

lowing subjects will be dealt with, among others:—German Science, Prof. J. Arthur Thomson; German Philosophy, Prof. A. D. Lindsay; Political Philosophy and Politics, Prof. D. H. Macgregor; German History and Character, Prof. R. Lodge; Modern Inventions, V. E. Johnson; Electricity, W. H. McCormick; Engineering, G. Knox. *Longmans and Co.*—The Development and Present Position of Biological Chemistry, Prof. F. G. Hopkins; The Polysaccharides, A. R. Ling; Colloids, W. B. Hardy; Respiratory Exchange in Animals, Dr. A. Krogh; Protamines and Histones, Dr. A. Kossel; Organic Compounds of Arsenic and Antimony, Dr. G. T. Morgan; Lecithin and Allied Substances, Dr. H. Maclean; The Ornamental Plant Pigments, A. G. Perkin; Chlorophyll and Hæmoglobin, H. J. Page (Monographs on Biochemistry); Electric Waves, Prof. G. W. Pierce; The Emission of Electricity from Hot Bodies, Prof. O. W. Richardson; Colloidal Solutions, Prof. E. F. Burton; Atmospheric Ionization, Prof. J. C. McLennan (Monographs on Physics); Electrolytic Dissociation Theory, Dr. J. C. Philip; The Physical Chemistry of Flames, J. E. Coates; Clays, Dr. J. W. Mellor; Catalysis of Gas Reactions, D. L. Chapman; The Electro-Chemistry of Non-Aqueous Solutions, J. W. McBain; Catalysis in Liquid Systems, Dr. G. Senter; Hydrates in Solution, Prof. E. A. Washburn; The Rare Earth Metals, Dr. J. F. Spencer; The Molecular Volumes of Liquid Chemical Compounds, G. Le Bas; Adsorption, V. Lefebure and A. M. Williams (Monographs on Inorganic and Physical Chemistry). *J. Nisbet and Co., Ltd.*—The Operative Treatment of Chronic Intestinal Stasis, Sir W. A. Lane. *Sir Isaac Pitman and Sons, Ltd.*—Experimental Physics, A. Cowling. *T. Fisher Unwin.*—Rubber Recueil: Papers on Rubber, its Botany, Culture, Preparation, and Commerce.

THE SECOND INDIAN SCIENCE CONGRESS.

THE second Indian Science Congress was held in Madras from January 14–16. It may be remembered that the suggestion to hold a Science Congress in India on the lines of the British Association was first made some three years ago by Prof. MacMahon, of Lucknow, and Prof. Simonsen, of Madras. The first meeting was held a year ago in Calcutta.

The Hon. Surgeon-General W. B. Bannermann, I.M.S., C.S.I., was president this year, and delivered on address entitled "The Importance of a Knowledge of Biology to Medical, Sanitary, and Scientific Men Working in the Tropics." After dealing with the scourges of India and recent research as to the nature of plague, malaria, and so on, the president remarked:—"It has been said that Indians have not yet distinguished themselves as they might in the domain of medical research. That is no doubt true, but the reason is not far to seek. The leisured and wealthy classes in India do not send their sons to our universities in any numbers, and when they do, certainly not with the idea that they should spend the rest of their lives in pure research work. Let us hope they will do so some day. It is, therefore, among the sons of the middle class and often poor community that we must look for the men with capacity and inclination for such work.

"But these are the very men who, not being in independent circumstances, must earn their living at the earliest possible time. They cannot, therefore, be expected to engage in scientific research which does not bring in money for daily bread or lead up to any permanent appointment. I would, therefore, appeal

to our wealthy Indians to endow medical research, so that their poor but capable fellow-countrymen may have something to look forward to as reward for scientific toil. There are plenty of subjects for research which ought to be endowed, chairs in our medical schools and universities that ought to be established. All our Indian universities are at present mere skeletons; will no one here take up the rôle of beggar and try to extract a few lakhs of rupees from the hoards of his wealthy and aristocratic friends? We know that there is plenty of money to be had when the heart of the nation is touched, as witness the magnificent response to the appeals made for war funds by H.E. the Viceroy and our own Governor of Madras. It must be your part, gentlemen of light and leading, to inspire similar enthusiasm in the good cause of university endowment. India wants to have, not only more chairs and lectureships endowed, but also research scholarships or fellowships established; fellowships available for the student and the research worker, so that he may live in reasonable comfort, and be able to devote his whole energy to the work without anxiety for those depending on him.

