with the seasonal variations of the salts in the soil solution and with the absorption of nutrient elements by the plant, and the latter with the mechanism of osmotic phenomena associated with the root-hairs of the plant.

In the discussion of this group of papers Dr. Hackett dealt with the capillary rise of water in soils, and Mr. Wilsdon mentioned some interesting experiments on hygroscopicity and osmotic pressure.

The second group of papers, on the organic constituents in the soil, opened with a review by Mr. H. J. Page (Rothamsted) of the nature and properties of the organic matter and its influence on soil moisture, soil temperature, and the reaction, composition, and concentration of the soil solution. Prof. Odén gave an account of his important researches on humus from peat soils, in which he has shown that the term "humic acid" is chemically correct. Dr. E. J. Salisbury (University College, London) described experiments on the relations between organic matter and the vertical distribution of acidity in natural soils.

In the discussion Dr. Ormandy directed attention to the necessarily complex nature of the material used in Prof. Odén's experiments, and suggested that parallel experiments on a simpler substance like china-clay would be useful.

In the third section—adsorption phenomena—Mr. E. M. Crowther (Rothamsted) dealt with the measurement of the hydrogen-ion-concentration of acid soils, both electrometrically and with the indicators used by Clark and Lubs. Mr. E. A. Fisher (Leeds University) critically discussed the application of the adsorption formula to soil problems, in view of the empirical nature of the equation and the facility with which, by numerical modifications, it can be used to fit experimental data of phenomena which cannot be related. He showed that the modified form of Way's chemical theory, which assumes exchange of bases by double decomposition between silicates and added salts, would account for the observed phenomena.

Dr. Russell in the course of the discussion referred to the necessity for taking account of the colloidal material known to exist in soil and the consequent difficulty of accepting an exclusively chemical explanation of base exchange.

A paper in this section by Mr. C. T. G. Morison (School of Rural Economy, Oxford) on pan formation was taken as read, as was also Dr. Mellor's introductory paper in the concluding section—colloidal phenomena—on the plasticity of clays from the ceramic point of view. Prof. Odén gave an account of his work on clays as disperse systems. He described the apparatus employed, which consists essentially of a balanced plate on which the suspended particles slowly settle, the gradual increase in weight being automatically recorded. Mathematical analysis of the data enables a distribution curve to be constructed, giving the percentage of particles present between any specified range of diameters.

Mr. N. M. Comber (Leeds University) dealt with his suggestive experiments on the flocculation of soils, in which the difference between silt and clay was shown, and the conclusion drawn that clay is protected by an emulsoid of a siliceous nature.

In the concluding paper Mr. G. W. Robinson (University College, Bangor) indicated certain physical constants of soil which would be of great help when employed statistically in soil surveys.

The forthcoming publication of the papers and discussion by the Faraday Society will be of use not only to soil investigators in general, but also to members of bodies such as the Association of Economic Biologists and the Agricultural Education Association, which, among others, were invited by the Faraday Society to co-operate in the discussion.

B. A. K.

British Science Guild.

NOTABLE VIEWS ON PRESENT-DAY PROBLEMS.

WELL-KNOWN leaders of scientific thought discussed the difficult and pressing problems of the times with hopefulness, sagacity, and insight at the fifteenth annual meeting of the British Science Guild, held at the Goldsmiths' Hall on Wednesday, June 8. The president (Lord Montagu of Beaulieu) was in the chair, and there was a large and representative assembly, which welcomed with much gratification the announcement that his lordship had consented to occupy the presidency for another year.

