# VIJNAN KARMEE

journal of the association of scientific workers of India

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**Journal of the Association of Scientific Workers of India**

**(Founder-President : Shri Jawaharlal Nehru)**

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## CONTENTS



*The views expressed in the journal are not necessarily those of the Association of Scientific Workers of India*

# Scientific Policy of India

The Association of Scientific Workers of India hails the resolution recently adopted by the Govt. of India and placed before both Houses of the Parliament by our Prime Minister on 'Scientific Policy' with its six-point programme by which the scientists of the country have been assured an honoured position in India.

The Association has been consistently impressing upon the Govt. of India the necessity for the adoption of such a policy resolution and in this context the announcement has come none too soon. Now that it has been adopted it will be welcomed by all those who have India's interest in mind and appreciate the role of science and technology for the rapid economic regeneration of the country. The present decision is all the more welcomed by the Association, the only body of its kind fully representative of scientific workers all over the country and engaged in different branches of science & technology.

It was only recently during the General Body meeting of the Association held at Madras on the 8th January, 1958 that Dr. S. Husain Zaheer, President of the Association, while explaining the demand of the scientists for according them a proper status remarked that their demand should not be taken to indicate their being desirous of 'higher place' in society in the order of precedence in ceremonial functions. As scientists they were not worried about what position was accorded to them on such occasions. What worried them more was the attitude which those in authority in the administration and other high places adopted towards the points of view put forward by scientific workers on important problems facing the country. Even on matters of technical and scientific interest, decisions were mostly taken by people having no direct knowledge of these. Our President gave a very apt expression towards the common feeling of scientific workers when he said that the attitude that was adopted towards scientific workers could be summed up in the expression 'back-room boys'.

It is indeed very encouraging that the Govt. of India have decided to persuade and accomplish the aims set forth in the resolution by offering good conditions of service to scientific workers of the country, associating them with the formulation of policies and by taking all other necessary steps to promote scientific research and to train the required personnel. The Association earnestly hopes that the Commission of Enquiry recently formed to determine the structure of pay and other emoluments of workers employed by the Government, will keep in view the objectives outlined in the Govt. resolution on 'Scientific Policy', while making their recommendation on the service conditions of scientific workers employed by the Govt. Our Association has already submitted a comprehensive memorandum on behalf of the scientific workers of the country to the Pay Commission for the immediate improvement of their conditions of service and has made various recommendations aimed at the fulfilment of the objectives.

The Association assures the Govt. of India that the scientific workers of our country have always been willing and are ready to shoulder the responsibility to which they may be entrusted in the great adventure of building the Nation.

# A Pledge to the Nation

At the last Annual Council meeting and General Body meeting of the Association of Scientific Workers of India held at Madras in January 1958 a pledge was taken by the members to give their whole-hearted support towards the objectives of the Second Five Year Plan. During the last year certain inflationary pressures were being felt in the country and there was a sudden serious shortage of foreign exchange. Doubts began to be expressed in certain quarters on the possibility of attaining the targets envisaged in the plan and reflections were made on the ambitious nature of it. The Association, however, has the fullest faith on our people for the successful implementation of the plan and it is convinced that the targets in the plan are the minimum that should be reached during the plan period to effect any noticeable change in the standards of living of the people in our country. The Association also considered it necessary to express a sense of dedication towards the development of the country and the following pledge gives expression to it :

"The Indian consitution recognises certain fundamental rights for all citizens. As citizens of India scientific workers as well as others have certain primary responsibilities and duties. In the programme of national development the scientific and technical workers will play no inconsequential part, since every programme of expansion involves progress in scientific & technical research. Hundreds and thousands of scientific workers will be required to carry out the numerous programmes of research & development in the Second Plan.

"An organised group of scientists can help in the direction by personal examples and by popularising scientific outlook in day-to-day life. It is expected that whereever the scientific workers are employed the trained scientific mind will be brought to bear upon all problems in development & management.

"We have in our country all the potentialities for the development of our country and for the consolidation of these developments. We can look forward to the future without apprehension if only we could utilize the energy and talents latent in our country properly and effectively.

"We the scientific workers of the country pledge ourselves towards a rigorous discipline to meet our obligations towards national reconstruction."

# Science Policy & the Scientific Workers

Dr. S. Husain Zaheer, President, Association of Scientific Workers of India, has issued the following statement to the press: "On behalf of the scientific workers of India, I welcome with appreciation and gratitude the resolution on 'Scientific Policy' adopted by the Government of India and placed by the Prime Minister before Parliament on Thursday 13th March, 1958. From the point of view of the progress and development of the country, it must be considered an event of great significance.

For the first time, the government of the country has acorded its recognition to the fact that science and technology are the most important social factors governing the evolution and progress of society in modern times. The level of their development is a measure of cultural advancement and social prosperity.

The government has also shown realisation of the fact that for the pursuit and accomplishment of its aims, scientists, as the most advanced section of society, must be offered good conditions of service and an honoured position. Also, they must be actively associated with the formulation of policy decisions.

It is gratifying to note that the Science Policy resolution meets to a very large extent the demands put forward by the Association from time to time during the the last few years concerning the role of scientists in the development of the country. This should not, however, lead to a sense of complacency and scientific workers should continue with their efforts to help implementation of this policy.

The Association would like to point out that the government has yet to enunciate the practical steps wherewith to implement their declared scientific policy. The Panel of Scientists to advise the Planning Commission met more than an year ago, but has not been consulted since then. Its important recommendations in regard to policies for science and scientific personnel remain largely unimplemented. In Great Britain, the government has a permanent science policy advisory committee of eminent scientists. In the U.S.A., the President has appointed a scientific adviser to counsel on an overall direction and integration of scientific affort. As a first step, the Government of India should give greater authority to, and actively associate the Panel of Scientists with the direction and execution of the Second Five Year Plan.

To scientific workers, the resolution of Government is a call for greater devotion to duty and increased responsibility. They will have to justify the promise of better conditions of service and an honoured place by a more determined effort towards the speedy scientific and and cultural advancement of the people of our country. To this task, they should prepare themselves, organisationally and intellectually. The Association of Scientific Workers of India, pledges itself to dedicate its efforts wholeheartedly to this end.

# Federation in Perspective

By

**Professor C. F. Powell,** F.R.S.

Since the last General Assembly of the Federation, the tenth anniversary of its Foundation has been celebrated. This is therefore an appropriate time to review the extent to which the decisions of the previous assembly have been carried out. Further, and more generally, we may survey briefly the history of the Federation to discover whether it does indeed meet a real need in the development of world science. We may also ask whether the aims established in the charter have been followed. Are they valid for us to-day? Do they cover all the present needs, or should they be extended? If we find positive answers to these questions on the worth of the Federation, we may further ask whether the structure of the Federation is appropriate to present needs, and whether we have had sufficient success to encourage us to further efforts. If not, we must examine the causes of our checks and failure. Let me begin with a brief account of the origin of the Federation and the basic ideas and aspirations of its Founders.

The World Federation of Scientific Workers was founded in 1946 through the initiative of the Association of Scientific Workers (Britain) together with a group of English and French scientists which had existed before the 1939-45 war; a preparatory conference was held in London in February of that year. The original meeting was attended, in addition to those whose loss we mourn to-day—by Professor Joliot and Professor Bernal.

At this Conference, it was decided to lay the foundation of a world-wide organization of scientific workers, and this decision was ratified at the inaugural conference of the Federation, which was held in London 20-21 July, 1946. The first meeting of the Executive Council was held in Paris in November 1946, and decided that a Charter for Scientific Workers should be drafted. This was accordingly done and was subsequently adopted by the Federation. It is in the Charter and the Constitution that the basic aims of the Federation are formulated. These documents, and the resolutions adopted by the General Assembly and its Executive Council govern the actions of the Federation.

### Basic ideas of our Founders

Let us now glance briefly at the aims of the Founders and the ideas which animated them eleven years ago. It is a subject which has been examined often in meetings of the Assembly, and in publications of the Federation, but a brief summary will be appropriate because

Opening address at the Fifth General Assembly, W.F.S.W. at Helsinki in September, 1957. Reprinted from W.F.S.W. Bulletin.

these ideas provide an essential background to the life and work of the Federation.

The Founders of the Federation met in a situation which was dominated by the explosion of the first atomic bombs. They were deeply impressed by this event which they saw as a most dramatic demonstration that humanity had entered a new epoch, the distinguishing feature of which was the widespread application of the scientific method to almost all fields of human activity. The experience of the past ten years has completely vindicated the assessment which they made of the significance of the scientific revolution, and their basic ideas are valid for us to-day:—

They saw, and we share their view to-day, that after thousands of years of the savagery and barbarism of prehistory, of six thousand years of civilization, we have reached a fundamentally new epoch in human affairs. This new epoch is the result of the introduction of a new method of winning new knowledge from nature; a new method which is based on the principle, that instead of relying on ancient authority we must depend on ourselves; for the advancement of mankind, we must consciously set out to study nature, and to discover its secrets.

The beginnings of a widespread introduction of the new method were made only about two hundred and fifty years ago, and in the early years, as judged from our present perspectives, progress was very slow. The great power of the method was made manifest, however, with the coming of the industrial revolution; and in the past fifty years, the application of scientific method has resulted in an unprecedented speed of technical innovation. We have now reached a stage where, every few years, inventions and discoveries are introduced which in past ages would have made notable a particular millenium.