"I should like here to point out that we in Madras have made a beginning in this direction owing to the enlightened liberality of the Rajah of Pithapuram, who has presented 50,000 rupees for the expenses of an inquiry into diabetes, that fell disease which carries off so many of the best brain workers in this part of India. This is an example which I trust will often be followed in the future; it can lead to nothing but good for India and her peoples.

"You will remember what our late beloved King-Emperor said with reference to tuberculosis:—"If preventible, why not prevented?" We may say the same of all these diseases—"They are preventible; why are they not prevented?" For their prevention we require research and research workers. Research workers are, after all, human beings and must be able to support themselves and their families by their labours. Who will come forward and help us? India needs this help, and we cannot look to Government for more than a small part of the money required. Government has done magnificent work of late years in establishing laboratories, and subsidising research all over the land, but much more is required. We want scholarships and fellowships with pensions for our best research workers. Endowments for this purpose will do more to keep alive the memory of the donors than the erection of chattrams or other traditional forms of charity. It will not merely do this but will confer an inestimable benefit on the inarticulate millions of India, who do not even know that they can be delivered from the various diseases that afflict them, and are scarcely conscious of their existence.

"But we not only require research workers, we want an organisation that will help to educate the people in the ordinary rules of health. There should be in each presidency an official whose business it is to look after the hygienic education of the common people. He should be in charge of a Bureau of Public Health, and his work should consist in preparing pamphlets and popular lectures with lantern-slide illustrations, which could be lent to lecturers who would undertake to itinerate in the villages and talk to the common people. He should organise classes for the teachers in our teachers' colleges, and he should gather together and popularise information from every quarter. Such an official—who would have to be very specially selected—would do an immense amount of good in educating the people, and without education we can hope for very little advance along the road to health.

"Until the usefulness of such a bureau is fully established, we can perhaps scarcely expect much help from Government, for it has plenty to do with the public revenues, but I am quite sure they would view any endeavour to educate the masses with a sympathetic eye."

After the presidential address it was decided to hold the 1916 meeting in Allahabad, and Dr. W. N. F. Woodland was appointed the local hon. secretary.

In the Agriculture and Applied Science Section Dr. H. H. Mann, of Poona, presided, and his address dealt with "The Lines of Development of Indian Agriculture."

Agriculture in India, he said, is of two kinds. On one hand you have an extensive agriculture, conducted without much capital, with primitive implements and methods, and yielding poor results when compared with any Western standard. On the other, you have a number of comparatively small, but highly organised industries, conducted largely by planters, growing special valuable crops, with adequate capital, and yielding exceedingly high returns.

It is not generally realised how unsatisfactory the results of the average Indian agriculture really are. We have no census of production in India as yet, and really satisfactory figures are not possible. But in a few cases it is possible to give figures which make us realise the position. In wheat production, for instance, the yield per acre is certainly not more than ten bushels per acre, and is probably nearer eight, or one-third of what might be considered as a good crop; more especially in this case where so much of the land devoted to it is irrigated and hence not dependent on a very variable rainfall. In the case of cotton, the figure is equally striking, and in this case the area and production are very fairly well known. From twenty-two million acres, the produce runs to above four million bales, or about 75 lb. of lint per acre, while in America, with an equally uncertain rainfall, the production reaches 200 lb. per acre. Again, if we take an intensive crop grown very largely under irrigation, like sugar-cane, the yield works out at under one ton of raw sugar per acre, as against a world's average of about two tons at least. In this case the average in India is very much lowered by the miserable outturn from Northern India, and the crop in Bombay and Madras is fairly up to the world's average. These figures are so striking that a newcomer to the subject is apt to think that improvement is easy, and that the raising of the standard of this cultivation towards that reached elsewhere is not very difficult.

This, however, is not the case. In no country perhaps is progress more difficult. One is hindered at every point by unexpected difficulties. The lack of anything more than a minimum of capital has been often considered as the most outstanding of these hindrances, and it is very important, though not the only one. The very great conservatism of the Indian cultivators has often, also, been mentioned. In this matter, it may be stated very emphatically that Indian cultivators are not more conservative than their situation demands. When a man is working on a minimum of capital, when any excess capital costs probably from 12 per cent. upwards for interest, when the money is turned over only once or at most twice in a year, it is the only policy to be extremely conservative.

Three methods of investigation seem important with a view of improving matters. One of these is the study of soil physics. It seems very important here, especially as several of our types of soil are peculiar, that the methods of increasing their absorbing and retaining capacity for water under our conditions re-

quired very careful investigation. A second investigation, that of implements, is one which is very much needed. A third method, to increase the utility of the water which actually falls in our drier tracts, is the development of drought-resisting varieties of plants.