The president, in opening, expressed their sincere sense of loss at the death of Sir Norman Lockyer, who not only took a great interest in the work of the Guild, but was also one of its most distinguished founders. They had also sustained another serious loss in the death of Sir William Mather. During the past year the Guild had given consideration to many matters of importance to scientific workers. They held that civil servants in these days ought, at any rate, to be of scientific mind or appreciate science, even though they might not be highly educated in science itself. The work of the State year by year needed more and more scientific handling and treatment, and the Civil Service as a whole should be encouraged to consult scientific men and to have recourse to scientific advice when occasion demanded. They had tried to spread their influence from London to the provinces, and so far had been very successful. They were doing their best to bring in great provincial centres, which in many ways were more promising scenes for scientific education than London itself. He was sorry they could not announce that day what they hoped last year would be the case—a conference with the representatives of Labour. They thought they had better wait for a calmer state of things before they asked either Capital or Labour or representatives of the State to consider their mutual relations to each other and to science. He thought they ought to ask themselves in regard to the generally unsettled state of the country, in fact of nearly all civilised countries to-day, whether it was possible to go on putting up our scale of living for all classes and to reduce our hours of work at the same time; and, what was more serious in many cases, reduce the output more than in proportion to the number of hours put in. It was quite certain that in this country, if we were to compete with the world and maintain a high standard of living at the same time, we must increase our output per man of machine work even if we worked shorter hours. That was a very difficult problem to solve, but he did not despair with the help of science, in some trades at any rate, of its solution. Then they had to aim at the better education of all classes in scientific facts and inculcate more and more the scientific habit of mind. But our system of education must be less of the parochial and insular kind and more scientific, broad, and world-wide in outlook. The difficulty to-day, he thought they would agree, was that in many of the great subjects which they had to consider facts were very difficult to get at. Science aimed at the truth, and in social and political matters, as well as in scientific matters, if they knew the real facts, a

solution was not always easy, but at any rate it was made much easier. Education was the great hope of the future, and in that education science must play a prominent part.

The annual report of the executive committee having been adopted, on the proposition of Lord Avebury, seconded by Sir John Cockburn, Dean Inge delivered a striking address entitled "The Road to Ruin and the Way Out." It was obvious, he said, that the first half of the subject was easier than the second. The road to ruin was the road along which we were travelling; the way out was not easy to find, and possibly difficult to follow. It was useless to utter mere jeremiads, and it took a great deal to destroy a powerful nation. Medical science taught that the more acute and violent the disease, the more vigorous was the production of anti-toxins, and it added the comforting assurance that if the constitution survived an invasion of poisonous microbes the patient would probably have acquired immunity for a considerable time to come against that particular disease. Perhaps it might be so in our social and political life. Very few politicians and sociologists allowed nearly enough for the swing of the pendulum. The false doctrine of continuous progress had led most of us to treat the flowing tide as a permanent encroachment of the sea. The direction in which the tide was flowing was called "progress," the opposite direction "reaction." History should have taught us better. Political experiments were welcomed enthusiastically until they had been tried; when they were in operation disillusionment began at once. The more revolutionary the change, the quicker was the process of conversion, so that it was almost a commonplace that the young firebrands of a revolutionary age—men like Wordsworth, Coleridge, Southey, Carlyle, and Ruskin—often ended as uncompromising Tories. We had not by any means done with aristocracy and monarchy in Europe. Human nature remained the same, and it tried one way after another to misgovern itself and mismanage its affairs. The first thing necessary was diagnosis. It was obvious that the most ruinous feature of modern society was the strike. This country depended for its very existence on being able to export manufactures to pay for imported food, and our power of exporting manufactures was rapidly disappearing. No scheme of "redistributing" property, however drastic and iniquitous, could have the slightest effect in preventing the starvation of a country which could not feed itself and would not work under economic conditions. There were two forces available which could bring a country out of the worst of holes. These were science and religion. Thev in that Guild were chiefly concerned in the application of scientific knowledge and scientific method to British industry. We were always abusing ourselves for being behind the time—so unlike the Germans, for example. That was the British lion's little way; he was always lashing himself with his tail and calling himself a fool and a slacker, until foreign nations came to believe him. When they tried conclusions with him they found that he was by no means such a fool as he looked, and they complained that it was very unfair. Still, he had no doubt that this Guild would continue to find plenty to do. But behind scientific method there was something deeper—scientific faith and the scientific temper. They must not shut their eyes to the fact that science had many enemies; science as such was disliked by many people. But science had one enormous advantage over its old enemies—it had the nature of things on its side, and wherever it was disregarded and disobeyed it did not talk, but struck. Dame Nature was a good teacher, but her fees were high. It was worth a great deal to impart the scientific way of looking at things—the scientific conscience (should he call it?) in education. He was himself an enthusiastic humanist, and he should be sorry indeed if science were to oust humanism in our education; he should be sorry for the sake of science itself, for a man could scarcely be a scientific worker without being also a humanist; but science we must have as a part of everyday training. Only he would suggest that the faith and temper and conscience of science were a more important acquisition than any mere facts. We wanted to teach the next generation to respect all facts wherever they might find them. A scientific training marked a man who would not commit his soul and his conscience to the keeping of anyone, whether priest or Labour official. We needed this independence badly; some whole classes were in danger of losing it. The other force that might help us out of the mud was religion or, as he should prefer to say, Christianity. The fundamental message of Christianity was that we must get our values right, and that if we got our values right nothing else would be seriously wrong. Science was daughter to one of the absolute and eternal values—truth; art paid its homage to another—beauty; and morality to the third—goodness. Religion consecrated and endeavoured to humanise those three absolute values which it regarded as revelations of the nature and character of God. Our generation might be very stiff-necked and perverse, but sooner or later wisdom would be justified of her children. They must just go on giving their testimony, whether men would hear or whether they would forbear. "The mills of God grind slowly, but they grind exceeding small."

