Indian Science Congress

J. L. Simonsen

As the theme of the first portion of my address I propose to give an account of the early history of the Congress. I think it is desirable that an authoritative statement should be on record since in a few years our knowledge of this may be lost. In order that you may be able to appreciate the causes which led to its formation it is necessary we should try to visualise the position of scientific research in India in 1910–11.

Early in the present century it was recognised by those in authority that all was not well with university education in India, and in 1904 what may be called the Curzon Commission on University Education was appointed. As a result of the recommendations of this Commission, it was decided to raise the standard in the various universities and to introduce what are generally known as honours courses. At that time direct teaching was not undertaken by the universities which were solely examining bodies, the actual instruction being given in the affiliated colleges. To bring into effect the new courses it was necessary to increase the teaching staffs in the various colleges, and it is clear that this Commission realised the desirability of stimulating research in the University Colleges. They recognised the correctness of the view so concisely expressed by Dr Alexander Hill 'Where there is no zeal for research there is no vitality in teaching.' If we except three great names in the history of scientific research in Indian Universities, I refer to our three past presidents, Sir Alfred Bourne, Sir Jagadis Bose and Sir Prafulla Ray, I do not think that I am wrong in saying that research in the universities at the commencement of the century was practically non-existent. I do not wish to infer that scientific research in India was non-existent at that date. This was very far from being the case, but research was confined to the various scientific services such as the Survey of India, the Geological Survey, the Botanical Survey, and the Meteorological and Agricultural Departments to mention only a few. From all these departments work of the very first importance emanated, and it is only necessary for me to mention the names of Sir Ronald Ross, Sir Leonard Rogers, Sir Sydney Burrard, Sir Thomas Holland and Sir Gilbert Walker.

It was under these somewhat uninspiring circumstances that in 1910 Professor MacMahon and I found ourselves when we were appointed to the newly created chairs of chemistry in the Canning College, Lucknow, and the Presidency College, Madras. Coming as we did from large English laboratories, we at once felt the great lack of any scientific intercourse. Not only was there neither in Lucknow or Madras any scientific society, but in addition there was a complete absence of any scientific atmosphere. At that time, if we except the meetings of the Asiatic Society of Bengal, the only opportunities afforded for scientific discussion were the somewhat irregular conferences promoted by the Government of India such as – Sanitary Conferences or Conferences of Agricultural Chemists. These were purely official gatherings, and it occurred to Professor MacMahon and myself that scientific research might be stimulated if an annual meeting of workers somewhat on the lines of the British Association could be arranged. We felt that not only would the direct personal contact and association of actual workers be of great value, but also that the general public would be brought to realise the importance and value of scientific research. We decided therefore to obtain the views of other scientists, and in the autumn of 1911 we issued a circular letter which is reproduced as Appendix I to this address.

Whilst the general consensus of opinion was favourable to our proposal to have an annual meeting, the doubt was expressed by many of those best able to judge whether the time was ripe for such an organisation. Some considered that there was not sufficient work being done in India to justify an annual meeting, whilst others suggested that, in view of the great distances, it would prove impracticable to arrange for such meetings.

We decided to proceed with our proposal, and in 1912 we selected seventeen of the foremost men of science to act as a committee to arrange for the holding of the first annual meeting (Appendix II [*Not reproduced – editors*]). On Saturday, 2nd November, 1912, a conference was held in the rooms of the Asiatic Society of Bengal with the late Sir Henry Hayden in the chair. The others present were Messrs Christie, Hooper, Kemp, Tompkins, MacMahon and myself. The actual minutes of the meeting are reproduced in Appendix III [*Not reproduced – editors*], the most important resolution reading as follows: 'The Asiatic Society of Bengal be asked to undertake the management of a Science Congress to be held annually.'

As you are all aware progress in India is always slow and although it had been our intention to have the first meeting in Calcutta in December, 1912 or January, 1913 this was not feasible and it was not until the 17th January 1914 that the first meeting was held with the late Sir Asutosh Mukherjee as President. The delay was perhaps not altogether unfortunate since our first meeting thus coincided with the centenary celebrations of the Indian Museum. The actual meeting extended over three days and the number of papers notified for reading were thirty-one.