Mr. F. M. Howlett, in his paper, termed "Chemical Entomology," stated that insects are usually easy to influence by one sense, and one alone. In the case of one small fly a small trace of isovaleric aldehyde will bring many thousands of them to a place in a short time, though none were present before. Among the fruit-flies, the maggots of which are found in many fruits, the scent is so well developed and so distinct that each species seems to be attracted by a different smell.

Dr. Coleman, of Bangalore, read two papers on the black rot of coffee, and the "koleroga" disease of the areca palm. He thinks that it is likely that by treatment with Bordeaux mixture black rot of coffee can be checked. The second paper, on the areca palm disease, told the story of one of the very few successful campaigns in India against a destructive disease of the betel nut, which threatened the industry in some districts of Mysore.

In the Physics Section, the contributions of the chairman, Mr. C. V. Raman, on the velocity of restitutions after impact between various elastic materials and his speculations as to the type of air disturbance involved in the click of two billiard balls, aroused a good deal of interest. Among other papers were:—Dr. D. N. Mallik, on a type of electric discharge in the neighbourhood of a permanent magnetic pole; Dr. Royds, on spectrum series; Mr. C. Michie Smith, on the climate of Kodaikanal; Mr. S. Appaswami, the Madras Physics Department, the motion of violin strings; Mr. J. Evershed, of the Kodaikanal Observatory, on sun-spots and prominences. In all twelve papers were read and discussed.

In the Chemical Section Dr. P. C. Ray, of Calcutta, presided, and fourteen papers were communicated. The chairman opened the proceedings by giving a brief account of his recent work on the use of nitrites and chloroacetic acid in causing tautomerisation in certain thio-derivatives, and in a further paper discussed the action of alkyl iodides on dimercuriammonium nitrite. Prof. J. J. Sudborough dealt with alcoholysis, and also gave an account of work which he was carrying on with his students on the replacement of sulphonic acid groups in aromatic compounds during halogenation. Prof. Neogi and Mr. Chowhari described their experiments on the conversion of aliphatic nitrites into nitro-compounds. Prof. Joseph, of Colombo, gave an account of his and Mr. W. N. Rae's work on chromium phosphate. Profs. Gibson and Simonsen communicated two papers on stereochemical problems, in one of which the resolution of β -naphthotetrahydroquinoline was described.

The Section of Zoology was presided over by Dr. N. Annandale, of the Indian Museum. The two most important papers before the meeting were those on the autotomy and regeneration of the tail in the house-gecko and on the zoanthids of Madras. They were by Prof. W. N. F. Woodland, of Allahabad, and Prof. K. Ramunni Menon, of Madras, respectively.

Dr. C. A. Barber, of Coimbatore, the chairman of the Botany Section, in his opening address, took sugar and the sugar-cane as his subject. The history of the industry in Java was studied in detail as showing a fine example of the application of scientific work to sugar-cane problems. The question whether India (which now imports nearly a million tons each year) could hope to become an exporting country was answered in the negative. It was shown that India was a quarter of a century behind Java, and was, in

fact, only just commencing scientific sugar-cane work. Recent work in India was discussed, especially the efforts to improve the local varieties and the raising of seedling sugar-canes in the newly founded cane-breeding station at Coimbatore. Mr. F. R. Parnell, of Coimbatore, read a very interesting paper on some Mendelian characters of the paddy plant. Dr. W. Burns and Mr. S. H. Prayag described experiments on inarching inflorescence of the mango when a union was made and the fruit of one tree was thus borne on a tree of another variety. Prof. P. F. Fyson discussed the phanerogamic flora of the patana regions of the Nilgiris and Pulney Hills, pointing out the affinities with Ceylon, the Vohasia, and Himalayan regions.

Other papers were by Mr. M. O. Parthasarathy Iyengar, on the defoliation of some Madras trees; by Dr. C. A. Barber and Mr. D. Vekataraman, on the depressed habit in the sugar-cane; and Mr. C. Tadulingam on the Madras flora.

The meeting of the Geological Section was presided over by Dr. W. F. Smeeth, State Geologist of Mysore, who read a paper on the geological history of southern India, and gave an account of the character and distribution of the various components of the great archæan complex as developed in Mysore. Babu H. C. Das Gupta described an occurrence of crystalline limestone from the Daltonganj coalfield. Mr. E. Masillamany dealt with certain basic dykes in Travancore, including gabbro, dolerites, and norites, the petrology and field relationships of which were discussed.

