reward for the study of the problems of life, especially in the higher groups, than the domestic animals. The importance of the study cannot be over-estimated from a purely scientific standpoint, and certainly if the prosperity, happiness and advancement of the human race are put in the count the subject is of transcendent importance."

Reference of a like nature might be made to numerous programs of scientific societies, to courses of study in colleges and univerties, to contributions to the best scientific journals of the day, but no argument on the subject is needed at this time, for the reason that no observing person can be found in this audience who does not already recognize the truth of the statement that I have last made.

I thank you for the high honor of choosing me president for a third time, and congratulate you on the excellent prospects for a successful meeting on this, its twentieth year, and predict that a long and useful career yet remains for the Society for the Promotion of Agricultural Science.

W. J. Beal.

Agricultural College, Mich.

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*THE BRITISH ASSOCIATION.**

For the second time, after a lapse of 27 years, the British Association will meet in Bradford in the beginning of September. Not a few of those who attended the first meeting are still alive, some of them being among the most distinguished of our living men of science. There is no doubt that a certain number of those who attended the previous meeting will again be present in Bradford next month. They will notice a very great change in the town; it has grown enormously; it has been to a large extent rebuilt; and it has been raised to the dignity of a city, while its population has probably doubled. Bradford will have much to show to those who are interested in the many practical applications of science. There will be abundant hospitality, receptions, dinners, a smoking concert, excursions to places of interest in the neighborhood, and other forms of entertainment for those—and they are many—who regard the annual British Association meeting as a gigantic picnic.

The meeting of 1873 was presided over by Professor A. W. Williamson, the distinguished chemist, whose presidential address consisted mainly of a review of the progress of chemistry up to that date. The advance in this, as in other directions, since then has been enormous. The president selected at the previous meeting had been the late distinguished physicist, Dr. Joule, but owing to the state of his health he had to forego the honor of presiding at the first Bradford

* A forecast from the London *Times*.

meeting and his place was taken by Professor Williamson. Among some of the well-know representatives of science who were present at the Bradford in 1873, and who are now no more, we may mention the names of Cayley, Clifford, H. J. S. Smith, W. Spottiswoode, Clerk-Maxwell, Balfour Stewart, W. B. Carpenter, John Phillips, Gwyn Jeffreys, Rutherford Alcock and Dr. Beke. The economic section was presided over by W. E. Forster, and it is of some interest to note that the present popular assistant general secretary, Mr. George Griffith, occupied the same position in 1873 that he does now, although for several years in the interval he ceased to be an officer of the Association. The first Bradford meeting had an attendance of close on two thousand, and the grants made for scientific research reached the considerable sum of £1685.

The second Bradford meeting will be presided over by Professor Sir William Turner, who for so long has filled with such distinction the anatomical chair of Edinburgh University. His address will consist of a general review of the progress of Biology, with special reference to our knowledge of the structure and function of cells. The program of work in the different sections leads one to expect that the proceedings will be of considerable scientific interest.

The president of Section A (Mathematical and Physical Science) will be Dr. Joseph Larmor, F.R.S. In opening the business of the section Dr. Larmor will review the change of ideas which has recently become current regarding the scope and method of physical explanation. The acceptance on the Continent, in consequence of the brilliant work of Hertz, of the views originated in England regarding the nature of electric actions and their dependence on the ether has been largely accompanied by an elimination of the dynamical explanations which formed a main feature of Clerk-Maxwell's theory. This makes it a matter of fundamental importance to determine, if possible, how far purely descriptive methods can avail without appeal to a dynamical foundation; it involves consideration of the mode of representation of the physical activities of the material atoms; and it raises the question whether denial of direct action at a distance necessarily implies transmission by simple stress such as occurs in a material elastic frame. As chairman for the department of Astronomy, Dr. A. A. Common will give an address on Friday morning. Monday will be devoted to Meteorology and Pure Mathematics, while a discussion on ions will be introduced by Professor Fitzgerald on Tuesday.