Whilst the number of papers which were presented to the first meeting and the attendance threat appeared to augur well for the future, yet an examination of the authorship of the papers showed that of the thirty-one no fewer than twenty-five were from authors resident in Calcutta or other places in Bengal. This lent support to the attitude of those critics of the scheme who suggested that distance would prevent the holding of successful annual meetings, and it had also to be borne in mind that Calcutta then, as now, was the centre of scientific research. It appeared to us therefore that, if future meetings were to be successful, some form of government recognition was necessary so that Local Governments might be induced to pay travelling allowances to government servants. We, therefore, approached a body which is now defunct, the Board of Scientific

*Text of Presidential Address delivered during the 15th Indian Science Congress, Calcutta on 2 January 1928.

The editors thank M. S. Baird, University of Wales, for drawing attention to this address.

Advice, which comprised the heads of the various scientific services and we were fortunate in obtaining the enthusiastic support of two members of the Board, Sir Sydney Burrard and Sir Henry Hayden. As a result of their representations, the Government of India authorised Local Governments to permit such officers, as they might consider desirable, to attend our meetings. Not content with this Sir Sydney Burrard also induced the majority of the Indian Railway Companies to grant concession rates to non-government servants who wished to attend. Unfortunately owing to the war this concession was withdrawn and in spite of repeated representations the railway authorities appear to be unable to recognise the importance of our meetings and this concession has not since been renewed. I sincerely hope that in future wiser counsels may prevail.

I feel that I should be wanting in gratitude if, before leaving this aspect of the subject, I did not take the opportunity of placing on record my great appreciation of the help and encouragement which we received in the early days from Sir Sydney Burrard and Sir Henry Hayden. The former was our President at Lucknow in 1916 and those of us who were present on that occasion will still remember his brilliant Presidential Address; it was not our fortune to have Sir Henry Hayden in this office but I betray no secrets when I say that it was not because it was not offered to him. With that modesty so characteristic of him. he preferred to work behind the scenes and his help was never asked in vain.

It is not necessary for me to refer in detail to our later meetings. Each year has shown a growth in the number of our members and in the number of papers contributed. It is now becoming one of our most pressing problems to know how best to deal with these papers.

May I be permitted here to digress for a moment? Without desiring to minimise the importance of the reading of papers and the discussions arising therefrom, to me the great value of our meetings has seemed to lie in the personal contact outside the lecture room. To our younger members it cannot but be an inspiration to meet and talk to the leaders of scientific thought in India. This aspect is in my opinion all too frequently lost sight of and I wish to take this opportunity of emphasising it.

The secretarial work of the Congress continued to be shared by Professor MacMahon and myself until 1921 although during the greater part of this time Professor MacMahon was absent from India on active service in France. In April, 1921, Professor MacMahon resigned and his place was taken by Professor Raman who had from the start been an active supporter. When in 1924 pressure of other work compelled Professor Raman to resign, your present senior secretary, Professor Agharkar, was appointed. To them we owe a debt which will be difficult to repay.

No account of the history of the Congress would be complete without a reference to our relations with the Asiatic Society of Bengal. I have frequently been asked to explain our relationship and I have always found it somewhat difficult to do so. In the minutes of the original committee meeting it is recorded that the Asiatic Society of Bengal were to be asked to arrange the first Congress and this they did. In subsequent years the bonds attaching us to the Society were extremely close but there was no definite connection beyond the fact that the Honorary Treasurer and Secretary of the Society were *ex-officio* members of the Executive Committee whilst at first the appointment of the Congress Secretaries required the confirmation of the Society's Council. This loose unwritten constitution has proved to be all to the advantage of the Congress. The Society has acted as our Treasurer, it has met a large part of the cost of our publications and has undertaken much of our routine secretarial work. I think that we are deeply indebted to the Council of the Society for permitting their officials to assist us in this manner and more especially to their General Secretary, Mr van Manen. So far as I can see the Society has not had any direct benefit from the connection whilst to us it has been of incalculable value. On financial grounds alone I do not think that without their aid we could have survived. I trust that the unwritten law which binds us to the Asiatic Society of Bengal may continue, since, to be associated with an ancient society of such standing, cannot but add lustre to our name.