The development of the scientific revolution has imparted an entirely new and distinctive character to our times. On the one hand, it has placed in the hands of humanity powers enormously greater than any previously available. These powers are so great that it is generally agreed, by all competent authorities, that it is now technically possible for mankind, in a war employing weapons of mass destruction, to destroy all, or practically all, the achievements of civilization, together with a very large part of the living matter, including the human population, of the globe.

**In a peaceful world**

On the other hand, employed in the service of mankind, the new powers can play a most beneficient role. Again there is general agreement that if the powers already at our disposal were wholeheartedly employed for peaceful purposes, the lot of mankind could be rapidly transformed. In a truly peaceful and co-operative world, our present perils and anxieties would soon appear as part of the agony of mankind in the period preceding the scientific age. The essence of our present dilemma was forcefully expressed by a celebrated British philosopher when he said that if only men would take action to promote their own happiness, rather than, as at present, to secure the discomfiture of others, the world would indeed become a very thriving and peaceful place.

Unless we are reduced to a new condition of savagery following a nuclear war, we must expect the great speed of technical innovation to be a permanent feature of the life of mankind. For in the absence of the catastrophe of world war, technical progress, and the social changes which it brings, cannot be undone. None of us, I believe, would be likely to underestimate the immense difficulty of the social and political problems which follow, in a divided world, from the incessant flow of technical innovation and discovery. But it may be pointed out that mankind is already committed to a scientific epoch and cannot escape it. For the very life of hundreds of millions of people depends upon the application of recently won scientific knowledge. I may instance antibiotics, which are only twenty years old. A retreat from the path of scientific advance would now mean the return of famine and pestilence.

There are some for whom such a statement of the great dilemma of our times is unpleasing. They see only the grave political difficulties in finding a peaceful solution of present conflicts, and describe a restatement of basic principles as politically naive. But what is perhaps obvious to a group of scientists and politicians is not always clear to the main body of the people. Certainly, the wider implications of principles of such great importance and generality are not yet firmly grasped, and they can hardly be too often restated and reflected upon, by scientists and others. But, in addition —and it is one of the aims of our Federation—it is of great importance that there should be created, in all countries of the world without exception, a well-informed body of public opinion, composed of people who may be widely divided upon all other issues, but who are united in an appreciation of the great constructive possibilities of science, and in a determination to banish, for ever, the horrors of the possibility of a nuclear war. These basic conceptions of our Founders have great educational value in the development of such an informed body of opinion.

### Aims of the Federation

I have tried to set out the main background of ideas which our Founders were among the first to express. The principal aims of the Federation, as embodied in the Charter, followed:—

The first aim of the Federation is to play its part in ensuring that the great achievements of science shall be used for the advancement instead of the destruction of mankind. This involves contributing to public understanding of the great issues outlined above, and we shall hear much at this assembly of work to this end.

The second objective, which we may refer to as the economic and social aims of the Federation, is to contribute to the improvement of the position of science and scientists in the different countries represented in the Federation, and in the world at large, in order that they may most effectively contribute to the development of science within the framework of their different national traditions. This second aim involves not only problems related to the economic position of scientists, but also a great range of problems concerned with the promotion of science in countries with a very wide range of social conditions.

The third aim is to assist in the promotion of international scientific collaboration. It has been an important feature of the advance of science that it has been international in the sense that it has depended upon a free exchange of ideas and results from scientists in different countries. There is still much to be done in promoting such exchanges, particularly in the difficult conditions of our times. But there is a wider aspect of this problem. Thus, although we recognize the great importance of the scientific revolution, and the great significance of what has already been achieved, we are also clear that we are only at the beginning of the scientific epoch. The problems involved in the application of science in different countries, the levels of scientific and general education and of technological development, vary enormously throughout the world. It is here that a world federation can play a particularly important role.

World science, as it matures, will be enriched by bringing into play the creative talents and the cultural heritage of the people of the whole world. But at the present stage, scientific development is very uneven. It is powerfully developed in some countries, rudimentary in others. For the progress of science on a world scale, it is of immense importance that the rich experience of some countries should be made available to others at present more backward. This is to be seen as a problem much deeper than the mere exchange of technical information. All kinds of personal and social difficulties have to be met in building up a sound scientific tradition in a country. It is clearly of great value to have a forum for the discussion of such problems to which the immense range of experience from a wide diversity of countries, on a world scale, can be contributed.

These then are the main aims of the Federation as embodied in its Charter. What is the structure of the Federation, the means by which these aims may be pursued?

**Structure**

The organizations affiliated to the Federation vary very much from country to country in the nature of the objectives, but it is possible to classify them very broadly into two main groups. There are first those organizations which are trade unions, such as the Association of Scientific Workers of Great Britain and the Union of Higher Educational and Scientific Workers of the Soviet Union. Secondly, there are associations independent of national trade union organizations, some of them with broad cultural objectives, such as those, for example, in Denmark, the U.S.A. and in Federal Germany.

At present the W.F.S.W. has affiliated organizations in the following nineteen countries:—Albania, Bulgaria, China, Czechoslovakia, Denmark, France, the Federal German Republic, the German Democratic Republic, Great Britain, Hungary, India, Japan, North Korea, Mongolia, Pakistan, Poland, Rumania, the U.S.A., the U.S.S.R.

You will know that between meetings of the General Assembly an Executive Council of about twenty-four persons, takes responsibility for the work of the Federation. Since meetings even of the Executive are often difficult to arrange, the powers of the Council are delegated to a smaller body, the Bureau, which can meet more frequently, generally either in London or in Paris.

It may be remarked that the rules of the Constitution are such that no association, however large it may be, can obtain a predominant influence to the detriment of organizations numerically weaker or belonging to countries with smaller populations. Apart from this it is recognized by all those who take part in our Assemblies or Council meetings that the atmosphere is extremely friendly and that the majority of the decisions taken are unanimous. Strict rules of procedure are adopted and the rights of all members rigorously observed.

Experience has taught us that for the stability of the Federation it was essential that all actions should be directly related to the Charter, or decided by the

Assembly or have the expressed support of all member organizations.

The detailed report on the growth and work of the Federation are the subject of detailed contributions to this Assembly, and it will therefore be appropriate for me only to refer briefly to a number of salient features:—

**(a) Growth**

Throughout the ten years of its existence, the Federation has grown both in the number of its affiliated organizations and in the individual membership thus represented. A very important increase in its strength came with the affiliation of the trade union body representing scientific workers of the U.S.S.R. in 1953. As we have already heard, there are affiliated organizations from nineteen countries represented in this assembly, with a total eligible membership of 167000. We have great pleasure in welcoming here the members and observers from a number of countries represented here for the first time.

In spite of important efforts, serious obstacles to the extension of the Federation in several regions remain to be overcome, and I shall try to distinguish them at a later stage of my address.

**(b) Voice of the Federation**

As has already been stated, it is the resolutions of the General Assemblies and the Executive Council which, within the general framework set out in the Constitution and the Charter, govern the activity of the W.F.S.W.

The implementation of these resolutions is in the end the responsibility of the affiliated organizations themselves.

The Federation itself has since its foundation published a Bulletin with the primary aim of providing the necessary links between the affiliated organizations. In 1957 the Federation embarked upon *Scientific World*, which will deal with subjects of current interest to scientists world over. The internal Bulletin of the Federation will be published whenever it is deemed necessary.

The Federation's first non-periodical publication, a pamphlet on nuclear dangers, entitled "Unmeasured Hazards," has been a great success in many countries.

The Federation hopes to publish other pamphlets and special issues of *Science and Mankind* devoted to the subjects "Hunger and Food", edited by Professor Josue de Castro, and "Science and Health," edited by Sir S. S. Sokhey and Dr. Ludwik Rajchmann, are in preparation.

The Federation publications appear in the official languages—French, English, Russian and Chinese, and some have been translated into other languages. In addition, the centres in London, in Prague and in India have Regional News Services in English for the use of affiliated organizations.

**(e) International co-operation**

The Federation has frequently intervened on questions of secrecy in scientific matters and in favour of the free exchange of scientific material in the struggle against all actions, such as, for example, the withholding of visas, which restrict the participation of scientists in conferences, discussions and international meetings.

The Federation and its affiliated organizations have taken such direct practical steps as have been at their disposal to arrange meetings between scientists, combined with holidays, in Czechoslovakia, Hungary, Great Britain, France and the German Democratic Republic, and will increase their efforts in this direction.

Following the decision of the Fourth General Assembly an information centre has recently been created which has already organized as a first step the circulation on a small scale of periodicals devoted to the popularization of science.

It should also be noted that the World Federation of Scientific Workers exchanges information regularly with the Department of Non-Governmental Organizations of the United Nations Organization and the specialized agencies like U.N.E.S.C.O., the International Labour Office and the World Health Organization. It was in this connexion that the Federation was invited to send observers to the atomic conference in Geneva in August 1955.

The Federation has on several occasions taken steps to see that permission or encouragement was given for wider participation of scientists at international congresses, as for example, the Congress of Biochemistry at Brussels in 1955. Finally, we should not forget the commemoration meeting held in London 23-25 May 1947, on the occasion of the death of the great French physicist Paul Langevin, and the ceremonies together with scientific discussions held in Paris in 1947 on the anniversary of the death of Lord Rutherford. The Federation was also actively concerned in the ceremonies and meetings on the occasion of the moving of the ashes of Paul Langevin and Jean Perrin to the Pantheon in Paris.

