political economy, generally to the entire neglect of the more exact departments of science, and, above all, he prefers votes to history, political economy, science, or anything else. The instincts of the man of exact science are indeed opposed to those of the normal party politician. The man of science must be very sure of his grounds before he makes a statement, and must rigidly compare all existing facts with any theory before he declares the probability, or his personal conviction, of its truth. Above all, he must be careful to avoid the influence of preconceived views of his own or the views of his friends before he draws his inferences from observed facts. Where would the party politician be if he based his action on such grounds? He would soon be hounded out of his party, or reduced to slavish submission by the party whip.

So long as we have party government I fear there is no escape from the predicament. The object of the Science Guild is to provide some partial remedy at least for this undesirable state of affairs.

When Ministers have on any particular subject recognised the need of scientific advice they always have the Royal Society to which they may apply, and from that society they can always obtain sound advice on any subject that involves exact science. But it needs some scientific knowledge to know when sound scientific advice is required; and too often Governments do not know when they should ask for such advice, or they may know enough to realise that acceptance of the advice they require might involve expenditure that would not purchase votes or might lead to action that would be unpopular with some of their constituents.

Now it is here that a body like the Science Guild may rightly and does most rightly and properly come in. Unlike the Royal Society, it does not wait to be consulted. As a non-political body, it desires no party advantage from its action. Therefore when a Bill is in course of preparation or discussion in which it is clear that scientific advice has been neglected or not demanded, the Science Guild refers the matter to a competent committee of its own, and tenders advice without solicitation. It does not stump the country to proclaim its views; it leaves to the Government or the member who fathers the Bill the responsibility of adoption or non-adoption of its advice; it leaves to others to use any further pressure that may be required, based upon the views of the Science Guild.

Our guild is yet young, and it takes time before the elector at large can realise the due weight of its views. But no one can question the competence of its committees; the men who compose them are well known for their scientific standing and sound practical common sense; and, as time goes on, Governments will more and more find the importance of listening to the advice so tendered. No man was more sensible of this than was Lord Haldane, who has been our president since the formation of the guild nearly seven years ago. It is with much regret we learn that the pressing duties of his high office have compelled Lord Haldane to resign the presidency of the guild. We are most grateful to him for the services he has rendered, and for the recognition he has given to the value of the work aimed at and done by the guild.

We all, I am sure, are gratified to know that the Rt. Hon. Sir William Mather has consented to fill the chair vacated by Lord Haldane's retirement. He, as we all know, has taken a prominent part in the promotion of technical education throughout the country. He has been an able and active member of the guild, and we all have confidence that in his hands and under his inspiring influence the work of the Science Guild will grow and flourish.

JOINT MEETING OF BRITISH AND FRENCH ELECTRICAL ENGINEERS.

DURING the joint meeting of the British and French Electrical Engineering Institutions, held in Paris on May 21–24, a wide range of subjects was discussed. The greater part of the time was devoted to electric railway traction. The electrical equipment of purely urban and suburban railways has already become almost a mere question of economics and technical detail; the broader engineering and scientific problems are solved. So far, however, the replacement of the steam train by the electric train on main lines has only been limited, and this is a work for which the electrical engineer is making ready. Its consideration cannot be deferred until the improvements in the economy of generating and distributing electrical energy, and converting it into mechanical energy on the train, are such that there can be no other reasonable method than to burn the coal at the pit's mouth instead of the locomotive furnace; for in the meantime the "electrification" of suburban lines must continue, and the railway engineers naturally desire to equip their lines on some system which will lend itself to main line traffic as well as suburban, without extensive alterations being necessary when the second part of the problem is taken in hand. For this reason, the presentation and discussion of six papers on electric railways by French electrical engineers of high repute was particularly well timed.

The chief reason for different methods in dealing with urban railways pure and simple and main line railways may be summed up in two words, viz. distance and locomotives. On an urban or suburban line, the energy required is spread over a comparatively small geographical area; while on a main line the energy has to be transmitted over a considerable distance. Again, the traffic on an urban or suburban line is mainly passenger traffic, while a large proportion of the traffic on a main line is for the conveyance of goods.

In the majority of suburban lines a comparatively low electrical pressure (500 or 600 volts) is carried on the conductor along the track; this means a proportionately large current is required, but the voltage-drop and loss of energy which this entails are not serious on account of the small distance between the power station or substation and the train. Partly to facilitate the conveyance of this high current from the conductor rail to the train, and partly to enable trains to be conveniently subdivisible into lengths corresponding with the density of traffic at various periods of the day, the "multiple-unit" system is employed, in which there are two or more motor-coaches on each train, each taking current from the "live" rail conductor, but all controlled from the cab of the front motor-coach.

On long main lines, on the other hand, it is obviously more economical to transmit the energy to the train in the form of a higher potential and lower current, and this is the more desirable owing to the necessity of using locomotives, at all events for the goods traffic, which entail transmission of the whole of the current to the train at one point or one set of contacts with the live conductor. Therefore, other things being equal, a high-pressure single-phase current, as is being used on the London, Brighton and South Coast Railway, and also to some extent on the Midland Railway, and on several American and German lines, is indicated as the solution to the problem so far as main line traffic only is concerned; it is easy to generate and transmit, and requires only one live conductor, which is overhead. On the other hand, the overhead work introduces complications and expense for suburban traffic in which there are many lines of tracks and many points and crossings, the equipment of a single-phase locomotive costs more and weighs more than that on any other system, and, last but not least, there is a great risk of serious disturbance to telephone and telegraph lines in the neighbourhood due to both electrostatic and electromagnetic induction.