It has been my privilege for nearly eighteen years to have been closely connected with education and research and this seems to me to be an opportune time to consider how we now stand as compared with 1910 when the idea of the Congress was conceived. In 1910, as I have already mentioned, research was confined mainly to the various scientific services, in other words it was almost entirely carried out by Government servants. The condition was, therefore, completely different to that prevailing in Great Britain where such participation was practically unknown. As one of the results of the great upheaval due to the war, the position in Great Britain has undergone a fundamental change. The activities of the Department of Scientific and Industrial Research are so well known that I need only refer to them in passing, whilst in addition, the British Government has further recognised the fundamental importance of research by the appointment of the Civil Research Committee, which may be regarded as Scientific Imperial General Staff.

During the latter years of the War and for a short time afterwards it appeared that the Government of India had at length come to recognise that it should do all that lay within its power to organise and encourage research. I am much afraid that this hope was illusory and that the impetus was due mainly to Sir Thomas Holland. With the departure from India of this great scientist and administrator not only did advance cease but a retrograde reaction seemed to set in. Perhaps the most serious and direct blow was the curtailment of the grant to the Indian Medical Research Fund Association. Fortunately, this grant has once more been restored but it will be many years before the trained workers who were lost can be replaced. On the other hand, it is with pleasure that we note an advancement in a direction new to India, namely, the formation of the research associations for the investigation of cotton and lac. The work of the Indian Cotton Committee, with which our past President Mr Howard has been so intimately connected, is too well known to require elaboration, whilst the Lac Research Association has made a successful start. I have referred to these two research bodies as I consider that research conducted on these lines by independent organisations is to be encouraged in every manner possible.

Whatever may prove to be the future line of development of research in India, there can be no question that both the Imperial and Provincial Governments

must continue to be deeply interested and involved. Unfortunately, the present organisation suffers from a grave disability in dealing with any scientific problem in that it no longer possesses an advisory body to whom it can refer such problems. Open as the former Board of Scientific Advice was to criticism I would strongly commend to the authorities its reconstitution on a broader basis. There can be no question that Governments require an influential and impartial body to whom they can refer matters of scientific importance. The expense involved would be small, and the advantages to be gained are obvious.

Whilst the advance of the spirit of research in the universities can be viewed with satisfaction, I do not think that those of us who have been intimately connected with teaching for the past twenty years can look with equal satisfaction on the present position of Indian Universities so far as the general academic standing is concerned. A large number of new universities have been created and on paper the courses of study and the standard of examination would appear to be the equal of those obtaining in other countries. In actual fact this is far from being the case and it is with a due sense of responsibility that I feel compelled to say that, with few exceptions, the degree standard has been considerably lowered during the last few years. In my opinion, the blame does not lie with those actually engaged in teaching. The recent University Acts have placed far too much power in the hands of laymen. No doubt a patient is fully aware of the qualities which he expects to find in the medical man who attends him; the contractor knows what he requires of the engineer whom he employs. This does not, however, justify either the patient or the contractor in thinking that he knows the correct courses of study or the correct standard of examination which will enable him to obtain the doctor or engineer he desires. Yet, if we examine the constitution of the majority of the Indian Universities we find that, owing to a desire for democratic control, the real power has been taken out of the hands of the professorial staff. I am willing to grant that it is highly desirable that the general policy of the university should be regulated by laymen, but I would emphasise the necessity of debarring them from any detailed control of either courses of study or the standards of examination. These should be absolutely under the control of the professorial staff and it should be impossible for the administrative body of the university to order that the percentage number of passes in any examination should be increased as has to my knowledge happened more than once. The only result is a general diminution in the status of the degree and if this is permitted to continue the degree of an Indian University will cease to be of value in academic and industrial affairs. Perhaps we shall see a change when there is a clearer realisation of the difference between knowledge and wisdom. It was Cowper who wrote

> Knowledge and Wisdom, far from
> being one,
> Have oftimes no connection. Knowledge
> dwells
> In heads replete with thoughts of other men;
> Wisdom in minds attentive to their own.
> Knowledge is proud, that he has learnt
> so much;
> Wisdom is humble that he knows no more.

