

of the University of Leeds, and well known for his work upon the nutrition of animals and milk production, is director of the establishment, and takes charge of the work upon animal-feeding; Capt. Hunter, late of the Department of Agriculture in Ireland, is responsible for the plant-breeding work; and Capt. Gimingham, who was attached to the Research Institute at the University of Bristol, is concerned with soil problems. These heads of divisions, with twelve others, constitute the research staff.

The work set out in the report before us is necessarily of a preliminary character. The first business of a scientific establishment of this kind is to supply data for the guidance of the management. The varying soils of the estates have to be analysed and correlated with the results of manurial trials in order that the specific needs of each field as regards lime and the main elements of fertility can be defined. Variety trials of the principal crops have to be made so as to ascertain what kinds of grain and fodder crops yield best under the several conditions of soil and climate. Again, economic feeding rations have to be worked out by trial for the particular classes of

livestock and the special purposes for which they are being kept. All this is not research, but the scientific control necessary to a business organisation.

Most of the present report is occupied in setting out such results, which may usefully be correlated with similar commercial trials, but do not present any essential novelty. Research is an affair of years, and wisely the director makes no promises and says nothing about the real investigations he may have initiated. It is clear, however, that new ground is being broken, particularly in connection with plant-breeding. The field bean, for example, has been taken in hand; on many soils it is a crop of considerable economic importance, which never seems to have received any serious attention from the seedsmen or the older race of plant-improvers.

The report may be obtained on application to the director at the Research Station, The Bury, Offchurch, Leamington. It is the first fruits of a movement of great promise to agriculture, and redounds to the credit of both the director and the founder of the company, Mr. Joseph Watson.

Optical Wedges.

WEDGES of tinted glass have been used for graduating light for experimental purposes during the last fifty years or so, and about five and twenty years ago Warnerke made annular wedges of pigmented gelatine. It is twenty years since the "Chapman Jones plate tester" was put on the market, the graduated portion of which is a pigmented gelatine wedge, the mould being cut into five pieces that are placed side by side for the sake of convenience. Optical wedges, therefore, have been well established as standard apparatus for a long time.

We have received from the firm of "Herlango," of Vienna (at the request of Prof. J. M. Eder) an example of "a new grey wedge photometer," called, after the names of those who have devised it, the "Eder-Hecht" photometer, the essential part of which is a pigmented gelatine wedge with a scale printed on the thin celluloid that covers its face. This, with a neatly made white wood printing frame, is the complete apparatus. The plate is 3 cm. by 16 cm., and the divisions of the scale are 2 mm. apart. But the scale is not a simple ladder. Every fifth line is numbered with its mm. distance from zero, and, in addition to the number, has on each side of it a short thick pointed swelling to emphasise it and render it more easy to see how far the light-produced image extends. For use with it the firm issues various sensitive papers, both printing out and development, a silver-chloride paper made according to the formula of Bunsen and Roscoe, and also a colour-sensitised paper. An extended table gives the relative light quantity, and also the "absolute light quantity in Bunsen-Roscoe units," represented by each 2-mm. division. Thus, given the suitable sensitive paper, the apparatus is ready for use and convenient. It is applicable to light

measurement in connection with photography, meteorology, climatology, biology, light-therapeutics, agriculture, the designing of buildings, botany, photographic reproduction processes, etc. Photometers slightly varying from the above, as in steepness of gradation, length of the wedge, the character and coarseness of the printed scale, are provided when more convenient. For photographic plate sensitometry the wedge plate is 9 by 12 cm., and by the side of the ladder scale are four narrow graduated strips, red, yellow, green, and blue respectively.

Accompanying the photometer is a copy of a paper by Walter Hecht on the use of such photometers in plant culture and a copy of a paper by Prof. Eder published in the *Photographischen Korrespondenz* for September, 1919, in which he gives apparently every possible detail and formula in connection with these photometers. But he does a considerable injustice to the Chapman Jones plate tester in associating it with Warnerke's original step-tint sensitometer. It differs from the sensitometer designed by Prof. Eder in having a wedge from two to three times as long and divided into twenty-five parts instead of sixty parts. These twenty-five parts may be subdivided to any extent on mere inspection according to the observer's acuteness of vision. It has the four colours giving four definite parts of the spectrum, and, in addition, an Abney colour sensitometer, which shows at a glance whether a plate alone or a plate plus a colour filter gives the same density for equal brightness of several colours. We think, too, that comparing the density produced under any given colour with a scale of densities admits of greater precision than the estimation of the vanishing point of the image as is done in Prof. Eder's instrument. C. J.