Some critics of the Federation in western countries take the view that it is not a proper instrument for international exchanges between scientists, and that these can best be promoted, for example, through the learned societies. I think that this criticism implies too narrow a view of the nature of the present needs of international scientific collaboration, and the advantages which could be gained if it were fully developed. Doubtless a very important part is played by the learned societies in promoting exchanges in particular fields; but there are other, very important, aspects in which such societies are not interested and which are outside their special field of competence. Valuable work in such fields can be done by the special agencies of U.N.O., but the resources at their disposal are very small compared with the manifest needs.

The essential point here is that international scientific collaboration is immensely and mutually profitable to those taking part in it. It is a work which has many aspects in addition to its traditional forms, and the resources and organizations at present taking part are very small compared with the advantages to be gained. There is therefore a valuable and useful role for every interested person and organization.

### (d) Peaceful utilization of science

We have seen that the problems posed by the development and utilization of weapons of mass destruction, were first facing mankind when the World Federation was founded. Our Federation, and its affiliated organizations, have repeatedly taken a stand on the grave issues thus raised.

Such activity has naturally increased as anxiety about the consequences of the continued testing of atomic weapons began to be expressed. In this connexion, our President, with others of the officers of the Federation, have made a number of public statements to the press, and have addressed themselves, severally or jointly, to the President of the General Assembly of the United Nations and to the Ministers of Foreign Affairs of the Four Great Powers.

For some years, the W.F.S.W., being

deeply concerned with the hazards arising from the employment of atomic energy in peace and war, has been interested in a general meeting of competent scientists to make an independent assessment of the dangers arising from tests of nuclear weapons and their use in war. Through the initiative of Earl Russell, and with the support of several organizations, and with generous assistance from individual philanthropists, such a meeting was recently held in Pugwash, Nova Scotia. Dr. Burhop will give a detailed report, but I may say that members of the Federation made a valuable contribution to this conference. I think it is reasonable to say that without the assistance of the World Federation the meeting at Pugwash would not have been so widely representative and its conclusions would not have covered such a wide field of agreement.

### (e) Economic and social aims

It has been for individual affiliated organizations, rather than the Federation itself as an international body to work to defend or improve the status of scientific workers.

Nevertheless, the Federation can help to strengthen the efficacy of such actions, and it has not failed to do so:

(*a*) by exchanging information through the Bulletin and by the reports of affiliated organizations to the various General Assemblies.

(*b*) by the issue of information compiled as a result of systematic investigation. This was attempted by a questionnaire addressed to individuals on the working conditions of scientific workers. This was addressed to many scientists in various countries but unfortunately had only a sporadic response. It has recently been taken up again in the form of a collective and simplified questionnaire sent to organizations;

(*c*) by its connexions with international organizations like U.N.E.S.C.O. and I.L.O. In particular we were approached recently by the I.L.O. in connexion with one of its investigations;

(*d*) by the organization of regional conferences in which affiliated organizations and others not yet affiliated to the Federation can examine their problems and compare the solutions arrived at in countries of similar structure. In this way representatives of organizations in eastern Europe and Asia met in Prague in October 1956 and a conference for countries of western Europe was held in Paris in February 1957.

In addition to these concrete achievements, the Federation has had a number of important successes which, although not immediately obvious, are very important for the future. It has been remarked by Earl Russell that international affairs are bedevilled by a widespread mistrust between the representatives of the two great groups of powers, and this mistrust invades almost every field of science and culture. How is this situation to be remedied? Surely we can expect no dramatic solution, but must aim at building up trust in limited fields and widening the area of mutual confidence and agreement. It is here that the Federation has had important successes. The experience of the past eleven years has taught us how to work to ensure the stability of the Federation. Within the limited field of its aims it has created a forum where delegates from many countries can meet and discuss common problems. The friendly atmosphere at this Assembly is a testimony to our success; our meetings are not a battleground, This success is precious : it is the result of the experience of ten difficult years. It is precisely because of this experience that members of our Federation were able to make a valuable contribution to the character of the Pugwash conference and to its successful outcome. It may be remarked that Pugwash was a success because it followed similar principles, and led to an increase of mutual confidence.

As a final point of achievement, we may recognize one final important point. Through the existence of the Federation, a very large number of invididual meetings have taken place between individual scientists from many different countries in a way which would hardly have been possible in the absence of the Federation. These personal contacts have already been immensely important in leading to a great variety of collaboration in scientific matters. It is an exceedinly important aspect of the work of the Federation which goes on almost unnoticed by us.

In the face of the great and difficult tasks before us no one of us should be complacent about the successes achieved. But we have gained experience. We are one of the few organizations embracing representatives of east and west which has remained intact under the stresses of the past ten years. This is a considerable achievement ; the Federation must now be consolidated and extended.

**Weaknesses**

If these are some of the achievements of the Federation, what are its principal weaknesses at the present time in relation to its aims, and how are they to be corrected ?

I think the principal weakness at the present time is the fact that with one or two notable exceptions the Federation, both in the east and the west, does not yet command the support of a large proportion of the great body of scientists who are sympathetic to the main aims set out in the Charter. Most scientists are in favour of international scientific collaboration and the widespread application of science in a peaceful world. Why do they not associate themselves with the World Federation which exists to promote these aims ?

One of the principal reasons in western countries is that there is a widespread mistrust of the good faith of the Federation. Whilst its aims and expressed intentions would be widely accepted, there is a feeling in some circles that these are merely manœuvres designed to disguise other objectives. This prejudice is supported by the fact that our affiliated organs in the different countries represent only a part—in some countries only a small part—of the whole spectrum of opinion of the general body of its scientists. And this narrowness of representation is necessarily reflected in the personnel of the Federation itself. The experience in some eastern countries also shows evidence that the Federation is supported in practice by only a small fraction of the general body of scientists. It is a matter of central importance for the strengthening of the Federation that these prejudices should be overcome. Much wider circles of scientists would then be drawn into the Federation and its life and work thereby enriched. How is this to be achieved ?

Professor Joliot in his message to us has made an important point in this connexion. Among critics of the World Federation there are those who are opposed to its fundamental aims as set out in the Chapter. They are against international co-operation among scientists on any terms and seek to maintain the divisions between those of the two great groups of powers. Nothing that we can do will therefore attract their support. But how can we win the confidence of those scientists who are sympathetic towards our main aims, but mistrustful of our good faith in advocating them? I think that there is no other way than that we should persevere steadfastly in the direction we have been going for several years now. If, as we believe, the Federation has indeed an important part to play in promoting the aims of the Charter, and if we rigorously avoid participation in any action outside the proper scope of the work of the Federation, being particularly careful to avoid actions which might seem to favour one rather another of the two groups of powers, then the Federation will surely grow in influence and usefulness. On the other hand, if we allow ourselves to be drawn into partisan actions outside our proper aims, if we contribute to the exacerbation of international relations by making statements which may appear designed as a weapon in the diplomatic struggle between the great power groups, our influence will decline, and the Federation wither away.

Yet we must be careful not to abandon our basic principles, nor to cease to advocate them on the grounds of expediency.

This then is the right direction for our work; we must proceed with the greatest care and tact. People must learn by experience that we are people of principle who are also capable of discretion; that we respect opinions which may be widely different, on many matters, from our own; that we are concerned for the difficulties in the position of others, and anxious not to embarrass them.

As a second weakness of the Federation, I would suggest that there is an insufficient appreciation of our present opportunities, and therefore an insufficient effort to take advantage of them. As an example, I may suggest that the Federation already has the possibility of greatly increasing the sales of its publications. With a modest effort by its affiliated organizations, it could improve greatly the quality of *Scientific World* and could secure a sale, on a world-wide scale, of not less than 50,000 copies of every issue. A development in this direction could provide a large part of the income of the Federation. Such a growth in our resources would allow us to increase the scale of our work, and would make it easier for us to appeal more effectively to wider circles of opinion among the scientists of both east and west.

**Future perspectives**

It is the task of the Assembly to establish the main directions of the work of the Federation in the next ten years. As a contribution to this decisively important task the considerations set out above lead me to suggest the following three points:—

(*a*) We must continue to pursue our main aims, choosing the most advantageous forms of work in the light of the experience of the past ten years.

(*b*) We must increase the influence of the Federation by drawing more scientists, from wider circles of opinion, both in the east and in the west, into creative activity in support of the aims of the Federation.

(*c*) We must place particular importance on an improvement in the quality and distribution of our publications; this can be important means for making widely known the aims of the Federation, for engaging more people within our affiliated organizations, in active support; and for increasing the income of the Federation.

# Resolutions Adopted at the General Body Meeting, A.S.W.I, 1958

**Congratulations to Sir C. V. Raman**

This meeting of the A.S.W.I. congratulates Sir C. V. Raman on the award of Lenin prize for the promotion of peace among mankind. Sir. C. V. Raman's many endeavours in the scientific field has brought honours to India and his researches have helped to win a distinguished place for India in the scientific world. Award of Lenin prize for the promotion of peace amongst mankind is a unique distinction and is a recognition of his life-long services to the world of science.

**Achievements of Science**

*Preamble* :

Recent events, springing from the programme of the International Geophysical Year, has completely revolutionalised scientific thought. As the result of strenuous work of a large team of scientists, engineers, technicians and factory workers, it became possible for sputniks to be hurled into the outer space these being made to move in a predetermined orbit. The sputniks have enabled scientists to conduct for the first time several experiments in the top layers of the atmosphere as also to study their characteristic features. Scientists all over the world are eagerly waiting to get the latest knowledge about cosmic rays, solar activity, magnetic storms and the colour of the earth. This in fact is a concrete symbol of man's coming liberation from the forces which have hitherto bound him to earth and wishing that the new techniques now developed could be harnessed for a greater cooperative human assault on the barriers of distance which still separate us from our nearest neighbours in space.