Whilst it is always simple to offer destructive criticism it is not always so easy to suggest a cure, but in this case I would venture to say that it should not be difficult to raise the standard of education in the universities. The main difficulty which confronts most teachers is the large number of students, the majority of whom enter for their collegiate career not with a desire to acquire knowledge or wisdom, but to gain a degree which is a stepping stone to government employ. This factor is the real cause of the maintenance of a low standard. A simple remedy lies to hand, namely the extension of Civil Service Examinations to all grades in the clerical departments of government. Such examinations are the general rule in other countries, and in India they are held for the higher grades, but for ordinary clerkships the primary requirement is a university degree or some other educational qualification. I would recommend that in the place of laying down an educational standard as a preliminary to employment that admission should be by competitive examination. I am willing to admit, that the introduction of this system would in all probability lead to the formation of cramming institutions, but whatever may be the defects of these, they would liberate the universities from their present thralldom and enable them to devote themselves to their true function, the advancement of learning.

The importance of the study of natural products

Having completed my survey of the early history of our Congress I will for the remainder of the time which is at my disposal be somewhat more technical

> And Nature, the old Nurse, took
> The child upon her knee
> Saying, 'Here is a story book
> Thy father has written for thee.'
>
> 'Come wander with me,' she said,
> 'Into regions yet untrod,
> And read what is still unread
> In the manuscripts of God.'
>
> And whenever the way seemed long,
> Or his heart began to fail,
> She would sing a more wonderful song
> Or tell a more wonderful tale.

In days not so far distant the man of science was not a specialist. Although by profession he might be a geologist or botanist, he could maintain a very thorough appreciation of all developments in the world of science. Thus Bacon in his catalogue of experiments to be done, which was appended to his *Novum Organum*, was able to range from a subject such as 'Fiery Humours' to that of the 'Nature of Numbers'. Our breadth of outlook must now perforce be much more limited, and even in the subject which we profess it is possible only to be master of a limited portion of that subject. Deplorable as this may be, it is, I am afraid, a factor which will remain unaltered, and with the rapid development of scientific research is likely to be intensified unless the suggestion recently advocated by the Bishop of Ripon be adopted. I would plead this as an excuse, if in what follows, my language should at times be technical and difficult of understanding by those who are not chemists.

My own investigations have been concerned in the main with the study of the chemistry of natural products and as a result I have been brought into fairly close touch with such related subjects as botany, geology and medicine. In the illuminating address of my distinguished predecessor to which many of us had the privilege of listening last year, he outlined some of the beautiful methods which he has devised for probing the secrets of

plant life. In comparison, the methods of the chemist may appear to be somewhat crude, they attack the position from a different angle, but one from which results of equal importance are likely to result.

One of the objects of the chemist is to separate one by one the various individual substances present in living matter and to determine their structure by analytic and synthetic methods. It is fascinating to consider the advance in our knowledge from 1806 when Sertürner first isolated morphine from opium, to the present year distinguished by Barger and Harington's brilliant synthesis of thyroxine, the active principle of the thyroid gland.

The interest of the study of plant and animal products is not confined to the laboratory, but extends into the economic world. As an example of this, I would commend to your attention the excellent work of Annett and his collaborators on the relationship of the alkaloidal content of the poppy juice to the age of the plant and to external features such as the nature and previous treatment of the soil. All true lovers of science must deplore the circumstances which led to the curtailment of this investigation, since it is only by detailed and painstaking studies of this type, that we can pass to the many more complex ones which await solution.

I have always considered it somewhat remarkable that so little attention has been devoted by organic chemists in India to the study of natural products, most of their researches being concerned with abstract problems. It must be admitted that problems of the former type are difficult and offer little attraction to those who estimate work by quantity and not by quality. In the *Quarterly Journal of the Indian Chemical Society*, which is now in its fourth year, I have only been able to find nine papers which deal with the chemistry of natural products. Is it presumptuous to suggest to the organic chemists of India that they should study intensively the unique wealth of material which lies at their door, and devote less time to the study of problems of theoretic interest only?