The South African Association for the Advancement of Science.

DURBAN MEETING.

THE nineteenth annual meeting of the South African Association for the Advancement of Science was held at Durban, in the Technical College, on July 11-16 last, under the presidency of Prof. J. E. Duerden. The meeting was well attended, and was very successful. More than fifty papers were read,

and the time-table was so arranged that attendance at the presidential address of each section was possible for every member. An official welcome and a reception in the Art Gallery was given by the Mayor of Durban, while a conversazione was arranged by the local committee of the association and the Natal

Society for the Advancement of Science and Art. A number of interesting excursions to places of local interest were arranged.

A popular lecture, illustrated by lantern slides, was given by Dr. A. L. du Toit, geologist to the Irrigation Department, on "Land Connections between the other Continents and South Africa in the Past." The lecture dealt with the ancient continent of Gondwanaland, its glaciation, the spread of animal and plant life across it, its dismemberment, the development, geographically and biologically of the several portions, their temporary reunion, and finally the evolution of the present continental masses.

The South Africa medal and grant were presented to Sir F. Spencer Lister, bacteriologist to the South African Institute for Medical Research, Johannesburg, in recognition of his work on the differentiation of the pneumococci of lobar pneumonia into many immunologically distinct groups, and the successful application of the discovery to the artificial production of immunity against pneumonia in man.

The presidential address by Prof. Duerden was on "Social Anthropology in South Africa: Problems of Race and Nationality." A sketch of the rise of social anthropology was given, and the view was maintained that anthropological studies should contribute to the upbuilding of the State by offering a scientific understanding of the peoples within it. Such was very necessary in South Africa, with its very diverse stages of social evolution and its many distinct races and nationalities which should live together in harmony and build up a South African nation. The alleged aversion between white and black was discussed, and was shown to manifest itself only on an assumption of equality, the difference in the degree of civilisation being too great to be bridged. The Bantu is highly assimilative, but neither originative nor constructive, and hence is dependent on the European for his advancement. The fusion of racial groups in South Africa was discussed, and the opinion given that there would be no fusion, though the members would intermingle in ordinary avocations. Solidarity of race may be superseded by national bonds and loyalty under just and humane treatment. The retention of national aspirations of British and Dutch are not incompatible with a South African national solidarity. It was held that a new unifying South African nationalism was dawning, and that the future relationships of the European to the lower races must be that of a benevolent aristocracy of ability.

The presidential address to Section A, by Dr. J. Lunt, of the Royal Observatory, Cape Town, dealt with "Stellar Distances, Magnitudes, and Movements." The speaker reviewed briefly the development of astronomy, the oldest science, and discussed various spectrographic methods, especially in relation to the determination of the distances, sizes, and movements of stars. The work in astronomy in the United States was described at some length, and comparison made with the conditions prevailing in South Africa. The new universities of South Africa should play a part in the development of astronomical and astrophysical research here, where the study of the skies of the southern hemisphere was an essential complement to the work in the northern observatories. The address concluded with a vigorous appeal for the training of workers, for adequate equipment, and for a better appreciation of, and reverence for, the wonderful universe of which man forms so small a part.

Dr. J. Moir, in his presidential address to Section B, dealt with "The Atomic Theory of 1921." He showed the tremendous strides that had been made in the conception of atoms and molecules in the last twenty years. Two primitive materials, hydron and electron,

with two intermediate building substances, H_2 and H_3 , as well as helium, are considered to be the basis of all elements. The constitution of a number of elements was explained and illustrated in detail, numerous examples being given. Many cases were cited in which physical means during the world's evolution may have acted on different substances; for example, strontium sulphate, yttrium phosphate, and zirconium silicate, which now have similar electron and ion constitutions, are three very different substances which may really be one, changed by external forces.