Section B (Chemistry) will be presided over by the distinguished chemist Professor H. W. Perkin. The subject of his address will be 'The Modern System of Teaching Practical Inorganic Chemistry, and its Development'; and, after discussing the progress which has been made in the teaching of practical chemistry in schools, he will point out that during the last thirty years very little similar progress has been made in teaching inorganic chemistry in universities and colleges. Having shown that the system adopted at the present day is practically the same as that taught thirty years ago, Professor Perkin will next proceed to give a historical sketch of the development of this system, and will conclude his address with a discussion of the question whether the present system is the best and most suitable for teaching practical inorganic chemistry, or whether it might not with advantage be considerably modified. The greater part of the time of the Section will be devoted to discussions on (1) the chemistry of camphor, to be opened by Dr. Lapworth; (2) the questions raised by recent work on metals and alloys, to be opened by Mr. W. H. Neville, F.R.S., of Cambridge, in the course of which it is

to be hoped that the important question "What is a metal?" may be settled; (3) the recent developments in connection with asymmetric structure in carbon and other compounds, to be opened by Mr. W. J. Pope, of the Central Technical College; and (4) the recent improvements in the textile industries (including artificial silk, etc.), to be opened by Dr. Liebmann. Among other papers promised are: 'Some Recent Work on the Diffusion of Gases and Liquids,' by Mr. Horace T. Brown; 'Determination of the Spectra of Gases at 400° C.,' by Professor Dixon; and 'On the Relationship between the Heating and Lighting Power of Coal Gas,' by Mr. T. Fairley. A paper of great local interest will be one on the treatment of woolcombers' effluents, by Mr. W. Teach; while the relations of phosphorus, iron, and carbon when present in iron and steel will be discussed by Mr. J. E. Stead, of Middlesbrough. Papers have also been promised by Professor Smithells, Dr. Laurence, Dr. J. B. Cohen, and Mr. F. W. Richardson. Professor Ewing and Mr. Rosenhaim will show slides illustrating the effects of strain and annealing on the crystalline structure of metals.

The Geological Section (C) will have as its president one of the most unconventional and brilliant of the younger geologists—Professor W. J. Sollas. The subject of his address will be 'Evolutional Geology.' The transformation of the science during the latter part of the 19th century, by which its scattered teachings have been organized into a compact body of doctrine and the whole science placed on a more philosophic basis, will be briefly alluded to. An account will be given of the development of the earth, including its early evolutional stages, which were once considered alien to geology. Its distribution in time will be particularly considered, and the dates of various critical periods in its history will be discussed.

As befits the *locale* of the meeting, the Section will devote especial attention to the carboniferous rocks, and particularly to the coal measures. One of the important events of the meeting will be a joint discussion with the Botanical Section (K) on the conditions which existed during the growth of the forest which supplied the material for coal. This is set down for Monday, September 10th, and the discussion will be opened on behalf of the geologists by Mr. A. Strahan, of her Majesty's Geological Survey (who for some time past has been engaged in supervising the mapping of the coal fields of South Wales), and Mr. J. E. Marr, F.R.S., a past-president of the section. It is expected that several other prominent geologists who have devoted attention to the coal measures will take part in this discussion. The same rocks will form the subject of a paper by Mr. Walcot Gibson, of her Majesty's Geological Survey, who will deal with their rapid changes in thickness and character in the North Staffordshire coal field; and Mr. W. Cash, of Halifax, will also contribute a paper on the Lower Coal Measures of the West Riding. The fossil fishes of the local carboniferous rocks will be discussed in two papers by Dr. E. D. Wellburn, and the report of the committee for investigating life-zones in our carboniferous rocks will be presented by the secretary, Dr. Wheelton Hind. Another topic of general as well as of local interest which will receive the attention of the section is the underground water system in the carboniferous limestone districts of the West Riding. The Association last year made a grant of £40 to assist in the investigation of the underground course taken by streams which disappear into crevices of the limestone in the neighborhood of Ingleborough. By the free use of chemicals the committee appointed to carry out this investigation has traced the under-