Indeed science has mastered techniques of producing extremely powerful rocket motors, materials of construction to withstand extremely high temperatures and automatic devices of extreme precision. It may well be stated with assurance that the first step to man's flight in a rocket has been already made, and mankind is already on the threshold of realising the idea of interplanetary communications.

*Scientific thought and application of scientific technique*

Scientific thought and the application of scientific technique has profoundly modified our approach not only to the social activities of manufacture and trade but also the fundamental questions of morals and the nature of the universe. As Professor Juliot-Curie says "scientific knowledge brings peace to our spirits, and a firm faith in the ascent of man, by casting out superstition and the fear of invisible forces; and by giving us an even clearer understanding of our place in the universe".

Application of the discoveries of science is a matter within the scope of human understanding and approach. The addition to sum total of human knowledge and the benefits to the human race based on the proper utilization of scientific|technological efforts are matters which require no proof in this era of sputniks and atomic energy. Yet quickening the pace of progress, achievements and benefits of a scientific era, purely depends on man. It has been proved beyond any doubt today that a planned effort with proper coordination at all stages for the development and progress of science, yields rich dividends, as the launching of sputniks and the utilization of atomic energy would show.

*Conclusion* :

A careful and scrupulous planning of scientific education and research, technical development, encouragement of persons with technical aptitudes, building of scientific and technological institutions meant for training of scientific and technical personnel, and a carefully planned industrial development alone has made it possible for man to launch the sputnik and unravel into the mysteries of life and universe.

**Resolution :**

This meeting of the ASWI while taking pride at the achievements of scientific progress which have led to the launching of the sputnik, remarkable achievements in ballistic missiles and the release of energy from the atom, calls upon all the nations of world irrespective of their political differences to create such conditions as would enable the progress of science at a much more rapid pace, by giving all the encouragement and aid essential for a planned and coordinated effort for the study, application, utilization and development of science.

**Atomic Hazards**

The advancement of science and scientific discoveries have brought in their wake, the attendant risk involved in their utilization. The trend in recent years has been, unfortunately, towards gearing all scientific efforts more towards their destructive use rather than in their application for the welfare of mankind and fruitful upliftment of the human efforts from mundane existence and drudgery. The primary efforts made in the scientific work towards developing finer and better nuclear weapons which could speedily bring about disastrous destruction of all civilized existence of the human race is a typical example of what has been stated above. And again the wonderful application of the human mind towards developing intercontinental ballistic missiles with the sole object of delivering destructive weapons such as the nuclear weapons with an masterful accuracy at the targets thousands of miles of way, would again demonstrate the decay brought about in the thinking of man in recent years, inspite of advancement of science. The launching of the man made satellites while demonstrating unmistakably the trend in the advancement of science, also leaves behind a cold shudder on the possible repercussions that may also arise out of the same. Thus again and again, achievements of man, are being looked at with askance by humanity at large, due to the destructive propensities that may accrue due to the wrong trend in thinking.

Whether it is science|scientist or the politician or the Army General who is to blame, the culminating destructive effect of the wrong application of science is unquestionable. Scientists have warned time and again on destructive potentialties of weapons like the nuclear bombs or the ICBM. The politicians of big powers have met time and again to break the deadlock in international affairs in matters like disarmament. Their failure to arrive at the only sane agreement has left the people in all countries less and less hopeful about peaceful existence of the human race on this earth.

In a crisis to the civilized existence on this earth the call from our Prime Minister to halt these efforts towards destructive processes and to open correct line of thinking which raise the level of human thought concommitantly with the advancement of science and civilization, is the only silver-lining. The Association would be failing in its duty if it does not strongly, unanimously and without any inkling of doubt, support our Prime Minister on his call for halting this mad race to destruction of all human efforts and civilized existence.

**Resolution :**

The Association of Scientific Workers of India, with apprehension at the growing speed of rearmament and the growing speed and power of nuclear weapons and their means of delivery against an enemy strongly reiterates its demand for complete suspension of the use of nuclear weapons and strongly condemns all efforts towards destructive application of scientific|technical discoveries|efforts by the advanced nations of the world.

The A.S.W.I. lends its fullest support to the efforts of the representatives of the country at U.N.O. in bringing about a speedy agreement on the question of immediate cessation of nuclear test explosions.

**Panel of Scientists**

*Preamble* :

In view of the critical stages faced by our economy during the past few years, it was hoped that the Panel of Scientists appointed by the Government to advice the Planning Commission would be an active body which would critically study the various plans from all aspects of the plan from the scientific angle and make recommendations to the Government. Since its formation, however, only one meeting of the Panel was held, many of the important recommendations made by it have remained unimplemented. This state of affairs has had two major consequence on the plan. Firstly the lack of co-ordination of researches with the plan and utilisation of results of researches achieved. Secondly the greater reliance of the Govt. in the non-technical administration in the evolution of plan projects, its pruning under conditions of economic crisis and expert advice. The net result of these tendencies has been that whereas the main scientific, technical effort of the country has been overlooked and at reasons isolated from being useful, a considerable amount of outdated machinery and not very expert personnel and advice has been imported in the country even at a time of grave economic crisis. Consequently in view of the fact that technical decisions have become purely administrative decisions much of the national technical activity has been reduced to the level of purely departmental activity, with consequent 'Empire Building'. Further what is more grave in order to justify the procedure of relying on foreign so called expert advise and import of machinery the national scientific effort is ignored and scientists denied the credit of being experts in their respective field.

**Resolution :**

The A.S.W.I. notes with regret that the Panel of scientists appointed to advise the Planning Commission has not been meeting and many of the recommendations of its first meeting have remained unimplemented. It records with dismay the isolation of the national scientific and technical effort, the import of out-dated machinery, not so expert technical personnel and advice and the drain of currency in times of economic crisis which has followed as a consequence of such a policy. It demands from the Government that suitable steps be taken to ensure the fullest activity of the panel and in view of the importance and the technical nature of the decisions.

**Rationalisation of Designations and Scales of Pay of Scientific 1 Technical Assistants under C.S.I.R.**

*Preamble* :

In the Government departments and in the Govt. sponsored aided institutions personnel of different categories are employed under different designations to carry out similar scientific duties connected with the fields of science.

The far too many designations to do a similar type of work results in considerable amount of lacunae in respect of avenues of promotion for the staff, who while doing similar type of work are yet in many cases given different designations. Rationalisation of designations in respect of the scientific technical personnel is a necessity.

**Resolution :**

The A.S.W.I. recommends that (a) There should be only one grade of Scientific Assistants and their scale of pay should be 200—15—230—20—250—25—500—30—650 with the provision that for holders of Post-graduate degrees the starting pay in the scale should be Rs. 250|-, and (b) In scientific institutions and departments there also exists the need for auxiliary staff such as Laboratory Assistants and technician like glass blowers, photographers, etc for which a pay scale of Rs. 100—10—170—15—350 is recommended. It is further recommended that holders of science degrees and technical diplomas when appointed to this cadre should be given a start of Rs. 170|- in the grade. Besides, this provisions should be made to ensure that ample opportunities are afforded to suitable employees in this cadre to be considered for appointment in due course of time to the cadre of Scientific Assistants.

**Central Scientific Service**

*Preamble* :

A suggestion for the creation of something in the nature of a Central Scientific Service in line with other All-India Services is worth considering. This will ensure the proper direction and co-ordination of the activities of the various scientists who must in the near future be employed in increasing numbers in pursuance of the research and production drive of the Indian Government and help to improve the status and emoluments of scientists in the service of the State and introduce a uniformity of status and emoluments as between the different scientific departments.

The following extract from the report of the Special Committee of the Governing body of the Council of Scientific and Industrial Research is relevant to the issue.

"The progress of science, and, in particular, the fruitful and effective working of National Laboratories and research institutions, depends on many factors. If there is one thing more important than anything else, it is that the laboratories should be able to attract and retain in their service competent men devoted to making science their chosen vocation. The atmosphere and the conditions of service should be such as to encourage a substantial fraction of the best science students from the Universities to take up scientific work instead of going into other professions, such as Administrative Service, etc. It seems that fundamental step in this direction is the creation of a scientific service somewhat on the lines of the scientific service in U.K.

**Resolution :**

The A.S.W.I. recommends that there should be a Central Scientific Service for Scientific Officers and that their scales of pay should be atleast the same as for Indian Administrative Services and their conditions of service should be governed by the rules framed from time to time under the All India Services Act (LXV) 1951.

### Resolution on Memorandum to the Pay Commission

The Council and the General Body in their last session at Calcutta strongly urged the Govt. of India to appoint a Commission to critically review the pay structure of scientific|technical workers and to recommend suitable cadres with attractive scales of remuneration and service conditions for the scientific|technical workers in the various departments of the Govt. of India.

Several other resolutions pertaining to the betterment of service and working conditions of scientific workers in India were also passed at the Calcutta Session.

A Pay Commission was appointed by the Govt. of India in August '57, and memorandum from the Association was invited. In pursuance of this a sub-committee was appointed by the CEC at its Hyderabad meeting to draft the memorandum keeping in view the directives of the Council and General Body at the Calcutta Session.