Prof. J. W. Bews took as his subject, "Some Aspects of Botany in South Africa and Plant Ecology in Natal," in his presidential address to Section C. The speaker sketched briefly the effect of environment on progress in botany. The history of botany widened the perspective, and it was interesting to note the progress of the science as transplanted into South Africa. The only indigenous botany was that of the natives, who possessed a wonderful knowledge of plants and their properties. Passing to botany in Natal, the speaker paid tribute to a number of pioneer workers, and proceeded to discuss the ecology of Natal more particularly. The coast belt, the midlands, and the Drakensberg or mountain region, were described, with their characteristic vegetations. The plant communities of Natal were discussed in some detail, as were plant migrations and the affinities of the Natal flora.

The presidential address to Section D was delivered by Prof. H. B. Fantham, on "Some Recent Advances in Zoology and their Relation to Present-day Problems." At the outset the field of pure science was discussed. Such must never be ignored, for the academic of to-day may be of the greatest technical benefit hereafter. Early specialisation for purely economic ends was to be deplored, for the specialist needed a breadth of outlook, an orientation in the whole field of his science, in order to have balance and perspective. The work done by protozoologists, helminthologists, and entomologists in the great war was referred to, and fields of work in South Africa indicated. Recent researches on ductless glands of animals were cited, and fisheries developments were noted. Many interesting results in connection with work on chromosomes and their relation with sex were quoted. Newer work in connection with the processes of evolution, especially in regard to heredity and acquired characters, was brought under review. The need for the application of biological principles in modern problems, including politics, was insisted upon. Heredity, environment, and response to stimulation needed concurrent attention. The higher standard of living for workers demanded more than mere amusement and indulgence in luxuries and excitement. Idealism was essential, and it was shown that religion and science were not necessarily in conflict. The speaker concluded with a plea for the inculcation of the spirit of biology in all education. With a widespread knowledge of history, biology, and sociology, man should improve his environment and attain co-operation, peace, and higher ideals.

Section E met under the presidency of Dr. C. T. Loram, who discussed "The Native Problem." The adjustment of white and black was difficult in South Africa, and a successful adjustment was held to be impossible without sacrifices on both sides. The chaotic political situation with regard to natives in the different provinces of South Africa was described. Legal procedures and jury systems were also mentioned, and it was a question whether the Roman-Dutch law of Europeans were best for the native on account of the differences between the two civilisations

concerned. The mentality of the native was analysed, and because of the lack of sublimation of the sex instincts, such as occurred in the European, there was not the same growth in ambition, idealism, and general achievement. The trade union movement among natives and their numerous religious bodies were mentioned, and European philanthropic leading was mentioned as being desirable. Location and taxation problems were discussed, and the co-operation of all scientists desired in solving the many problems connected with the native.

Prof. W. A. Macfadyen spoke on "Observations and Proposals for the Stabilisation of Money Values" in his presidential address to Section F. Inflation and deflation of currency were two of the greatest evils resultant on the great war, and they affected everyone. The stabilisation of money values and the preservation of such stability were shown to be the most fundamental interests of commercial, industrial, and democratic policies. National bankruptcy was defined, and it was shown that international exchanges had failed to act as bridges for commerce. The dissipation of capital during the war led to inflation, and the necessity for constant readjustment between wages and prices led to constant strikes and labour unrest. Legitimate trade and industry were replaced by speculation. Economic bankruptcy of a nation meant reversion to an archaic type of civilisation and the sacrifice for a time of all the artistic and professional values of civilisation. Fluid permeation of gold was shown to be necessary. The function of a central reserve bank was also discussed, and the function of the League of Nations in instituting an international currency reserve bank was indicated. The speaker summarised his points thus: The international export and investment of capital had woven the world into one financial system. Such an international system implied either a universal unit of account or an international banking system. The control of such a general standard of value so as to preserve an invariable ratio between goods and money was the most important of public and private interests.

It is only possible to mention some of the many papers read before the various sections, but most of them will be printed in the journal of the Association.

In Section A an interesting paper on asphalt in relation to road construction was contributed by Mr. D. B. W. Alexander; Mr. R. J. Norris spoke on the purification of sewage by the activated sludge process, and Mr. H. Clark gave notes on the occurrence of even harmonics in electrical current and pressure waves.

