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SCIENTIFIC RESEARCH UNDER THE AUSPICES OF THE ROYAL SOCIETY[1]

By Sir WILLIAM BRAGG, O.M.

THE PRESIDENT OF THE ROYAL SOCIETY

Three magnificent gifts have been made during the last few months for the furtherance of research in this country. In May it was announced that Lord Austin had placed a quarter of a million sterling at the disposal of the University of Cambridge to be devoted to the work of the Cavendish Laboratory. More recently still Lord Nuffield has presented to the University of Oxford a million and a quarter for post-graduate research in medical science. This afternoon the council of the Royal Society has accepted on behalf of the society a principal share in the responsibility for the administration of a sum of £200,000 bequeathed by the late Mr. H. B. Gordon Warren. The interest of this money is to be applied to the encouragement of research in metallurgy, engineering, physics and chemistry. The administering committee is to consist of eight members appointed by the society and two by the governors of Williams Deacon's Bank.

[1] From the Anniversary Address given at Burlington House on November 30.

These great gifts are naturally a source of deep satisfaction to the fellows of a society which was founded for the purpose of "improving natural knowledge." The givers are men who are or have been engaged in industry: which fact is itself a source of gratification. It is good to see that practical affairs are in accord with the realization of the vital importance of research.

Lord Nuffield's gift recognizes the value of research for the prevention and cure of disease. The obvious success which has already been attained in this way is sure ground for the expectation of further benefits commensurate with the magnitude of the new effort. Lord Austin's gift is for the promotion of investigations which are at the time devoted mainly to the abstruse problems of the atomic nucleus. The terms of Mr. Gordon Warren's bequest suggest a more immediate contact with industry.

Thus these benefactions differ widely in respect to their immediate purposes: but they all acknowledge the same principle, that the improvement of natural knowledge is essential to the general welfare. As for our society, it is the basis of its charter and the reason for its existence.

The capital value of the funds administered by the society, if we include in them the Warren bequest, is approximately a million sterling. In this amount is also included the bequest of about £40,000 by the late Sir Joseph Petavel, to which reference is made in the report of the council. By far the greater part of the money has been received within the last twenty years. In 1828 Dr. Wollaston founded the donation fund, the first fund of which the income was to be devoted to research; the amount was about £3,400. By the beginning of this century there were several such funds, the combined income of which was £1,375. In 1912 the total income had risen to a little over £2,000 a year. Then in 1919 began a period of large donations. First came the Foulerton gift and the Foulerton bequest. The Messel bequest was received in 1921. The Yarrow and the Mond funds came in 1923, the medical research fund in 1924 and 1925. To these the Warren bequest has to be added. In all the society now directs the expenditure of about £31,000 a year on research. The direction makes a considerable demand upon the time and energies of fellows, and it is a pleasant duty to acknowledge their willing and able service on numerous committees.

The use to be made of these moneys is to a considerable extent limited by the terms of the respective trusts. Nevertheless, here is ample opportunity for a general policy at the discretion of the society. It is natural and right that special emphasis is laid upon general or fundamental research, so far as donors' wishes allow; and indeed the terms in which the donors have expressed themselves are favorable to research of that kind.

It is to be observed that many other bodies possess funds which are administered for similar purposes. In a list published by the Royal Commission for the Exhibition of 1851, the commission itself takes place as one of the oldest, and the Leverhulme Trust as one of the newest. The list includes such well-known names as the Carnegie Trust, the Helley Stewart Trust, the Beit Memorial Fellowship Trust and others. City companies are also to be found here. The improvement of natural knowledge follows also on the activities of many bodies that have specific applications in view. Each branch of the Defence Services maintains its own research laboratories; so do the Medical Research Council, the Department of Scientific and Industrial Research, the Agricultural Research Council, the Post Office, and so on.

Still more closely concerned with the direct applications of natural knowledge are the laboratories of the country's industries. Many of these are of great and established reputation. On the whole, the industrial laboratory is some way from being as frequent a factor in industry as it ought to be, but undoubted progress has been made in recent years.

This brief enumeration of some of the agencies making for the improvement of natural knowledge will serve as a reminder that the sum total of the work done in this direction is very large. It may fall far short of what is to be hoped for, but it forms an agency which begins to acquire a certain coherence, something which can be viewed as a whole and considered in respect to its character and its effects. It is beginning to find itself, like Kipling's ship.