The Sub-Committee invited comments from Branches|Units and then met at Kanpur in October to finalise the memorandum. The memorandum was submitted to the Pay Commission in Nov. '57 and was ratified by the CEC in its meeting at Delhi on the 16th Nov. '57. The Pay Commission was also requested to give an opportunity to the Association to explain the memorandum and present our demands in detail in a deputation.

**Resolution :**

This meeting of the Council fully endorses the memorandum and request the Pay Commission to accept the recommendations made therein. The Council further requests the Pay Commission to invite a deputation of the Association to present its views in details.

### Resolution on Service Conditions of Workers in Govt. of India Undertakings during change over to a new Administrative set-up

*Preamble*

The administrative control of the National Instruments Factory, an undertaking of the Ministry of Commerce & Light Industries, Govt. of India has recently been transferred to a new Board of Directors set up by the Union Ministry and the Factory is now known as National Instruments Private Ltd. and it is to be run on commercial lines. A recent order has been published by the Govt. announcing the official transfer of the ownership and management of the institution to N.I. Private Ltd. subject to the ratification by the Parliament. The order though it states that the new Company would undertake the responsibility of taking over the personnel with their existing terms and conditions of service, does not make any reference to the rights and privileges which are due to a Govt. Employee. It has actually been understood from competent authorities that the benefits the Govt. Employees used to get such as Government Quarters, House Building loans, Cycle Allowance etc. will no longer be admissible to the employees under the new set up.

It is very unfortunate that the vast majority of employees who joined their services in good faith under the Central Govt. are suddenly transferred to a different administrative set up with a definite curtailment in their rights and privileges. The whole thing is sought to be brought about without the slightest consideration of the opinion and points of view of the employees. The employees consider that all matters pertaining to their service conditions in accordance with the Civil Service Rules of the Govt. of India are the primary responsibility of the Govt. of India who should endeavour to ensure that in a changed administrative set up there is no infringement on the rights and privileges of the employees. The Association of Scientific Workers of India feels that a curtailment of the rights and privileges of employees of the Govt. of India while changing the administrative set up goes against moral principles and undermines the prestige of the Govt. and also may create a feeling of disharmony between the employer and the employee which is very undesirable at this period of growth of our national economy.

**Resolution :**

The ASWI urges upon the Govt. of India to take into consideration the view points of the employees in a Govt. undertaking while effecting any change in the administrative control and requests it to ensure that the service conditions of workers who are primarily Government employees should be protected both in respect to the terms and conditions of service as well as their rights and privileges which are automatically admissible to the existing personnel as Central Government servants, had there been no transfer.

## Resolution on Confirmation of Technical Assistants at Govt. Test House, Calcutta

*Preamble* :

At the time of appointment, the technical assistants have to work as strictly temporary probationers for a period of six months to one year. At the end of the probationary period, they are confirmed. However, most of them are taken in on temporary or quasi-permanent basis, but very few of them are made permanent. This, apart from depriving the employees from the benefits of permanent service, creates a sense of insecurity about their future and affects their day to day work.

There is a recent circular from the Ministry of Home Affairs that 80% of the staff who have put in a certain number of years of service should be confirmed.

**Resolution :**

The ASWI urges upon the Ministry of Works, Housing & Supply that the technical assistants at the Govt. Test House should be given the benefit of being confirmed after a successful completion of their probationary period; at least 80%

of the present technical staff should be confirmed immediately.

**Promotion of Technical Assistants at Govt.Test House, Calcutta**

*Preamble* :

At present the number of senior posts (250-10 300-15-450-25|2-500) among technical assistants (160-10-330)) is very limited; only one-third of the number of technical assistants are for senior posts. Of these senior posts, however, half the number of posts are advertised and filled in by direct recruitment and half of the vacancies are filled in by promotion from technical assistants. This state of affairs, however, has a depressing effect on the moral of the technical assistants who even though they may have put in a number of years of service and have acquired sufficient experience, are deprived of the opportunity of getting promoted to the higher posts.

**Resolution :**

The ASWI urges upon the Ministry of Works, Housing and Supply that the present number of senior posts should be increased to half the total number of technical assistants and the technical assistants already working at the institution, should be allowed to apply and qualify for the unreserved posts also which they are not allowed to do at present.

**Establishment of a Scientific Printing Press by the C.S.I.R.**

*Preamble* :

The C.S.I.R. is bringing out two monthly journals, a fortnightly newssheet and Dictionary of Economic Products regularly. Besides, it has to regularly print its annual reports and the agenda, minutes, and proceeding of the Board and G.B. of the C.S.I.R. In addition to these, the National Laboratories publish their annual and other technical reports and pamphlets.

This volume of printing work warrants C.S.I.R. having a press of its own even on economic grounds. The letting out of this work to outside printing presses adversely affects the quality of printing of journals of C.S.I.R., apart from introducting the factor of uncertaintity of the time of their appearance.

With the rising tempo of scientific and technical activity in the country, a number of scientific, academic and technological Societies and Associations are bringing out their journals. They are all in need of a press which has the requisite personnel qualified to handle printing of scientific and technical literature. They would gladly patronise such a press if established.

**Resolution :**

The A.S.W.I. urges upon the authorities of the C.S.I.R. as the foremost scientific organisation of the country of the desirability of their taking initiative for the establishment of a scientific and technological press for printing of scientific literature in the country.

**Attending Technical Conferences**

*Preamble* :

Attending of technical meetings and conferences is a necessary consequence of the scientific effort. It is necessary in the interest of scientific research in so far as it helps in the solution of a research problem, and in the utilisation of reseaches, and vital consequence of the social obligations of science. This, however, is not fully appreciated in some quarters with the result that tours undertaken to meet colleagues to clarify a point, or gather research information, which is and cannot be published as a part of paper, or know the state of techniques in the industry are looked upon with suspicion. The C.S.I.R., either under the pretext of economy or due to some other considerations has been discouraging the delegation of scientists to conferences or tour. Such a policy is bound to have an adverse effect on research and isolate and localise it.

**Resolution :**

The A.S.W.I. strongly feels that the attending of scientific conference and tours undertaken for such purposes is a necessary part of research and it would be a false economy and detrimental to the interest of the scientific research to curtail them and requests the C.S.I.R. to reconsider their policy of discouraging them.

**Resolution on Ban on Foremen, Asstt. Foremen and Chargemen from Joining Unions.**

*Preamble*

Ministry of Defence, Directorate of Technical Development has issued a letter recently laying down that the categories of staff designated as Foremen, Asstt. Foremen and Chargemen are banned from becoming members of Trade Unions. Association of Scientific Workers of India will be adversely affected by such a decision of Government of India as quite a large number of members of this Association and its affiliated bodies|branches are drawn from these categories of staff. The Government should have encouraged such categories of staff, who by virtue of their being responsible Govt. servants, would have brought the same sense of responsibility to their co-workers in trade unions.

There is no doubt that the ban deprives quite a large number of scientific workers of the fundamental right of belonging to a trade union.

**Resolution :**

The ASWI resents the Govt. of India's ban on Foreman, Asstt. Foremen and Chargemen becoming members of trade unions and requests the Govt. to revoke the order effecting such ban.

**Interim Relief to Central Govt. Servants**

*Preamble :*

The intention of the Govt. of India in granting Rs. 5|- p.m. as interim relief to low paid Central Govt. servants to meet the requirements of the enhanced cost of living and soaring prices of all commodities, appears to be quite inadequate when the present high cost of living is considered. Granting of a minimum of 50% of the pay in the case of those drawing below Rs. 100|-, 25% in the case of those drawing upto to Rs. 200|- and 15% in the case of those drawing upto Rs. 500|- would only meet the drastic demands of the situation and such a meagre amount as granted by the Govt. does not honestly touch even the fringe of the acute problem.

**Resolution :**

The ASWI considers the grant Rs. 5|- p.m. as interim relief to the low paid employees to be very meagre and calls upon the Govt. to be more realistic in their approach to the welfare of its employees. The ASWI urges the Govt. to grant a more substantial relief as outlined above which alone would meet the dire needs of the present situation facing the poorly paid employees.

# News from Other Lands

**1958 Alpha : The Explorer.**

Some technical information has been made available as regards the U.S space satellite, recently launched from Florida.

The launching vehicle of the space traveller was a special, four-stage version of the Army's test rocket, the Jupiter-C. Its first stage, which contributed most of the push into space, was the familiar, well-tested Redstone, filled for the occasion with slightly longer fuel tanks and burning a hydrazine-based fuel.

When ready for firing, the whole assembly weighed 65,000 pounds. The 83,000 pound thrust of the first stage rocket-motor lifted it off the ground at a fairly fast clip. The first stage burned for 150 secs., and when its fuel was gone, about 60 miles above the earth, most of the Redstone dropped away, leaving only a short section of the nose attached to the spinning bucket, which contained a cluster of 44 small solid fuel rockets 50 inches long and six inches in diameter.

When the shortened assembly reached about 200 miles altitude pointing in the direction of its intended orbit, the rockets were made to fire by an electronic device. After the central & last rocket had been fired, the satellite spurted alone & reached an orbital velocity of more than 18,000 miles per hour.

Unlike the Russian Sputniks, which swept close to the Arctic & Antarctic circles, the Explorer follows a sinuous orbit around the earth's middle, crossing the equator at an angle of 34° and coming only as far north as Atlanta. At its 'Apogee', the orbit rises to 1700 miles above the earth, descending to about 200 miles at the 'Perigee'. The principal scientific purpose of the Explorer is to study cosmic rays at various distances from the Earth and it could not do this so well if orbit were more clearly circular.