In Section B Mr. C. W. Petchell spoke on alcohol fuels for internal combustion engines. Mr. C. Williams gave notes on the chemical control of cattle-dipping tanks, a matter of much importance in South Africa. Dr. B. de C. Marchand gave an account of methods for the mechanical analysis of soils containing heavy minerals, and Messrs. Kloot and Hyman gave a paper on the chemistry of condensed milk.

In Section C papers were given by Miss H. Forbes on the Natal species of *Cassia* and on the flora of Isipingo. Dr. P. A. van der Bijl gave accounts of some interesting and little-known South African fungi, and of the fungi found in the air of sugar mills. Mr. R. D. Aitken described the plant succession in a type of midland tree veld in Natal, and Mr. G. W. Gale discussed the aeration systems of certain Natal plants. Prof. D. Thoday discussed the genus *Passerina* and its distribution in South Africa, and Dr. Sim contributed notes on the Bryophyta of Southern Rhodesia. A most interesting paper was contributed by Dr. E. Warren on the interspecific hybrid and back-cross of the foxglove, the paper being followed by a useful

discussion. Two papers of special interest to agriculturists were contributed by Mr. E. Parish on agricultural experiment, its design and interpretation, and by Mr. A. O. D. Mogg on a method of veld estimation in relation to lamziekte. There was also a botanical excursion to Isipingo.

In Section D there was a discussion on South African Trematodes, in which papers by Dr. F. G. Cawston on *Bilharzia cercariae*, by Mr. F. W. FitzSimons on birds as possible carriers of snails, and so as distributors of *Bilharzia*, and by Dr. Annie Porter on experimental researches on various species of *Schistosoma* and *Fasciola* were first considered. Mr. J. Sandground gave a detailed account of the life-history of species of *Heterodera* in South Africa, and Mr. R. H. T. P. Harris described the beetle, *Ortalia pallens*. Mr. E. C. Chubb contributed a paper on the natural history and geology of Durban. Much interest was aroused by the account given by Dr. H. B. Fantham and Miss Esther Taylor of the Protozoa found by them in some South African soils. Dr. Fantham also described his further observations on parasitic Protozoa in animals in South Africa. Dr. Lindsay Johnson gave an interesting account of various methods for screening light observed in the eyes of vertebrates, beautiful lantern slides being shown. There was also a zoological excursion for observations on the animal life of Durban Bay.

In Section E Mr. D. A. Hunter discussed Bantu industries, Mr. W. H. Tooke dealt with natives and agriculture, and Mr. H. S. Keigwin gave an account of an educational experiment. Mr. S. S. Dornan spoke of the heavenly bodies in South African mythology; Mr. W. Wanger dealt with two Ntu problems, and Mr. A. J. Bryant gave an account of some native marriage rites. Prof. W. A. Norton read papers on the regiments of the house of Moshish, Sesuto praises of the chiefs and the Bantu idiomatist, and Mr. D. D. T. Jabavu contributed a paper on Bantu literature.

In Section F Mrs. Mabel Palmer discussed Irving Fisher's proposals for stabilisation of the value of money, and Mr. G. Burgess dealt with the taxation of land values. Mr. C. Graham Botha gave papers on archival problems in South Africa and on the preservation of our national monuments. Dr. J. E. Holloway spoke on decentralisation in university education and research. An interesting paper on the function of a school of art in the life of an urban community was given by Mr. O. J. P. Oxley, who illustrated his remarks by an exhibit.

The next annual meeting of the Association will be held in July, 1922, at Lourenço Marques, under the presidency of Dr. A. W. Rogers. H. B. F.

University and Educational Intelligence.

LONDON.—Dr. R. H. Aders Plimmer has been appointed as from January 1, 1922, to the University chair of chemistry, tenable at St. Thomas's Hospital Medical School. Since 1919 Dr. Plimmer has been head of the Biochemical Department of the Rowett Research Institute of Animal Nutrition at the University of Aberdeen and North of Scotland College of Agriculture, and research lecturer in applied biochemistry in the University of Aberdeen.

Mr. H. H. Dodwell has been appointed as from March 1, 1922, to the University chair of the history and culture of British Dominions in Asia, with special reference to India, tenable at the School of Oriental Studies.

Dr. Lewis Simons has been appointed as from March 1, 1922, to the University readership in