ground course of some of these waters to their issue in springs at lower levels, with unexpected results, which throw much light on the general question of the percolation of waters through rock-fissures. The committee will present its report during the meeting, and excursions are being planned to visit the site of the experiments. As usual, glacial subjects will receive due attention, among the papers already promised being one on the glaciation of the Aire Valley by Messrs. H. Muff and A. Jowett, while others are expected on the glacial phenomena of Snowdon and on a similar subject in parts of the East Riding of Yorkshire. Three of the reports of committees of research will also afford scope for the discussion of glacial matters, viz: That on the erratic blocks of the British Isles, that on the conditions of occurrence of Irish elk-remains in the Isle of Man, and that on the Pleistocene deposits of Canada. The last mentioned, which is the final report of a committee appointed at the Toronto meeting of the Association, is likely to receive particular attention, as it embodies strong evidence in favor of the much-disputed occurrence of an inter-glacial period. It is expected that Professor A. P. Coleman, of Toronto University, who has been most active in the last mentioned committee, will attend in person to read the report. The same gentleman will also read a paper on the recent discovery of a ferriferous horizon in the Huronian rocks in Ontario, north of Lake Superior—a discovery which may eventually prove of great economic consequence. Cave-exploration in Ireland and at Uphill, near Weston-super-Mare, will be reported on by two committees of the Association. A further contribution to our knowledge of the geology of Anglesey will be made by Mr. E. Greenley, and Mr. Vaughan Cornish will bring forward the new results of his study of ripple-marks. In short, all the indications point to a profitable and enjoyable week for the geologists who visit Bradford.

Dr. R. H. Traquair will be president of Section D (Zoology), with which, on this occasion, Physiology will be combined. Dr. Traquair in his address, will deal with the 'Bearing of Fossil Ichthyology on the Doctrine of Descent.' Major Ronald Ross will contribute a paper on 'Malaria and Mosquitoes'; Messrs Gamble and Keeble on 'The Color Physiology of certain Marine Crustacea'; Professor L. C. Miall on 'The Respiration of Aquatic Insects.' In addition there will be, as usual, a number of communications of a more special character in all branches of natural history, together with the reports of various committees on the results of exploration and research.

Section E (Geography) will be presided over by Sir George Robertson, whose address will deal mainly with certain geographical aspects of the British Empire. He is likely to have much to say on the important element of distance and its diminution by means of improved communications. This Section is likely to be as attractive as usual. Sir Thomas Holdich will deal with the important subject of railway connection between Europe and Asia. Captain Deasy, Captain E. S. Grogan, and Mr. Borchgrevinck will repeat the story of their various expeditions in Asia, Africa and the Antarctic. Mr. E. G. Ravenstein and Mr. B. V. Darbishire are both to deal with the subject of colonial and foreign surveys. Mr. G. G. Chisholm has undertaken to deal with the important subject of the probable economic relations of Siberia and China. There will be one or two papers on the position of geographical teaching in Bradford and the neighborhood. Dr. H. R. Mill will deal with the geography of South-West Sussex, and Mr. E. Heawood with the commercial resources of Africa.

Section F (Economic Science and Statistics) will have as its president Major P.

G. Craigie, of the Department of Agriculture. In his address he will probably dwell on the care necessary for the properly scientific use of statistics and, above all, on the caution required in making international comparisons, illustrating his text, probably, with some of the better-proved figures which enable us to measure the development or retrogression of agriculture in different and typical countries. Doubtless owing to the fact of Major Craigie's being president, Section F this year will receive an unusual number of contributions relating to the economics of agriculture. Professor James W. Robertson, Dairy Commissioner of the Agricultural Department of the Dominion of Canada, and Professor William Saunders, LL.D., director of the Dominion experimental farms, will read papers, and Mr. A. D. Hall, of the Agricultural College of Wye, will deal with the economic possibilities of the growth of sugar beet in England, while a committee of the Section will at length present their report on the effect on prices of options and dealings in futures. There will be, as usual, a day devoted to what are roughly described as municipal subjects, and here Mr. Auberon Herbert is expected to condemn root and branch all attempts of local authorities to provide houses. Several interesting papers will be forthcoming on miscellaneous subjects. Mr. L. L. Price will deal with some economic consequences of the South African war, and the Hon. W. P. Reeves, Agent-General for New Zealand, will contribute a paper on the somewhat novel subject of 'The Colonies as Money-lenders.' Dr. Marcus Rubin, chief of the Royal Statistical Bureau of Denmark, will discuss some recent movements of population. There will also be several papers on questions of labor and wages. The historical school will be represented by Dr. W. Cunningham, who contributes a paper on North American paper currencies during the colonial period.