The orbiting body, including the burned-out rocket, 80 inches long, six inches in diameter and weighs 30.8 pounds. The satellite proper weighs 18.13 pounds; of this, its steel outer skin weigh 7.5 pounds; and the rest nearly 11 pounds, is the payload of instruments. The 'Van Allen' package of instruments assembled by the Jet Propulsion Laboratory is designed to measure cosmic rays, micrometeorites, and the temperature of the satellite itself. Information from the instruments is sent to earth over two tiny radio transmitters, which weigh 2 pounds each with their batteries. The more powerful one, radiating 60-thousandth of a watt on 108.03 megacycles, is expected to stay on the air for 2 to 3 weeks. The low power transmitter (20-thousandths of a watt on 108 megacycles) draws less current, so it will probably broadcast for 2 to 3 months.

If the Explorer stays up as long as expected, the shift of its orbit will give information about irregularities in the earth's gravitational field. Its radio signals coming down through the atmosphere, by their fading and bending will describe ionised layers of air they have passed through. As the satellite spirals toward earth, very slowly at first, it will measure by its loss of energy the density of the air at the top of the atmosphere. It may even tell, merely by crossing the oceans at known speed, how far the continents really are from each other—a question that still defies the more meticulous map makers.

None of the scientists wants to predict how long the Explorer will cling to space, but Major General John B. Medaris, head of the Army Ballistic Missile Agency, thinks it may stay up for as long as 10 years.

(EXTRACTS FROM U.S.I.S. NEWS FEATURE)

**Congress on Disarmament and International Co-operation.**

Recent advances in science and technology open a new era for humanity. Mankind now has to decide whether the advances shall serve life or death.

Public opinion, joined by so many authoritative voices, has already spoken with a force hitherto unequalled in favour of disarmament and international co-operation. But people are worried. Not only has there been a agreement to stop nuclear explosions and to start disarmament, but the tension between the military blocs has grown sharper. The peoples are suffering more and more from the growing expenditure on armaments. There has arisen in the world the real danger of atomic war.

The World Council of Peace has always proclaimed that in order to avert the danger of war it was necessary to do away with military blocs, destroy atomic weapons and achieve total disarmament with strict control. It has declared that the building and maintenance of peace cannot be carried through without international co-operation based on the equality of rights of all nations, large and small, and with full respect for their territorial integrity, their sovereignty and for the right to independence.

So many organisations, moral and religious forces, so many scientists, writers and artists have recently expressed similar views that a free exchange of all the ideas would enable us to find together a way of attaining these aims.

To give wider expression to the voice of public opinion and to achieve decisions by the governments, the world Council of Peace calls, for mid-1958, the *Congress on Disarmament and International co-operation*.

(THE BUREAU OF THE WORLD COUNCIL OF PEACE)

**Statement of tke Association of Democratic Scientific Workers, Korea.**

The members of the Association of Democratic Scientific Workers, Korea have issued a recent statement "Let us scientific workers struggle jointly for the prohibition of atomic and hydrogen weapons". The appeal to the scientists of all countries of the world is printed below:

"Let us oppose resolutely the establishment and expansion of military bases especially atomic bases; and being aware that the disbandment of all the military blocs, the removal of military bases and the withdrawal of all the foreign troops from foreign territories will contribute to the lessening of the threat of atomic war and the easing of international tension, let us demand their immediate realization!

Under the condition in which the scientific understanding of the danger of atomic weapons is not satisfactory, let us widely carry out the educational work on the various hazards of atomic weapons and let us create a strong wave of public protest against the misuse of atomic energy!

# Association News

**Annual Council Meeting, A.S.W.I., 1958.**

The 11th Annual Council meeting of the Association of Scientific Workers of India was held on 4th & 5th January 1958 in the University Buildings, at Madras. Dr. S. Husain Zaheer, President was in the chair. The meeting started with the introduction of delegates from the different Branches and affiliated Associations. The Branch Secretaries present at the meeting then read reports of the activities of their Branches and units during the year 1957. It was heartening to note that there was some consolidation of our activities at the Branches which were not functioning quite well previously. Memoranda for submission to the Second Pay Commission were received from almost all the Branches and it helped the Association to sumbit a very comprehensive memorandum to the Commission. The members at the C.S.I.R. Laboratories submitted a number of resolutions for the inprovement of their working conditions through the Central Executive Committee to the Board of C.S.I.R. The problem of dearth of active cadres was however as difficult as before and it was interesting to hear that there was a tendency for the activities of the organization at particular places to diminish greatly whenever some active members left their places of work to go elsewhere. This was particularly true for Aligarh Branch, Bangalore Branch and the Unit at Science College of Calcutta Branch. It appeared from the reports of the Branch Secretaries that the rank and file members of our organization still do not take sufficient interest in the working of the organization to make it a truly representative body of scientific workers through which they can place their common viewpoints. It was realised that the sense of apathy and disinterestedness can only be overcome through persistent efforts by consistently championing the interests of the general members.

The reports of the General Secretaries (Publication & Organization) were read, approved and adopted (*printed in January issue, V. K.*). The report of the Treasurer with the statement of accounts for the year 1957 and budget proposals for 1958 was then presented which was adopted. It was noted with regret that some Units and Branches did not clear outstanding dues to the Centre even for the year 1956 and they were requested to send their accounts at the earliest to the Treasurer. It was also agreed that from now on the Branches and Units would send their informal statements of accounts for a current year before December every year to the Treasurer so that a full consolidated statement of accounts of the Association as represented through its Branches & Units may be presented. It would enable to obtain a better idea of the working of the organisation as a whole and the financial position could be assessed mere precisely. The Council on the motion of the Treasurer regarding the taking over of assests of a defunct branch empowered the C.E.C. to merge the assets as disclosed by a defunct branch in the Central funds.

There was a lively discussion on the publication of Vijnan Karmee and the general difficulties such as lack of articles, irregularity of Govt. grants, and insufficient advertisements were noted. The Council endorsed that all the members should do their best for securing articles and obtaining advertisements for the journal to put it on a self-sufficient basis.

The proposal for the 'Reorganisation of A.S.W.I.' was approved and the C.E.C. directed to take necessary steps in the coming year for implementation.

The following resolutions were adopted at the meeting (*printed elsewhere in the issue*) :

(i) Condolence resolution on the death of Dr. Bashir Ahmed.
(ii) Felicitations to Sir C. V. Raman on his obtaining Lenin Peace Prize.
(iii) Atomic Hazards.
(iv) Advancement of Science.
(v) Panel of scientists.
(vi) Rationalisation of designations and scales of pay of Technical Assistants of C.S.I.R.
(vii) Service Conditions of Workers in Govt. of India Undertakings during change over to a new set up.
(viii) Confirmation of Technical Assistants of Govt. Test House, Calcutta.
(ix) Promotion of Technical Assistants at Govt. Test House, Calcutta.
(x) Memorandum to Pay Commission.
(ix) Attendance at Technical Meetings & Conferences.
(xii) Establishment of a Scienting Printing Press by C.S.I.R.
(xiii) Ban on Foremen, Asst. Foremen & Chargemen from joining union.
(xiv) Interim Relief to Central Govt. servants.

The resolutions on the professional training for science graduates and the need for a professional status of scientific workers are to be sent for wide circulation to the Branches for comments & modifications if necessary.

The Council endorsed the actions to be taken as outlined by the C.E.C. on the establishment of a Regional Centre of W.F.S.W. and convening a conference of scientific workers sometime during the year (*reported in the January 1958 issue of V. K.*). The budget proposals of the treasurer for the activities of the regional centre were adopted.

**Central Executive Committee, 1958.**

The following office bearers and members were elected unanimously to the Central Executive Committee for the year 1958 at the Council meeting :

*President* :
Dr. S. Husain Zaheer

*Vice-Presidents* :
Dr. B. D. Nagchoudhury
Dr. B. Mukherji
Sri A. Rahman

*General Secretary* (*Organizations*) :
Sri D. V. Varma

*General Secretary* (*Publications*) :
Dr. S. Ganguly

*Joint Secretary* :
Sri S. Ramabadran

*Treasurer* :
Sri J. N. Misra

*Members* :
Maj. Gen. S. S. Sokhey
Prof. B. C. Guha
Sri Baldev Singh
Sri Y. R. Chadha
Dr. N. K. Bose

*Secretaries,*
Aligarh Branch

Bangalore Branch
Calcutta Branch
Hyderabad Branch
Lucknow Branch
Roorkee Branch
A. Sc. W., Kanpur
A. Sc. W., Khamaria
A. Sc. W., Kirkee

**"Reorganization of A.S.W.I."—A Proposal.**

The following proposal for the Reorganization of A.S.W.I. was adopted at the Annual Council of A.S.W.I. for necessary implementation. The proposal was moved by Sri M. R. Raman, Convenor of the Sub-Committee for the Reorganization of A.S.W.I.

*Reorganization of the ASWI* :

The reorganization problem of the ASWI has been on the anvil since the Baroda Session (1955). The members might be aware of the origin of this problem from the initial stages. The issue arose out of two aspects pertaining to the ASWI viz., (i) the need to remove the existing organisational maladies which stand in the way of efficient functioning of the organisation and (ii) the need for bringing about a stronger, dynamic and active body which could effectively fulfill the aims and objectives of the ASWI.