An important advantage of this branch of research work is that it brings one closely into contact with other sciences. In the study of plant products contact is first established with the botanist. Without his skilled aid it is not possible to be sure of the identity of your material, and it has been brought constantly to my notice how much excellent work is lost by the lack of botanical identification of the material used in the investigation, or by its inaccurate identification. Systematic botany is by no means simple, and it must be borne in mind that it is rarely possible to identify with certainty a piece of bark or a root. It is not alone the chemist who benefits by the collaboration; it is well known that in many cases with closely related species herbarium identification is almost impossible. To quote what may be regarded as a classical example – no skilled observer in the field has any difficulty in differentiating the two grasses known as *Sofia* and *Motia* yet in the herbarium they are both classified as *Cymbopogon martini*, Stapf. The distinction is of the greatest technical importance since the oil obtained from the *Motia* grass yields the well-known and valuable palmarosa oil, whilst from *Sofia* grass only a comparatively valueless and quite different ginger grass oil results. The chemical differentiation of these two oils affords no difficulty. The position is similar in the case of many other grasses, the difference between the chemical constituents being far more marked than any morphological variation. During the course of my own investigations I have come across a number of cases of this kind, and I would like to suggest that it might be worth while to make a detailed botanical and chemical study of the various *Cymbopogon* grasses in which India is so rich, in order to determine whether a chemical classification would not prove to be more satisfactory than a purely botanical one, as I think that it will be generally admitted that, in spite of the laborious researches for which we are mainly indebted to Dr Stapf at Kew, the present position is far from being satisfactory. A study of this nature might throw some light on the question as to whether the chemical constituents of the oil derived from the same grass vary with climatic conditions and with the nature of the soil. The analysis of essential oils is now sufficiently advanced for work of this nature to be undertaken with every prospect of success.

I do not wish to claim any originality for the suggested substitution of a chemical for a botanical classification. In Australia, Baker and Smith in their remarkable work[1] on the differentiation of the various species of *Eucalyptus* have already found this to be the only satisfactory method. In this connection I would like to direct attention to the case of *Eucalyptus dives* which has been studied recently in some detail by Penfold and Morrison[2]. This tree, which is the common broad leaf peppermint, occurs in Australia over enormous tracts of country, and the oil from the leaves has become of importance owing to the occurrence in it from forty to fifty per cent of the ketone piperitone, a commercial source of thymol and menthol. With the increased economic demand it was found that certain oils said to be obtained from the leaves of *E. dives* only yielded from five to twenty per cent of the ketone. They were at first regarded as adulterated. It was, however, shown that they were genuine oils and that *E. dives* existed in at least four varieties which were morphologically absolutely indistinguishable both in the field or in the herbarium, thus differing from the grasses *Motia* and *Sofia*. At first sight, this difference might be expected to be due to soil or climatic conditions but this does not appear to be the case, since the different varieties breed true when grown in pots. This opens up a very difficult chemico-botanical field of research, which may not be without bearing on cognate agricultural problems, but I would submit, that it substantiates my claim for the value of a chemical rather than a botanical classification in difficult cases.

In the opening remarks to this section of my address I referred to geology as one of the sciences with which investigators of natural products were brought into contact. One of the most interesting and difficult of border line subjects is the much debated problem of the origin of the petroleum oils. During the examination of the essential oil obtained from the oleo-resin of *Pinus excelsa*, which occurs in the United Provinces, it was surprising to find that the oil contained a considerable quantity of the paraffin hydrocarbon, undecane. This fact, together with the occurrence of pentane in the oils from *Pinus sahiniana* and *Pinus jefferyi* both habitants of North America, not unnaturally led to the consideration of the question of the origin of petroleum, more especially since remains of the coniferae have been found in the earlier strata.

I do not propose to detain you with a detailed and historical account of the various theories which have been

advanced to explain the occurrence of petroleum oils. I do not suppose that anyone now seriously doubts that they are of organic origin, a view which is supported by the fundamental fact, that the oils show optical activity. This side of the subject has been discussed by Rakusin in his book *Die Polarimetrie der Erdöle*. If we accept, as I think we must, an organic origin for the oil, is it necessary to assume that all the oils have the same organic origin? I would suggest that such an assumption is not necessary, and I would further suggest that in different areas the mother substance may have been different. According to Engler's views[3] the oils are formed from animal and plant fats, their optical activity being due to the presence of cholesterol or its decomposition products in the higher boiling fractions. Amongst other evidence he adduces in support of his theory the fact that the optical activity is always found in the same fractions in oils from different sources. Recently Zelinsky[4] has attempted to provide evidence in support of this theory by laboratory experiments which, in my opinion, can hardly be regarded as convincing. He has shown that when cholesterol is treated with aluminium chloride oils are formed which closely resemble the natural petroleums, and he has further shown that the same fractions of these oils and of the natural oils show optical activity. Treatment with aluminium chloride is somewhat drastic and can hardly be considered as analogous to reactions taking place in nature. Until, therefore, the presence of cholesterol or one of its degradation products has been detected in petroleum oil Engler's theory, attractive as it may be, cannot be considered as established.