An immediate and obvious effect is the increase in the volume of published results. The publications of scientific societies have doubled and trebled in size; and their treasurers are in many cases hard put to it to meet the consequent additional expense. Numerous industrial publications also contain records of special investigations. There is every reason for satisfaction with the increase in natural knowledge which has followed on the encouragement of research.

In certain respects at least the application of the knowledge acquired is also satisfactory, though judgment on that point will vary according to the position of the observer in a very large field. There are obvious improvements in the health and general well-being of the nation, in its industries, in the strength of its trade and in its powers of defence; and these are matters of primary importance. Though they may be no more than means to an end, they and the appropriate application of knowledge are a first consideration.

To such applications every kind of research may contribute; for even those who would have it that science must be followed without thought of its usefulness must admit that it has to be very pure science indeed which only meets with its application, as a straight line meets its parallel, at infinity. In general the encounter may be expected to come so soon that its effect has a present importance, and must be taken into account. The individual member of the society may keep his thoughts and his experiments within an isolated region, and so contribute what is due from him as a fellow. But the society as a whole must take the wider view and watch constantly the relations between scientific advance and the people who are affected by it. It accepts these responsibilities when it undertakes to administer the great sums that have been entrusted to it. In the early days of the society the fellows recognized duties in these respects, as the records of their "Transactions" show. Many of the founders occupied important positions in the state and their science bore directly on the needs of the nation. Throughout the three centuries of its existence, the same ideals have encouraged the activities of the society. At some times they have been less effective than at others, but their general purpose has never been blurred. The whole of the work of the society is therefore an important part of a general effort to improve natural knowledge in the expectation of resultant benefit.

Another consequence of that effort deserves especial consideration. The increase of knowledge and its applications are, each in its own way, worth working for. At the same time there should follow, and does follow, an increase in the quality and quantity of men who can add to knowledge and use it; also, it may be hoped, an increase in the number of those who realize its effectiveness. This is an exceedingly important point. It might seem unnecessary to observe that the resources which a nation possesses are of no use unless there are the foresight and the skill which are needed to make use of them. Yet a nation as a whole might fail to act on a principle to which its individuals would give a ready assent. The principle has to be stated plainly, so that it may be widely understood. One of the greatest assets of a nation is the presence within it of men who are quick to apply the knowledge of the time to the needs of the time. There are many varieties of such men. There are the handicraftsmen, whose skilled fingers are guided by intelligence; their number is greatly increasing in this country, though the contrary is often asserted. There are those who can assemble and combine materials for a given purpose, and there are others who can seize upon the broad consequences of a new discovery and choose the right moment for setting the old to one side. History has shown many times how the fate of a nation may depend upon its capacity to use the knowledge and the materials at its disposal. One may be reluctant to draw examples from the catastrophe of the great war, but in its heated atmosphere developments came quickly to maturity. During its course engines and devices of all sorts came into being which, before the war began, had never been thought of seriously, if at all. Such were tanks, paravanes, sound ranging, wireless telephony, aeroplanes and a thousand contrivances in every section of the war on the ground, under the ground, on the sea, under the sea, in the air. Their invention and development would not have been possible if there had not been the men for the work. It was fortunate that the nation also possessed a body of young men—chemists, physicists, engineers, biologists—trained in the laboratories of universities, technical schools, polytechnics, and so on, and in industrial workshops who were able to understand and work with the new devices. I doubt if the value of those trained young men has ever been fully realized. If, unfortunately, another great war broke out, the devices of to-day would surely be modified or superseded during its course, and the process of development would begin all over again. Provided that the defence withstood the first shock, the men with knowledge of materials and skill in using them would be in demand as before.

Though war times may furnish the more obvious examples, the developments of peace follow the same road, at a slower pace. The major industries of this country have owed their advance in part to the national resources and to political relations, but largely also to the skill of the country's scientific and technological workers. The electrical trades depend largely on discoveries which she has made and has been quick to use. The same may be said of her metallurgical work, of her shipping industry, of her business in textiles, of the dye industry in which she has now taken a position which might have been hers from the beginning. The battle for the health and the nutrition of the nation depends for its success upon the same qualities. This becomes continuously more so as natural knowledge increases, and its technical use requires a more intelligent craftsmanship.