Sir Alexander Binnie will preside over Section G (Mechanical Science), and his address will take the form of an inquiry into the steps by which we have arrived at our modern conception of nature, when reviewed from a scientific standpoint. He will point out the reasons why the philosophers of Greece missed the true interpretation of nature, and, passing on to the Roman period and the dark ages, will show how there has gradually grown up the conception with which we are all so well acquainted and with which before us, when studying natural phenomena, the mind is freed from all preconceived notions derived from other realms of study. The address will be illustrated by a chronological chart likely to prove useful to all scientific men. It extends from 1550 to the present time, and includes, collated with the births and deaths of the many distinguished men to whom we are indebted, the principal historical, scientific, and other *data* which mark the various periods, as well as the dates of discoveries and of publications bearing upon the subject. There is, as usual, a large number of papers down for reading in this Section. We can only refer to the more important. The very fine waterworks belonging to Bradford will be described, on Thursday, by Mr. Watson, a local engineer. On Friday the papers will be mainly devoted to civil engineering. Professor Hele Shaw proposes to collect together, in his paper on 'Resistance on Roads,' all the known *data* on frictional resistance on common roads, and will, it is believed, strongly advocate the appointment of a committee of the Association to carry on some further experiments on rolling friction on common roads. The immediate value of the paper by Mr. J. H. Glass, on 'Proposed Railway Construction in China,' is likely to be lessened by the terrible events which have happened there since his paper was promised. His plan is to describe the

great trunk line which it was intended to construct in Southern and Central China, and to give some account of the immense mineral wealth which lies there almost undeveloped. The paper will be illustrated by many beautiful lantern slides reproduced from photographs. For Saturday there are down two papers, dealing with the great staple industry of Bradford and Yorkshire —textile manufacture. They will describe the more modern methods of mechanical and photo-mechanical designing for textile fabrics, and will be read by Professor Beaumont and Mr. Barker, who are both engaged locally in the technical teaching of textile work. Monday, as usual, will be given up to the electrical engineers. First on the program for the day comes the reading of the final report of the Small Screw Gauge Committee, which has now practically decided which form of thread it will advocate. Mr. A. Mallock will then deliver a paper paper on 'Resistance and Acceleration of Trains—Measurement of the Tractive Force,' in which he proposes to give an account of the recent experiments made by him on electric and other railways to determine the acceleration, the tractive force, and the running resistance to which trains are subjected. This will be followed by some interesting particulars about the 'Liverpool and Manchester Electric High Speed Railway,' contributed by Sir William Preece. Mr. Gibbings will deal with 'The Design and Location of Electric Generating Stations' on a large scale for supplying electric power and lighting to large districts, and Mr. Barker will describe 'A Maximum Demand Meter,' the joint invention of himself and Professor Ewing. Tuesday, the last day on which the section meets, will begin with a paper by Mr. J. G. W. Aldridge, entitled 'The Automobile for Electric Street Traction.' It is hoped that the cinematograph will be used—for the first time, it is believed, at a British Association meeting—to illustrate this paper, which will deal with an actual service in operation in Paris, and will show how, under certain conditions, a tramway service may be organized without the usual tramway lines. Professor Goodman will describe 'A New Form of Corimeter for measuring the Wetness of Steam,' which he has himself invented. Two other papers are of considerable importance. In the first, Professor Arnold of Sheffield, will deal with what he terms 'the internal architecture of steel,' and will develop his theories on the ultimate molecular structure of steel and the micrographic analysis of steel in physical researches. The second, by Mr. E. K. Clark, of the firm of Messrs. Kitson & Co., will deal, under the title of 'Shop Buildings,' with modern engineering, workshop buildings, and methods of laying them out and organizing the work in them.