In three-phase working, as used on most of the Italian electric railways, the second of these three disadvantages does not obtain, but the first disadvantage is accentuated owing to the need of two live conductors for each line of track, and the possible effect on the telegraph and telephone lines is the same. The high-tension continuous-current system is growing in favour, therefore, but it suffers from other disadvantages, although it would certainly appear to fulfil most completely the conditions required in a large number of cases. Standardisation is, of course, desirable for railway working, owing to the through traffic from one line to another, and many suburban lines are already equipped on the medium-pressure third-rail system. In the full discussion of the subject in Paris, the relative values of these and other technical points were weighed.

Among the other papers read at the Paris meeting was one by Mr. W. Slingo, engineer-in-chief of the British Post Office, on certain auxiliary apparatus in telephone exchanges. He described a class of apparatus, originally evolved in connection with automatic telephone exchanges, which is now being applied by the Post Office in some of the manual exchanges in London to assist in the distribution of traffic. In ordinary exchange working, when a subscriber removes his telephone from the hook, a lamp corresponding to his number glows, being actuated through a relay, and the operator to which this number is allotted, or one of the operators on either side of her, places a plug in the subscriber's answering jack immediately by the lamp, and makes the necessary connection. In spite of there being three operators who can attend to any subscriber in the busy hours of the day, there is nevertheless a certain amount of time in which each operator is not fully engaged. In the new "Avenue" exchange, an endeavour to level the work of the operators was made by using "ancillary" jacks for each subscriber, multipled over two other sections of the board, so that any one of nine disengaged operators could take any call. In the new system, however, this distributing of the calls to a free operator is made absolutely automatic. The allotment of groups of subscribers to definite operators is discontinued. As soon as a subscriber lifts his telephone from the hook, an automatic switch at the exchange end of his line selects a line leading to any operator who is idle for the moment, the calling lamp at her position glows, and she immediately answers the call.

Two lectures were given on the closing day of the meeting, one, by M. Georges Claude, on the neon light, and the other, by Commandant Ferrié, on the Eiffel Tower time signals. A discharge in a tube of neon gas gives a very pleasant red or orange-red light, which is, however, absolutely devoid of blue rays. M. Claude proposes to combine the use of these tubes with mercury-vapour tubes, and as the latter are rich in blue rays and devoid of red, a more or less white light is obtainable. A difficulty arises in the fact that while the neon tube requires high-tension alternating-current for the luminescent discharge, the mercury-vapour tube requires low-pressure continuous current. It appears, however, that M. Claude uses in his "correcting" tubes both neon and mercury, which, he said, renders them suitable for alternating current (the exact physical explanation of this was not given in the lecture), so that both tubes can be connected to the same circuit. He gave the efficiency of the combination at about 0·8 to 0·9 per candle.

Commandant Ferrié's lecture on the Eiffel Tower time signals was extremely interesting, but as this subject was described in detail in Nature of March 13, it is unnecessary to do more than mention it briefly now. The time signals at present are sent out twice daily, from 10.44 to 10.49 a.m., and from 11.44 to 11.49 p.m. From July onwards there will be some alteration in the times for sending out these signals and also in the character and sequence of the warning signals. The times for the exact time signals will then be altered to 10 a.m. and midnight. To enable the greatest possible accuracy of observation, a series of 180 short dots regularly spaced at one second less about 1/50 of a second apart are sent out immediately before the ordinary night signals. To facilitate counting, the 60th and 120th dots are omitted. This series of dots is received by the Paris Observatory and other observatories, in each of which the operator listens at the same time to the beats of the master clock or another seconds chronometer. The two sets of beats thus constitute an "acoustic vernier," and during the time that the 180 wireless dots last, three coincidences spaced thirty seconds apart occur between the wireless dots and the beat of the clock. By noting the time indicated by the chronometer at the moment of coincidence, as well as the number of wireless impulses heard before the coincidence occurs, it is possible to calculate the time of the chronometer at the receipt of the first wireless impulse. For instance, if the Greenwich mean time of a coincidence was 23h. 30m. 25s., and the number of the stroke at coincidence was 42, the time of the first beat will have been 23h. 30m. 25s. minus 41 (1 − 1/50) seconds = 23h. 29m. 44·82s.

PROF. BERGSON ON PSYCHICAL RESEARCH.

Prof. Henri Bergson delivered his inaugural address as president of the Society for Psychical Research on Wednesday, May 28, in the Æolian Hall, New Bond Street. At the close of the address, which was delivered in French, and held the close attention of the company for nearly an hour and a half, Mr. A. J. Balfour, a past-president of the society, rose to express the thanks of the hearers, and characterised the address as the most interesting and illuminating one that the society has ever received. When we recall that Mr. Balfour himself, Prof. William James, Lord Rayleigh, the late F. W. H. Myers, and many other distinguished men have held the office of president, we can but feel that M. Bergson has justified both the choice of the society and his reputation as a maker of new thought.

M. Bergson took as his principal theme a study of the nature of the prejudices against the work and methods of the society; in fact, against its very existence—prejudices felt, not by the uninformed and unlearned, but by men of science, keenly desirous to extend the bounds of human knowledge. He attributed the objection to the methods which the experimenters in psychical research were forced to adopt in order to pursue their investigations—methods akin to the judicial, the historical, or even to those of the criminal detective, but, since the Renaissance, foreign to the world of natural and experimental science. The great development of mathematical science, based on the recovery of Greek learning, and carried forward by such men as Kepler, Galileo, and Newton, had given to the modern mind the conception of scientific