Many a similar instance might be drawn from past history. But the past differs from the present in this, that the knowledge then to be drawn upon was scantier and far less abstruse. It was related to the technical skill of the workshop rather than, as now, to the science of the laboratory. The agencies of change were such as the discovery of cast iron, the invention of printing, the design of the ocean-going chronometer, the eighteenth-century additions to the loom, and so on. To-day great matters turn upon the complicated physical science of the wireless valve or the intricacies of the internal combustion engine, or the highly skilled chemistry that brings assistance to medicine or the combination of physics and chemistry, biology and engineering involved in the preservation of food.

From this point of view the suggestion sometimes made that scientific workers might take a holiday looks more ridiculous than ever. No nation could afford such an intellectual disarmament in the face of the world; nor could the world itself in face of the evils that are to be overcome.

The position of the men, and especially of the younger men, who are encouraged by these financial aids to devote the most ingenious years of their life to scientific research must be considered by those to whom the ordering of their lives is due. Some of the most brilliant young men in the empire are selected for a specific purpose, which purpose they undoubtedly fulfil. Good work is done, and when it is finished a fine and most useful type of man is available for further service. In a great number of cases the satisfactory opportunity of further service presents itself. But it is not always so. It is possible to find a man living on income derived from one Research Trust after another until he ceases from age or other limitations to be eligible for further aid. His work may have been excellent, and his competence as great as ever, but he finds that he must look in some new direction for his living. Academic businesses may be of no use to him, nor he to them. His occupation has led him up to a blind alley. I am told that there is a certain tendency for men who have been employed in industry as research workers to change over, where possible, to purely administrative work which is expected to be more lasting and in the end more remunerative. There is here a hint as to the true cause of the trouble. The blind alley should be a thoroughfare leading to occupations more suitable to the men and better fitted to get the best out of them. It is obvious what these occupations are. They are places of responsibility to which specialists in science are as yet but rarely admitted. There is an encouraging beginning, but it takes time to realize that the man who is in touch on one side with the growth of natural knowledge should be in close touch on the other side with the opportunities of its application. He should be an equal in the council chamber rather than a subordinate in the waiting-room. On the other hand, the scientific expert must himself help to take down the barricade that makes the alley blind. This requires that his education should be much more than sufficient to make him only a laboratory man: which brings us back again to the very important point that the man himself must be as much the care of those who give him research work to do, as is the work which they set before him. Obviously, the more complete the equipment of the man, the better the chance that he will make his way, and the wider his final influence. The bodies that administer research funds are already beginning to consult each other for the sake of better efficiency in the choice and direction of workers. As this becomes more general, there will surely be an effort to take a wider view of the responsibilities which the magnificent generosity of public men has placed upon them.

Reference is made in the report to a plan of research on malaria in India. I think that I may well amplify the reference by describing rather more fully the proposals of council in respect to Indian medical research, especially as it involves the adoption of a policy which it is to be hoped will commend itself to the society.

In 1924 the Royal Society received a legacy of £10,000, and in 1925 £28,108 19*s.* 6*d.*, being part of the residue of an estate, for the prosecution of original research in medicine, for the prevention of disease and relief of suffering, with special reference to tropical diseases in British possessions. There are particular reasons associated with the gift for connecting its use with India. The council decided at its meeting on July 9 that the whole income, together with the invested income, shall be employed for five years (*i.e.*, until October 31, 1941) as follows:

A.—*Malaria research:* It decided to offer to Colonel Sinton, I.M.S., a stipend for five years to enable him to work at the Horton Centre on certain aspects of malaria. The Horton Centre will be under the control of the London School of Hygiene and Tropical Medicine, and unique opportunities will be available there for clinical study, for observations on the malaria parasite in man and *Anopheles,* for investigation of the serology and immunology of malaria and for chemo-therapeutic testing and experimentation on the human subject. Colonel Sinton is now, and has been for many years, actively engaged in malaria work in India.

B.—*Experimental studies on the ecology of certain species of Anopheles:* Where the control of malaria is successful it is nearly always achieved by measures directed against *Anopheles.* A detailed plan has been suggested by the London School of Hygiene and Tropical Medicine, by which a young man experienced in modern experimental zoology should be given opportunity for twelve to eighteen months, at that school, to learn about mosquitoes in general and the oriental species of *Anopheles* in particular, and should undertake experimental work in the physiology and behavior of *A. maculipennis.* He should then be sent for two and one half to three years to an appropriate center in India to carry out a program connecting malaria with the behavior of *Anopheles.* Council was informed that for the tropical portion of the scheme part of the cost could probably be met by the London School of Hygiene and Tropical Medicine. Assuming that this is the case, it decided that a sum up to £3,750 be offered provisionally, over a period of five years, to finance the project. A suitable investigator has been appointed in Mr. Muirhead Thomson.