The Section of Ethnography met under the chairmanship of Mr. H. V. Nanjundayya, whose address was on some aspects of ethnographic work. He said that the lower castes are aspiring to a higher status; Gotras are claimed, and customs which enable the observer to recognise the lower caste are suppressed. According to legend the Castes claim descent from God, but actually Castes are considered to be tribal distinctions. By the adoption of Samskaras of higher castes and practising them for several generations higher status is claimed, and renders investigation a matter of considerable difficulty. Dr. Annandale, in a paper entitled "Anthropometric Notes of Calcutta Eurasians," dwelt on the importance of regarding physical anthropology from a zoological point of view. He expressed the opinion that the primary classification of the races of man should be conducted on exactly the same lines that would be adopted in investigating those of any other species. Unfortunately the characteristic features of the different human races were still very imperfectly known, and existing systems of anthropometry were unsatisfactory in many respects. He had no new system to expound, but laid stress on the value of a large series of photographs taken on a definite system and illustrating as far as possible the actual external structure. He put forward a proposal for a photographic survey of the people of Calcutta, and especially of those of mixed race. Dr. Keitkar, of Bombay, read a paper on Indian sociology as a theoretical and applied science. Dr. S. C. Roy read a paper on totem worship amongst the Oraons. The author showed that Kachchapa (tortoise) must have given rise to the Gotra, now known as Kasyapa. The existence of a wooden figure of the tortoise and pig seemed to bear out the theory suggested by him. Other papers in this section were contributed by Mr. Gopinatha Rau, on viragals and mastigals—the memorial stones set up in honour of heroes who fell in battle and women who died for their husbands; Mr. L. K. Ananta Krishna Iyer read papers on prehistoric monuments in Cochin, and on the Vettuvans of North Malabar.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—The subject proposed for the Adams Prize Essay for the period 1915-16 is "The Course of Evolution of the Configurations possible for a Rotating and Gravitating Fluid Mass, including the Discussion of the Stabilities of the Various Forms." The investigation of the forms that can be assumed by a mass of gravitating fluid endowed with motion of rotation was initiated by Newton with reference to the figure of the earth, developed by Maclaurin, Clairaut, and Laplace, and extended by Jacobi. It was consolidated in Lord Kelvin's hands, as an example of the doctrine of the dissipation of energy, into a single problem illustrating the course of evolution of stellar and planetary systems. The sequence of the forms that can be assumed by a rotating fluid mass, first announced partially by Lord Kelvin, has been extended and systematised by the work of Poincaré, and expanded in new directions by Sir G. H. Darwin and other investigators. Further elucidation of this succession of forms, especially in the direction in which a tendency appears for the mass to divide into separate parts, is desirable, in view of its possible bearing on the modes of evolution of double and variable stars and the interpretation of other remarkable celestial objects. The case in which the mass is in whole or in part in the gaseous state may also present opportunities for investigations possessing astronomical interest. Some contribution to the further theoretical development of this subject is asked for. The prize is open to the competition of all persons who have at any time been admitted to a degree in the University. The value of the prize is about 220*l.* The essays must be sent to the Vice-Chancellor on or before the last day of December, 1916.

OXFORD.—On March 9 Congregation approved the appointment of Dr. H. M. Vernon, fellow of Magdalen College, as University lecturer in chemical physiology for four years, in succession to Dr. Ramsden, fellow of Pembroke College, who has been elected to the post of Johnson professor of biochemistry at Liverpool University. Congregation has also approved the re-appointment of Dr. J. W. Jenkinson, Exeter College, as University lecturer in comparative and experimental embryology for five years.

The Hebdomadal Council has lately put out an important statement dealing with the financial position of the University as affected by the war. It is estimated that, after allowance has been made for a considerable saving in the conduct of examinations, the statutable and necessary expenditure for the current year will exceed the ordinary receipts by at least 15,000*l.* This deficit may be reduced by various expedients, such as savings in respect of grants, and the suspension of repayment of loans (should the necessary powers be granted by the Bill now before Parliament), to a sum of about 6000*l.* The remainder may ultimately have to be made good by borrowing; but before the necessity for this step arises, the situation will, it is hoped, be to some extent relieved by the voluntary contributions of many of the officers and other members of the University.

It is stated in *Science* that Dr. William J. Mayo and Dr. Charles H. Mayo, of Rochester, Minn., the distinguished surgeons, have decided to establish a 200,000*l.* foundation for medical research and to place the foundation, under certain restrictions, in the hands of the University of Minnesota.