Sir Richard A. S. Redmayne (chairman of the Imperial Mineral Resources Bureau) next spoke on "The Importance of Research in the Development of the Mineral Industries." He remarked that the cessation of hostilities was succeeded almost at once by a period of feverish industrial activity—it would be erroneous to apply the words "general prosperity"—to be followed by a cycle of great depression. The demand for goods was great, but production was falling. What was the explanation? It lay, he thought, in a combination of circumstances:—(1) A feeling of insecurity due to unsettled political and financial conditions. Hence a disposition to conserve rather than to utilise in commercial ventures such capital as is available. (2) The incidence of the rate of exchange. (3) The high cost of production consequent on the high cost of living and the higher standard of comfort demanded by the labouring classes (and rightly so demanded) than formerly obtained. (4) The lower, and still apparently decreasing, productive power of Labour. The first two conditions would in part right themselves in process of time as the various political problems were solved, or partly solved, and rates of exchange would then tend towards the normal; but a very great deal depended upon the last two conditions, as the future position of production was not easy to forecast. Higher and cheaper production were difficult desiderata to obtain in view of the high rate of wages now ruling and the diminishment in working time either achieved or claimed by the manual workers of the day, and these were demands which were not likely to show much abatement in the future. What was the solution? The answer he ventured to give was "research," to discover by research cheaper means of production, and, by research, to create new outlets. How should research be organised and carried out? Empirical investigations must be based upon a scientific foundation if they were to be of ultimate and practical value. It had, however, been well said that if an investigator did not possess the inventive as well as the purely

scientific faculty, the value of the work was apt to be largely lost. The discovery of new things was one matter, and was a characteristic of the academic type of mind; the discovery of new uses for things was another matter, and was typical of the commercial mind. In this work of research the universities were peculiarly fitted to take an important—a leading—part. The research should not necessarily be pursued along definite lines with a definite object in view; the great discoveries were not made in that way. The Department of Scientific and Industrial Research might well endow university scientific research on chemical, metallurgical, and engineering work, supervising and co-ordinating and publishing the results. Effort was largely commensurate to the prize offered, and the discoverer should be rewarded for his labour and genius; but that would be a matter easy of arrangement. Research associations undoubtedly performed useful, even highly valuable, functions, but the wind of science bloweth where it listeth, and the time was ripe for a realisation of the fact that scientific research could not profitably be hampered by restrictions confining the efforts of those who were employed therein. It was of the essence of research that it should be free and untrammelled.

Sir Richard Gregory proposed a vote of thanks to the speakers, and remarked that the addresses of their two distinguished new vice-presidents were of a very inspiring and instructive character. Dean Inge had referred to the fact that a disease produced in the organism an anti-toxin to fight it, and the anti-toxin, Sir Richard suggested, that existed now for certain social diseases was the British Science Guild. It was really a British Efficiency Guild, and in the forefront of its activities must be the promotion, not only of research, but also of the application of research. We had numerous scientific societies, each of which was concerned with adding to scientific knowledge by research, but there was no society or organisation in the kingdom which existed, as the Guild existed, to see that knowledge thus gained was made good use of for national welfare. That was why the Guild could perform a most useful service in bringing before the public the value of research, science, truth, and righteousness to a nation that desired to maintain a leading position in the world. The trade unions referred to by Dean Inge and Sir Richard Redmayne were not trade unions, but wage-unions. If they were really trade unions, and if Labour were united with science to increase production instead of merely scrambling for pence on a Tom Tiddler's ground, then together they would be the greatest force in our Constitution.