C.—*Nutrition in India:* The existence of widespread malnutrition in India is beyond dispute, but more detailed and intimate information is required as to its incidence and effects. The council decided that Dr. C. Wilson should be offered a research grant for one year in the first instance, with possible extension for two more years, to enable her to make a survey of the nutritional condition of Indian families and to draw up a report. A study of the incidence of malnutrition among school-children, an investigation of dietary habits, an assessment of the value of foods in common use, etc., would be made in collaboration with the Indian Research Funds Association and with Dr. Aykroyd, its director of nutrition research. Dr. Wilson will be able, if necessary, to work for only part of the year in India, returning to England to carry out a statistical and experimental analysis of her results. One of her objects while in India will be to build up and train a small body of collaborators by which the work will be aided and perpetuated.

The total estimated cost of the three schemes, over a period of five years, is £8,550. The council of the Royal Society believes that by a far-reaching plan of this character, involving work of three different kinds, all bearing on health in India, its medical research fund can be better employed than by small grants made from time to time for worthy but minor purposes. It could make good use of far more substantial funds on analogous lines.

Reference is made in the report of the council to the decision in the matter of the postal ballot; this required the invocation of a curious provision contained in our ancient charters. We were directed, in cases of a difference which we could not settle ourselves —and in this instance our legal advisers had been unable to settle it for us—to call in the services of certain high officers of state. This we did, and the officers in question responded promptly, taking, I believe, no little interest in this ancient direction and its present application. We are greatly in their debt for their very kind assistance.

The great increase in the amount of material to be published has brought with it certain serious inconveniences. It has always been the practice of the society to scrutinize with great care all papers submitted to it. Fellows have been ready to undertake this task, though, as we all know by experience, the labor involved is serious. Three times as many papers have now to be examined, as compared with a few years ago, and there has been no material increase in the number of those who are available as referees. It is not surprising that men who lead busy lives find it difficult to attend promptly to the work which they are asked to do, especially as the intricacies of modern science may make it necessary for a referee to devote days to any one paper. If there is much delay, there is disappointment at the tardy publication of matter which the writer naturally thinks ought to appear at once.

The council has considered this matter carefully and has come to the conclusion that in the great majority of cases the summary of a paper might be set up in type and distributed within a very few weeks of its receipt, without waiting for the verdict of the referees on the paper as a whole. A fellow who communicates a paper will, of course, take the responsibility for the summary. The reading of the paper and its publication in full will follow in due course, as the responsible committees advise, on receipt of the opinions of the referees.

Three years ago Sir Gowland Hopkins in his presidential address spoke with admiration of the work of the organic chemist and in particular of the "emergence of power to grasp the architecture of complex invisible entities such as organic molecules and the ability to construct them at will." He told how under modern methods of investigation the picture which the chemist had formed of the invisible molecule had actually taken shape. His picture-making had been amply justified. His stereometry was not, as some thinkers had maintained, to be swept away in favor of a mathematical symbolism. On the contrary, its usefulness would surely grow as the new methods were developed.

This anticipation has been fully realized during the last few years, mainly through the remarkable increase in the accuracy with which the structure of molecules, molecular aggregates and solid bodies in general can be determined. For this the methods of x-ray analysis of crystalline structure have been largely responsible. Moreover, other methods have been greatly strengthened by the example set by x-ray analysis and by its reactions upon themselves. Optical, electrical, magnetic and other properties have been successfully studied with the same great purpose, *viz.*, the correlation between the properties of a substance and the spatial arrangements of its components.

While the x-ray methods have been mainly useful in describing the arrangement of the atoms in assemblages surrounded by others of like nature and conditions, the methods of electron-diffraction are giving a remarkable insight into the modifications of arrangement that are to be found on surfaces. The extraordinary interest of such knowledge arises from the fact that natural processes so largely depend on surface actions.

For many years after its inception the x-ray analysis was, as might be expected, engaged in trying its own powers and learning how to apply them. It cleared up many structural problems on which older methods had little to say that was definite, as for example the distinction between ionic, metallic, adamantine and molecular compounds. Many crystalline structures were determined, and the results, as is well known, have been serviceable in a wide field of scientific research, and in many industrial processes. The methods of analysis, the technique and the interpretation of results have been greatly improved, as might be expected, by the researches of many hundreds of workers. The increase in accuracy is so great that new possibilities of usefulness come into view.