Another possible mother substance has been suggested by Ormandy, Craven, Heilbron and Channon[5] in the hydrocarbon, spinacene, which has been shown by Chaston Chapman, Tsujimoto and others to be widely distributed in fish livers. The investigations of Heilbron and his collaborators would appear to leave little doubt that this hydrocarbon is a member of the terpene group, and readily undergoes polymerisation and degradation. Furthermore, it is optically active. If marine animals be accepted as a source of the petroleums, I consider that this hydrocarbon may with equal probability be regarded as the cause of their optical activity and possibly with a greater degree of probability, since the quantity present would be likely to be greater than that of cholesterol.

In 1922 I was led to consider whether the mineral oils in certain cases might not have originated in resiniferous trees rather than in marine organisms. The resin-bearing trees contain potentially large amounts of material capable of yielding by simple chemical changes both alicyclic and cyclic hydrocarbons. Some support appeared to be afforded for this suggestion by the fact that in Burma large quantities of fossilised remains of *Dipterocarpus* are found in strata adjacent to the oil-bearing strata. The various species of *Dipterocarpus* yield an oleoresin known as *Gurjun* balsam. In Burma the two principal species are *D. turbinatus* Gaertner and *D. tuberculatus* Roxb., yielding the so-called *kanjin* and *in* oils. Not being a geologist, I consulted my geological friends but received little support for the suggestion and I was therefore extremely cautious in my published paper[6], expressing myself as follows: 'In view of the fact that the members of the coniferae have been found in the early strata, it would appear to be possible that they were, at any rate in certain areas, one of the sources of the petroleum now found there'. This suggestion* seemed to me to be of some importance, since, if it were correct, there was the possibility that the occurrence of forests of resiniferous trees might indicate the presence of petroleum-bearing strata, a subject worthy of investigation by geologists.

I have therefore read with more than ordinary interest a monograph entitled *The Geology of Oil, Oil-shale and Coal* by my friend Dr Murray Stuart, a former member of the Geological Survey of India. It would lead me too far to discuss all the interesting suggestions made by him regarding the formation of coal and oils, it is with the latter that we are immediately concerned. Dr Murray Stuart advances strong experimental evidence for the view that it is not necessary to assume that the oils were originally formed in the strata in which they are now found, but that they may have been carried there by water being held in suspension in mud. They were subsequently deposited with this mud as a sediment. He then proceeds to suggest, after discussing the geological history of Burma during Tertiary times, that the oil now found in the Pegu strata originated in the fossil wood of the Irrawaddy system. This fossilised wood belongs almost entirely to the genus *Dipterocarpus*. During the process of silification, which he assumes may have actually taken place in the Arakan Yoma Island between the first and second phases of the Himalayan uplift, the oleo-resin would be 'ejected' from the wood and carried away with the mud by water and deposited in the Pegu strata. In so far as I am capable of judging Dr Murray Stuart's theories, they appear to be sound, and I am prepared as a chemist to accept them as a correct explanation of the occurrence of this oil field. Professor Dudley Stamp, who has worked in Burma, is prepared to support Murray Stuart's views although he does not agree with him that the Arakan Yoma Forests were the source of the *Dipterocarpus*. To quote from his most recent publication[7], 'If the chemists are satisfied as to the possibility of this material as the mother substance of the oil there seems no geological reason against the suggestion .... But Murray Stuart's idea will hold, provided he is willing to admit derivation of his material from the north. There, in beds of the same age as the oil bearing beds further south, vast quantities of fossil wood are found.'

Whether these theories on the origin of petroleum will prove to be correct cannot be foreseen, but I think that they indicate how interesting may be the chemical study of natural products, and how it may help in the solution of problems belonging in reality to other departments of science.

*In a discussion at the Chemical Society on the chemistry of petroleum (*Chem. & Ind.*, 1925, 3, 168) I again referred to this suggestion.