The Federal pattern suggested here was under discussion during the Agra Session and recommended for further consideration in the light of certain other critical proposal brought forward there. The Federal pattern was modified in the light of the discussion at the Agra Session (1956) and an assessment of the proposals at the Calcutta Session (1957) lead to the adoption of the same in principle.

The Calcutta Session of the Council however, appointed a sub-Committee to consider and recommend a suitable process by which the reorganisation could be brought about without disintegration in the membership or dislocation in the working of the organisation.

The report of the Sub-Committee was considered in detail at the CEC meeting held at Delhi in Nov. 1957. The recommendation of the Committee have been approved by the CEC for adoption by the Council.

*Recommendations for suitable process of reorganization of ASWI on a Federal pattern* :

(1) The Association should be reorganised on a federal pattern.
(2) In the formation of new units all efforts should be made towards creation of associations as far as feasible.
(3) For the different Branches the problem should be tackled according to the condition prevailing. The problem of organising scientific workers employed by the C.S.I.R. should be taken up in the context of the A.S.W.I. resolution on the subject.
(4) Branch such as Calcutta who desire to bring about the reorganisation to a federal structure should be advised by the centre on matters pertaining to a model constitution, registration, finance, membership etc. which would enable them to get over the difficulties at the initial stages.
(5) To avoid dislocation of work of existing branches due to reorganisation the C.E.C. should take active steps conducive for closer collaboration amongst scientific workers who may have been apparently reoriented with speci-

fic groups such as Regional Branches|Councils (An effort in this direction would do away with the fear) of fall of membership of existing active Branches.

(6) In the Federal structure envisaged the Central Body will a registered Trade Union only. The affiliating bodies may be either associations or trade unions. The federal structure does not impose any stricture on the affiliating organisation to function in an autonomous manner as long as they do not infringe upon the fundamental objectives and views of the Association as laid down in the constitution.

*Proposal.*

This meeting of the A.S.W.I. approves of the recommendations as above for bringing about the reorganisation of A.S.W.I. on a Federal pattern and recommends that the C.E.C. take all active steps necessary to implement the same on the lines recommended.

**Condolence Resolution**

This meeting of the A.S.W.I. mourns the sad demise of Dr. Bashir Ahmed, a founder member of the A.S.W.I. and President of P.A.Sc.W. and wishes to convey its heartfelt sympathies to the family of the bereaved. In the passing away of Dr. Bashir Ahmed the scientific workers have lost a valiant fighter for their cause.

Statement about ownership and other particulars about newspaper ( *VIJNAN KARMEE* ) *to be published in the first issue every year after the last day of February.*

FORM IV

(*See Rule 8*)

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I, Dr. S. K. Mukherjee, hereby declare that the particulars given above are true to the best of my knowledge and belief.

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# VIJNAN KARMEE

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## CONTENTS



*The views expressed in the journal are not necessarily those of the Association of Scientific Workers of India*

Articles, Book Reviews, Letters to the Editor etc. are invited from our readers.

Materials should be sent to the Editorial office, Vijnan Karmee, 92, Upper Circular Road, Calcutta-9.

# Development of a Science Tradition

Recently a member of the Lok Sabha posed the question 'What is the *outstanding* contribution of the national laboratories and the research institutions in India to science—have they developed any *remarkable* instrument or machinery for use in industry or agriculture'. (Our italics). On a somewhat different plane a candidate appearing for interview for a scientific post was questioned 'what is your outstanding contribution to science'. Whenever they come in contact with the common man the scientific workers high or low are questioned 'have you produced anything new in your laboratory' and at a more sober plane 'is the country getting a proper return from its investment in the national laboratories and research institutions'.

These and numerous other questions that are asked reflect, in part, the desire of the common man to see Indian Science make rapid progress and play its proper role in the country's development and his impatience with its tardy pace. On the other hand they also reveal an unawareness and ignorance of the historical mode of the development of science and the role of social factors in its progress. 'Sputniks' are not projected into space overnight as Rome was not built in a day! It must be remembered that the oldest of the national laboratories is not more than ten years old. Others are younger still. The funds available for research in the laboratories and the universities are strictly limited and were less than meagre until a few years back. The *total* budget of the Council of Scientific and Industrial Research is smaller than the annual expenditure on scientific research of even private firms like I.C.I. or Ciba. In addition the science institutions in the country have yet to build a healthy science tradition, from which flow the outstanding achievements of science.

If, inspite of these shortcomings, individual Indian scientists, have made significant contributions, the credit for these goes to the inherent genius and the traditions of the Indian people and the contact with modern science brought about during the period of the British rule. There are certain factors—social and scientific, which must be given careful consideration if a speedy progress of scientific and industrial development is to be ensured. Some of these are considered below :—

(a) *Science and the people* :

The general literacy and a scientific appreciation of the facts of the Universe by the people promote social progress of the country. Freedom from superstition and prejudice, rational behaviour and scientific attitude signify a higher level of social culture conducive to the growth of science. In advanced Western countries and more particularly in the U.S.S.R. the governments and the scientific societies go all-out to interpret science to the common man. In fact, science is like a "religion" and an article of faith in the Soviet Union and the organs of authority are directed to educate the people to understand the facts of science and adopt a scientific attitude. In India, the mass of the people for historical reasons are not yet fully science conscious.

(b) *Science and Education* :

The general level of education, opportunities for higher studies and training in institutions for scientific and industrial research and the *number* of people trained for professions of science, agriculture, and technology, are a measure of the pace of advancement to economic prosperity. The quality of scientific and technological education also count. In India this factor operates at a totally inadequate level both qualitatively and quantitatively compared to other industrialised countries or such countries which are making an effective effort towards raising the standard of living of their people i.e., China, Yugoslavia, Poland, Italy, Greece etc.

(c) *Science and Society* :

If the development of Society is desired in any particular direction, a greater incentive must be provided for progress in that direction For modern industrial development, scientific personnel is the kingpin. Scientific workers must be assured :

i. an honourable place in society ;

ii. freedom from economic worry and distraction ;

iii. appreciation of their contribution to social development ;

iv. individual liberty and freedom and a proper atmosphere for research.

These conditions are obtainable when society values its men of science and promotes their welfare. In India, the position of the scientist is economically insecure and socially unattractive, almost degrading !

(d) *Science and Industry* :

In modern times the progress of science is inter-related, inter-linked and inter-dependent on industrial development. The dividing line between pure and applied research has vanished long since and one can think of only the gap between discovery and its application. In under-developed countries, the close and intimate association of scientific research with industrial development is even more important ; firstly to minimize the waste of scientific effort and talent, and secondly, to give proper direction to research as a means of industrial progress. Any insulation of one from the other is deterimental to the development of both, and consequently against the interest of the country itself. In India, the vital link which should make scientific research an instrument of industrial development is yet to be forged.

(e) *Science and Administration* :

India has attained an independent status only recently. Its development, so far had been suppressed on account of its colonial status. The administrative set up has not yet re-oriented itself to the political changes of the last decade —an inescapable consequence of the evolutionary as against the revolutionary nature of the change over, and is resistant to the requirements of rapid scienfic and industrial progress. The antiquated, incongruous and irrational rules and procedures, reluctance to shoulder and devolve responsibility cause lengthy delays and obstruct progress resulting in waste of scientific effort and frustration. The entire machinery manned by bureaucratic and ragid administrators who imagine they can order discoveries and inventions is stifling and blocs initiative and creativity in scientific research. Since administrative position means power and prestige and generally higher emoluments and quicker promotions the bright young prefer this to a career in science. Even some of the foremost scientists are not averse to giving up a scientific career for an administrative assignment, resulting in depletion and malemployment of scientific effort.

These are some of the factors typical of an under-developed country which must be remedied to permit a rapid growth of science :

It has been said

> "There is a tide in the affairs of man, which, taken at the flood leads on to fortune"

The tide is the rising tempo of scientific effort.

Discoveries and inventions in modern times are not isolated phenomena, but spring from a high degree of social and cultural development. A society in which educational level and science consciousness are well developed, which has a large number of scientific and technological educational and research institutions turning out well trained scientists and technicians, and whose administration is geared to aid and promote rapid progress, where scientific research and its application are not separated by a wide gap and which guarantee individual liberty, freedom for research and exchange of ideas—has a far greater chance to make original and outstanding contributions in the field of science. A proper growth of these factors builds up a tradition which helps the progress of science still more.

The Science Policy resolution of the Government of India shows a recognition of the above named factors. If implemented, it can give a great impetus to scientific, industrial, social and cultural development of the country. The resolution may remain a pious platitude if no active steps are initiated, and it becomes the duty of the Scientific Workers' Association to think out, propose and initiate positive steps to achieve the objectives enunciated in the resolution.

# Scientific Policy Resolution

The Govt. of India adopted the following resolution which was placed before both Houses of the Parliament by the Prime Minister on 13th March 1958 :—

"The key of national prosperity, apart from the spirit of the people, lies, in the modern age, in the effective combination of three factors, technology, raw materials and capital, of which the first is perhaps the most important, since the creation and adoption of new scientific techniques can, in fact, make up for a deficiency in natural resources, and reduce the demands on capital. But technology can only grow out of the study of science and its applications.

The dominating feature of the contemporary world is the intense cultivation of science on a large scale, and its application to meet a country's requirements. It is this, which for the first time in man's history, has given to the common man in countries advanced in science, a standard of living and social and cultural amenities, which were once confined to a very small privileged minority of the population. Science has led to the growth and diffusion of culture to an extent never possible before. It has not only radically altered man's material environment, but, what is of deeper significance, it has provided new tools of thought and has extended man's mental horizon. It has thus influenced even the basic values of life, and given to civilization a new vitality and a new dynamism.