The improvement appears in two ways. In the first of the two, the measurements of the dimensions of the unit of pattern of a structure can now be made to one part in several thousand. Consequently, the determination of the electron charge e, made by the x-ray method, can stand beside the older determinations of the oil-drop method. There is a persistent discrepancy of about one part in two hundred, the former giving the value 4.80×10^{-10}, the latter 4.77×10^{-10}; but it is clear that the larger value is at least as near the true value as the smaller. A full discussion of the x-ray method is given by Compton and Allison in their recent book on "X-rays," and a critical examination of some outstanding points is made by du Mond and Bollman.[2]

Again, as has been observed by Bernal, the use of high-precision determinations of the lattice constants of metals will soon become the most reliable gauge of purity of a metallic element. Accuracy has here been pushed to one or two parts in forty thousand. Again, the phase boundaries of an alloy can be very closely and conveniently defined by observations of such a character. Accuracy has been of great importance to the well-known work of Hume Rothery on alloy structures, and to the curious and very important relations between order and disorder in alloys which have been specially studied at Manchester.

The accuracy with which the position of each atom in the unit cell can be measured is of quite a different order. Thanks in particular to the use of Fourier analyses by J. M. Robertson and others, the distances separating the atoms, center to center, can be found to about 1 per cent., even when the complicated molecules of organic crystals are under examination. This is a great advance on the possibilities of even a few years ago, and it has important consequences. In particular, fresh light is thrown upon the problem of the chemical bond. At one time, single, double and triple bonds were considered to be distinct and definite phenomena. The tetravalency of carbon, for example, was described as an assemblage of four equal powers of combination, of which one or more might be exercised in the same direction. When the diamond structure was found by the x-ray methods, it was no matter of surprise that the four separate single bonds were displayed in the attachment of each carbon to four neighbors. In the structure assigned by the chemist to benzene, the fact that each atom had but three neighbors presented difficulties; various theories have been suggested in explanation, mostly little more than different ways of drawing diagrams, in which four single bonds were made to act somehow. In recent years, it has been more usual to propose that bonds may alternate between single and double, and that the tetravalency of carbon in the benzene ring is satisfied because three of the six links are double and three single, the two kinds alternating both in time and in order round the ring. The conception can be extended to cases much more complicated, provided that the two forms between which alternation occurs do not differ much either in form or energy. The effect is described as one of "resonance," a term due to Hund but applied to organic chemistry mainly by Pauling and his collaborators. Its bearing on structural chemistry was discussed by Sidgwick a few months ago in a presidential address to the Chemical Society.

When substances in which this "resonance" is supposed to occur are examined by the x-rays, it is found that the actual center to center distance of two atoms connected by alternating a link between single and double is characteristic of neither of the two extremes. These last two are definite quantities, and the length of the varying link lies between them. An actual link is rarely a pure single or double or triple link. Pauling and Sidgwick both discuss a number of cases in which the center to center distances can be correlated with a probable or possible amount of resonance. An excellent example is furnished by oxalic acid, which was examined by Zachariasen in 1934, but has just been remeasured by Robertson, using the powerful Fourier method of analyzing the observations. The distance between the carbon atoms is 1.43 A. The length of the single link of diamond is 1.54 A. The length of a double bond is very nearly 1.33 A. It might seem that in oxalic acid the link is actually more nearly double than single; but this is not so. A small proportion of double linking seems to shorten the distance considerably. For instance, each link in the hexagonal network of graphite must be two thirds single and one third double, yet its length is 1.41 A. In benzene, the half and half arrangement (following Kékulé) is correlated with a length of 1.39 or 1.40 A. Thus the actual length of a bond may prove to be a safe indication of its nature. Robertson points out that the oxalic acid molecule is always planar, which may be accounted for on the ground that rotation is restricted round a link which is even partially of a double character.

It has recently been shown by Bernal and Megaw[3] that in all probability there are two types of bond linking oxygen atoms through intermediary hydrogens. The one is the "hydrogen bond"; it is found, for example, in acids, and it corresponds to a separation distance, oxygen to oxygen, of 2.55 A. The other is the hydroxyl bond; it is found in a number of hydroxides, and its length is about 2.8 A. By the use of this conception it has been found possible to locate the positions of the hydrogen atoms in several hydroxide structures, particularly in the clayey mineral hydrargillite. The oxalic structure of Robertson seems to supply a new and interesting example of the difference between the two kinds of bond. One of the oxygens at each end of the oxalic acid molecule is bound to a water molecule in the crystal by a link 2.87 A, the other by a link 2.52 A.