On the proposition of Lady Lockyer, hearty thanks were also accorded to the Warden and Court of Assistants of the Worshipful Company of Goldsmiths for the use of their hall. Lady Lockyer paid a graceful tribute to the munificence of the Goldsmiths' Company in educational and other directions, and made an appeal to those who were not members of the British Science Guild to become associated with it, whether they were scientific workers or not.

University and Educational Intelligence.

CAMBRIDGE.—Mr. E. K. Rideal, Trinity Hall, has been appointed to the Humphry Owen Jones lectureship in physical chemistry. Dr. L. Cobbett, Trinity College, has been re-appointed University lecturer in pathology.

The Rede lecture was delivered on June 9 by Sir Napier Shaw on "The Air and its Ways." The lecturer likened the atmosphere to a steam-engine, for which the heated surface of the earth and sea acted as boiler, the cold polar regions and the cold upper air as condenser, and the normal winds and cyclonic depressions as flywheel. The normal winds were the equatorial belt of air passing westwards and the circumpolar motion of the upper air travelling eastwards. Between them were the anticyclonic circulations which, like the driving-belts of tanks, carried forward the westward moving air of the equatorial, and the eastward moving air of the polar, circulation.

MANCHESTER.—At the meeting of the council of the University on June 8 the following appointments were made:—Miss Winifred S. Clarke, lecturer in education; Miss May A. B. Herford, lecturer in classical archæology; Mr. S. Williams, assistant lecturer in botany; Mr. W. Cartwright, assistant lecturer in metallurgy; Mr. P. I. C. Gibson and Mr. A. Haworth, demonstrators in pathology; and Miss Georgina May Duthie and Mr. R. C. Shaw, demonstrators in anatomy.

Mr. W. E. Alkins has resigned his appointment as lecturer in metallurgy as from September 29 next.

OXFORD.—Mr. W. Brown, Christ Church, has been elected Wilde reader in mental philosophy.

ST. ANDREWS.—The honorary degree of LL.D. is to be conferred on July 12 upon the following:—Prof. W. M. Bayliss, Sir William Henderson (chairman of Dundee Technical College), Emeritus Prof. D. Macewan, and Prof. A. N. Whitehead.

THE University of Wales has decided to confer the honorary degree of D.Sc. upon Prof. T. W. E. David, Sir J. J. Dobbie, and Prof. A. Gray.

MR. R. J. PYE-SMITH, formerly professor of surgery in the University of Sheffield, has bequeathed the sum of 1000*l.* to the University in question for a chair in surgery.

MR. A. MACCULLUM, of Edinburgh, who gave 25,000*l.* during his life towards the erection of the new Royal (Dick) Veterinary College buildings in Edinburgh, has bequeathed, under certain conditions, on the death of his wife, a further sum of 10,000*l.* for equipping and furnishing the college buildings.

THE following appointments have been made in connection with the Royal College of Surgeons of England:—Dr. F. W. Edridge-Green, Mr. V. Z. Cope, and Prof. T. Swale Vincent, Arris and Gale lecturers; Prof. S. G. Shattock, Erasmus Wilson lecturer; Sir Arthur Keith, Arnott demonstrator; and Sir Charles A. Ballance, Thomas Vicary lecturer.

THE London School of Economics and Political Science is prepared to award one or more post-graduate studentships, of value up to 200*l.* a year for one or two years, to suitable candidates who wish to combine research with a certain amount of teaching at the school, or to follow approved courses of study with the view of qualifying themselves for such teaching. Applications, stating qualifications and giving two references, should be made as soon as possible to the Director, London School of Economics and Political Science, Clare Market, London, W.C.2.

THE Selborne Society has issued a list of lectures, most of them illustrated by lantern-slides, which its lecturers are prepared to give during the coming