Appendix 1

Proposed Indian Association for the Advancement of Science

Dear Sir,

The rapid expansion, during recent years, of the teaching of science throughout India as well as the multiplication of laboratories in colleges and institutions designed for research purposes has disclosed a lack of scientific organisation which calls for the attention of all those engaged upon educational and research work in the country. The isolated worker in India is, for the most part, deprived

of the help afforded by scientific reference libraries and his difficulties are enhanced by the fact that he is removed from the European environment whence he draws in large measure his inspiration.

We feel that the disabilities under which science suffers in India would be in part ameliorated, and that an impetus would be given to research work by the establishment of some central organisation after the manner of the British Association for the Advancement of Science, whereby different workers throughout the country might be brought into touch with one another more closely. The attention of the society might be directed to every field of enquiry and to every aspect of scientific activity whether purely theoretical or applied to those numerous special problems offered by the Indian Empire and peculiar to its natural and economic conditions. The study of endemic diseases, of the conditions governing agriculture and forestry, of engineering problems in the tropics and subtropics, of the natural products of plants and of the mineral resources of the country, all these subjects call for extensive and systematic research in the laboratories with which India is now equipped. Behind this there is the larger educational problem, that of presenting to the minds of the people the aims of science, its purpose and ideals, its value as an instrument of social and economic improvement.

The objects of the proposed society are similar to those of the British Association and they cannot be better stated than in the words which form the preamble to the constitution of that body: 'to give a stronger impulse and a more systematic direction to scientific enquiry; to promote the intercourse of societies and individuals interested in science in different parts of the country; to obtain a more general attention to the objects of pure and applied science, and the removal of any disadvantages of a public kind which may impede its progress.'

It is to be noticed that co-operation with the activities of the society would not preclude the publication of results in European periodicals nor in departmental journals dealing with particular branches of research; its primary aim is to afford medium of communication between workers in different parts of India. Accordingly, it is proposed to establish an association which shall hold an Annual Meeting (sectional or otherwise) in the more populous Indian towns where papers might be read and discussed, the proceedings to be published in the form of an Annual Report. We invite your opinion as to the expediency of founding a society of this kind and would be glad to know whether, in the event of its successful inauguration, you would be glad to support it on the general lines indicated above. The success of the scheme, naturally depends upon the extent and representativeness of the support accorded to it. We hope to arrange an early meeting in Calcutta where the details might take practical shape.

In conclusion, attention may be drawn to a most important aspect of the scheme, namely, that concerning the co-operation of Indians. We realise that the future of science in India depends upon the adequacy of the practical training which students receive in College laboratories, and furthermore, that nothing is better calculated to increase its efficiency than the inculcation of research as the ultimate purpose of all scientific knowledge. It is unnecessary to point out how many and varied are the problems awaiting solution or how intimately the social and economic future of India is bound up with the successful application of scientific methods to all the activities, whether agrarian or industrial, of the community. We cordially invite the participation of Indian scientists, convinced in the belief that in such measure as it is accorded the objects of the society shall more nearly approach fulfilment and its usefulness and permanence be assured.

The undersigned, who in response to a public demand for action are undertaking the task of arranging an informal plebiscite on the question, would be glad of the favour of your opinion, and request that replies be sent to either of the addresses indicated below:

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1. Baker and Smith, *A Research on the Eucalyptus, especially in regard to the Essential Oils.*
2. Penfold and Morrison, *J. Roy. Soc. N.S. Wales*, 1927, **61**, 54.
3. Engler, *Das Erdöl II*, 1909, 132.
4. Zelinsky, *Ber.*, 1927, **60**, 1793.
5. Ormandy, Craven, Heilbron and Channon, *J. Inst. Petrol. Technol.*, 1927, **13**, 1.
6. Simonsen and Rau, *Ind. Forest Rec.*, 1922, **9**, 118.
7. Stamp, *J. Inst. Petrol. Technol.*, 1927, **13**, 40.

Edited and published by Prof. P. Balaram and Prof. S. Ramaseshan, Current Science Association, Bangalore 560 080.
Typeset by R D Typesetters, Bangalore (Ph: 3405672). Printed by Lotus Printers, Bangalore (Ph: 3380167).