[2] *Phys. Rev.*, September, 1936.

[3] *Proc. Roy. Soc.*, A, vol. 151, p. 384, 1935.

It has been pointed out[4] that the linking up of hydroxyl bonds explains the properties of the gels that are formed by neutral hydroxides.

These few examples may serve to show how improvements in the technique of x-ray analysis are sharpening a tool which has already been of assistance to research in many directions and now seems to be acquiring a new usefulness.

The chemist has already shown that the properties of the molecule depend on the internal disposition of its atoms. The characteristics of the solid state depend also on spatial relations, and in a manner which is even more complicated, much more complicated than in the case of the independent molecule. Accurate measurement of the spatial arrangements lays a firm foundation for the study of the properties of a substance in relation to its structure and its composition. The problems to be solved are, of course, extremely complex, but it is surprising how much can be done towards the examination of intricate molecular associations when the spatial relations between the most commonly occurring atoms are known. This applies, for example, to the study of the proteins which has already gone far; to the clays, and to the glasses and other extended structures. At one time it seemed hopeless to expect to learn much of the structure of bodies which were so irregular as to give no sign of crystallinity. But it is now possible to work from the regularity in occurrence of a few definite separation distances, even when regularity in orientation does not exist: and methods have been devised by which these distances can be determined by the x-ray methods.

It is clear, I think, that the stereometry which the chemist has developed so successfully is acquiring new powers which will have the widest applications.

SCIENTIFIC EVENTS

GERMANY AND THE NOBEL PRIZES

FOLLOWING the award of the Nobel Peace Prize to Carl von Ossietzky, the German pacifist who was confined at the time in a concentration camp, Chancellor Adolf Hitler issued on January 30 a decree which reads:

In order to avert such shameful occurrences for all future time, I decree with this day the foundation of a German national prize for art and science.

This national prize shall be divided annually among three worthy Germans to the amount of 100,000 marks each.

Acceptance of a Nobel Prize is herewith forbidden to all Germans for all future time.

Executive orders will be issued by the Reich Minister for Popular Enlightenment and Propaganda.

At the Propaganda Ministry it was emphasized that the prohibition applied not merely to the peace prize, but to all Nobel awards.

The New York Times prints in full the statement made to the Reichstag by its president, Colonel General Hermann Goering, which reads:

Ridiculous insults which proceed partly from rage and partly from the bad taste of others can neither offend nor shame Germany. They merely fall back on those from whom they come, and especially on those who always pride themselves on their special good breeding.

When we see attempts to insult Germany before the world by awarding a peace prize to a traitor, to a person punished with penal servitude, then such action does not shame Germany but merely makes those ridiculous who are responsible for it.

But because Germany will not tolerate such shameful things in the future and does not want any dispute about them at all, the Fuehrer has created this day a national prize for art and science.

May the world realize from this that everything which it may undertake to insult the German people will always fall back on the other. It is, as the Fuehrer has repeatedly emphasized, a singular characteristic of present-day democracies to ignore facts and realities. But one must learn in time that the once torn and impotent Germany has been transformed into a proud, strong, honest, honor-loving, freedom-loving people—a people that has a right to be proud of its achievements before all nations, before history, before the future.

An Associated Press dispatch from Stockholm of the same date reports that Germany's ban on acceptance of Nobel Prizes by Germans will have no effect on the granting of awards by the Nobel committee. Professor Karl Manne Siegbahn, a committee member who won the prize for physics for 1924, asserted that the awards would be without regard for German laws, on the ground that no distinctions were possible between German and other scientists. However, whether payment is possible is a matter between the winner and his government.

A JOURNAL OF "PARAPSYCHOLOGY"

DUKE UNIVERSITY News Service has sent to SCIENCE the following release:

Establishment of a new scientific journal devoted to research in telepathy and clairvoyance has been announced by the Duke University Press. The journal will be called the *Journal of Parapsychology* and will be edited by Professor William McDougall and Dr. J. B. Rhine, with the assistance of Charles E. Stuart. It will be issued quarterly.

[4] Fricke, *Koll. Z.*, vol. 69, p. 312, 1934.