Professor John Rhys, who will preside over Section H (Anthropology), will probably deal in his address with the early ethnology of the British Isles, approaching the subject from the sides of language and folklore. It is hoped that other contributions to this subject, which are anticipated, may give opportunities of discussing some of the vexed questions which it includes. A discussion is also proposed on the subject of 'Animal-cults: their Relation to Totemism,' which has been variously interpreted of late years; and on the present state of our knowledge of the origin of writing in the Mediterranean. Mr. Arthur Evans will describe the pictographic system of writing of which he has disinterred numerous specimens at Knossos in Crete; and Mr. F. Griffith offers a paper on the development of Egyptian hieroglyphics. Dr. Haddon will describe the results of the recent Cambridge expedition to Sarawak; and Mr. David Boyle, of Toronto, has a paper on recent revivals of native religious beliefs

among the aboriginal tribes of Canada. Professor Cunningham, Dr. Beddoe and Professor A. F. Dixon send papers dealing with questions of anthropometry.

Professor Sydney H. Vines will preside over the Botanical Section (J). His address will deal with Botany in the 19th century, and will be a review of the more important advances made in the different departments of the science. As has already been stated, this Section will have a joint discussion with the Geological Section on the Coal Period Vegetation. A museum is being arranged to illustrate the Yorkshire Coal Measure Flora, etc., in connection with the discussion. Mr. Percy Groom, of Coopers Hill Engineering College, is to deliver a semi-popular lecture before the Section entitled 'Plant-form in Relation to Nutrition.' There will also be papers on Fossil Plants, Plant Anatomy, Plant Physiology, etc.

The Friday evening discourse will be delivered by Professor Gotch, the subject being Animal Electricity, while that on Monday evening will be by Professor W. Stroud, whose subject will be 'Range Finders.' Professor Sylvanus P. Thompson will give the lecture to the operative classes on Saturday, and will take as his subject 'Electricity in the Industries.'

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*VARIATION AMONG HYDROMEDUSÆ.**

THE announcement of Bateson in his 'Materials for the Study of Variation' that medusæ best illustrated the principle which he designated as 'Discontinuity of Meristic Variation' led me, in connection with researches which have been under way for several years, to note more specially any indications which might either confirm or discredit this statement. Accordingly I have from time to time made such collections of the Hydromedusæ as might afford a means of testing the matter. While as yet these have not been extensive, except in a few genera, they seem to be sufficient to warrant a brief summary of facts bearing upon the general problem of variation. The collections have been chiefly of the following genera: *Eucope*, *Obelia*, *Margelis*, *Pennaria* and *Gonionemus*.

The facts exhibited by *Eucope* have recently been published by Agassiz and Woodworth, and while I have made observations upon those which I had collected in larger numbers than any other, they are yet so similar to those made by these observers that I shall make no particular reference to them at this time. Of the species of *Obelia* and *Margelis* I have as yet had no opportunity for extended study. Facts presented here will have reference only to the species of *Pennaria* and *Gonionemus*.

Of *Pennaria* the medusæ are very small and of a shape which renders rather difficult an examination of the radial canals, a feature which, in my observations, has been among the most variable of structural characters. From the examination of only about a hundred specimens I have found no marked variation of this feature except in the direction of atrophy. The medusa of *Pennaria* seems to be in a somewhat degenerate condition. In many specimens the marginal canal is wholly atrophied and in some cases also the radials, to a greater or less extent. I have elsewhere* pointed out that in many cases the medusæ of this species never become free, but discharge the generative products while remaining connected with the polyp. Another feature which may prove to be a variation is the appearance of small wart-like or vesicular protuberances at various points of the extumbrella. Agassiz, in the North American *Acalephæ*, refers to a similar feature but explains it as probably due to the distortion caused by ova in the subumbrellar cavity. This, however, I am strongly convinced is

* Abstract of a paper presented before the Section of Zoology of the American Association.

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