It is only through the scientific approach and method and the use of scientific knowledge that reasonable material and cultural amenities and services can be provided for every member of the community, and it is out of a recognition of this possibility that the idea of a welfare state has grown. It is characteristic of the present world that the progress towards the practical realisation of a welfare state differs widely from country to country in direct relation to the extent of industrialisation and the effort and resources applied in the pursuit of science.

The wealth and prosperity of a nation depend on the effective utilisation of its human and material resources through industrialisation. The use of human material for industrialisation demands its education in science and training in technical skills. Industry opens up possibilities of greater fulfilment for the individual. India's enormous resources of man-power can only become an asset in the modern world when trained and educated.

Science and technology can make up for deficiencies in raw materials by providing substitutes, or, indeed, by providing skills which can be exported in return for raw materials. In industrialising a country, a heavy price has to be paid in importing science and technology in the form of plant and machinery, highly paid personnel and technical consultants. Any early large scale development of science and technology in the country could therefore greatly reduce the drain on capital during the early and critical stages of industrialisation.

Science has developed at an ever-increasing pace since the begining of the century, so that the gap between the advanced and backward countries has widened more and more. It is only by adopting the most vigorous measures and by putting forward utmost effort into the development of science that we can bridge the gap. It is an inherent obligation of a great country like India, with its traditions of scholarship and original thinking and its great cultural heritage, to participate fully in the march of science, which is probably mankind's greatest enterprise today.

The Government of India have accordingly decided that the aims of their scientific policy will be—

(i) to foster, promote, and sustain, by all approriate means, the cultivation of science, and scientific research in all its aspects—pure, applied, and educational ;

(ii) to ensure an adequate supply, within the country, of research scientists of the highest quality, and to recognize their work as an component of the strength of the nation ;

(iii) to encourage, and initiate, with all possible speed, programmes for the training of scientific and technical personnel, on a scale adequate to fulfil the country's needs in science and education, agriculture and industry, and defence ;

(iv) to ensure that the creative talent of men and women is encouraged and finds full scope in scientific activity ;

(v) to encourage individual initiative for the acquisition and dissemination of knowledge, and for the discovery of new knowledge, in an atmosphere of academic freedom ;

(iv) and, in general, to secure for the people of the country all the benefits that can accrue from the acquisition and application of scientific knowledge.

The Government of India have decided to pursue and accomplish these aims by offering good conditions of service to scientists and according them an honoured position, by associating scientists with formulation of policies, and by taking such other measures as may be deemed necessary from time to time.

## *Know the Association of Scientific Workers of India*

**Year of formation :** The Association of Scientific Workers of India was formed in 1947 under the persidentship of Sri Jawaharlal Nehru and was registered as a trade union under Indian Trade Union Act, 1926.

**Objects :** The Objects of the Association are :

(a) To improve and safeguard the economic interest, the conditions of life and the professional and social status of all scientific workers in India ;

(b) To work for the most effective use of science and the scientific method for the uplift and welfare of the society as a whole ;

(c) To ensure that the national resources of the country and also the results of scientific research and development are utilised in the best interests of the community as a whole ;

(d) To take steps to remove prejudices, superstitions and other institutionalised social habits and customs inhibiting to progress and generally to inclecate the scientific spirit among the people ; etc.

**Membership :** Membership is open to professionally competent scientific worker as evidenced by possessing a degree or equivalent diploma in Science, Technology, Engineering, Medicine etc. Matriculates engaged in a technical capacity under the supervision of a professionally competent scientific worker, are eligible to be members of the Association.

Units of the Association may be formed in Scientific, Technical or Industrial institutions, who should have a minimum strength of ten members.

**Forum :** A monthly journal 'Vijnan Karmee' is published on behalf of the Association of Scientific Workers of India. The journal aims to act as a medium through which scientific workers can exchange experience and opinions on matters of common interest. It lays emphasis on the social aspects of science, impact of science on society, social factors which affect the promotion of science, the working conditions of scientific workers etc.

**Offices :** The Editorial Office is at the Department of Applied Chemistry, University College of Science and Technology, 92, Upper Circular Road, Calcutta-9. The Organizational Office is at Kanpur with Sri D. V. Varma as the General Secretary (Organization). The address is 15/211 Civil Lines, Post Box No : 388, Kanpur. Any enquiries may be sent to any of the above two places.

# Science and Planning*

By

**Prof. J. D. Bernal**

To begin with, why do we have to discuss planning in science at all? Science, in its past heroic age got on without any. It just grew by accretion with bits added here and there under the stress of immediate needs or according to the impulses of individual genius. Certainly, planning in science can never be what it is in the profession of architecture from which it drew its name. In science you cannot decide in advance what to do and then complete it as planned. The essence of scientific research is that it deals with the unknown. In this respect it is much more like military planning, but here it is no human enemy who may do unpredicable things that must need keep the plan flexible, but our ignorance of nature which may, and most often does, turn out quite different from what we imagine it at the outset of a research. As in nature, son in science "The best laid plans of mice and men gang oft agley." However, the scale of science to-day is such that there is no going back to haphazard science. Planning there must be, though we need to strive to retain the maximum of freedom and flexibility and to avoid, as absolutely fatal to advance, routine and bureaucratic ways of working.

The planning of science differs from other kinds of planning in that it is not wholly determined by a clear outer purpose. Although the general advance of science is, by and large, as directed by the economic means and needs of a given society, unconsciously in capitalist societies, consciously in socialist ones, these are only limiting and stimulating factors. Besides this, and to a large extent as time goes on, the different sciences develop their own internal drives and lines of advance which must be taken into account in any attempt to plan science. Outer and inner drives are both necessary to the flourising of science. The former is not only a practical necessity but also a check on ingrown traditions which the history of science shows have often held up science and which have only been shaken loose under the impulse of practical needs.

The scope of planning in science may be taken to include, by military analogy, tactics and strategy but principally the latter. The tactics of science involving the carrying out of short term particular investigations, involve little more planning than is included in traditional scientific method. The longer the range, the larger the scale of scientific investigations, the more need there is of planning. For convenience we may divide the strategy of science into field, grand and global strategy. The first concerns the long term work of an institute or linked groups of institutes in a particular field in one country such as, for instance, Cancer Research or Building research. The second, grand strategy, is concerned

* Opening Speech at the Symposium held on the above subject at the Fifth General Assembly, W.F.S.W., at Helsinki.

with the general planning of research for a country, involving determining the balance between different branches. The third envisages the advance of science over the whole world. Common to all scales of scientific strategy are the consideration of means and objectives. The scientific planner must know, at least provisionally, what he is trying to do and must be able to assemble the personnel and the material to do the job. Non-planned science proceeds the other way round, the material is just there and it is left to the men to think up something to do with it.

For large scale planning it is the shortage of men and material that largely holds up the work and introduces a time lag that might last for several years. The shortage of men is the most serious. In the last resort the provision of apparatus is a matter of money, and science still costs so little compared to industrial or military expenditure that any state, however poor, can provide it if it is really serious about the advancement of science.

The provision of trained scientists in sufficient numbers is a much more serious limitation particularly for countries just entering into the stage of industrialisation and scientific research, but as this will be dealt with in our second symposium, I will not say more about it here.

A most important question in the planning of science is the kind of institutions in which research and development should take place and the relative distribution of the effort between them.In the world to-day we have roughly three categories of such institutes : I. University laboratories, II. Research Institutes —mostly either State run or under the direction of an Academy—and III. Industrial laboratories, Agricultural field stations, geological field teams and hospital laboratories closely attached to their corresponding enterprises.

The proper planning of research requires not only the best performance on each of these levels, but close and lively contacts between them. This is very rarely achieved, largely for bureaucratic reasons and this is a point to which we in the Federation should direct particular attention. At present, University research is too remote from practice, and applied research is too *ad hoc* in character and not enough aware of scientific trends. Except in military research, and to some extent in the light electrical and chemical industries, there is an almost entirely unnecessary gap of between thirty and fifty years between the discovery of a new principle and its large scale application.

Another vexed question is whether fundamental research should be carried out mainly in University laboratories or in Institutes directed by an Academy of Science. Some years ago there was almost absolute division on this subject. Capitalist countries favoured University research, Socialist countries the Academy Institutes. Now there is considerable reorganisation going on both sides and signs of the emergence of a common pattern. The danger of neglecting University research is that the supply of bright young workers can be maintained only from there and that if Institutes or, in capitalist countries, industrial laboratories, tempt the best workers away, the quality of teaching will suffer, to the long term detriment of the industrial research inself. On the other hand there are now so many subjects, such as nuclear physics, which have grown so big and expensive that, either the University cannot cope with them or, if it is given the means to do so, has its structure seriously distorted in the process.

These are important questions of organisation of science which our Federation ought to be studying for it has access to a wealth of experience from countries of widely different kinds and, indeed, is the only organisation in the world that is in a position to weigh the advantages of the different methods.

Returning now to the question of the strategy of science, I would like to quote some passages from an article I wrote nearly two years ago.

"Just as in warfare, two contrary objections may be made to the very possibility of strategy in science. One is that success is a measure of the genius of the commander or discoverer who operates by no rules but is guided only by intuition. The other is that success is a measure of the number and quality of all involved, that the advance of science like the winning of campaigns is a series of obscure soldiers battles, that tactics decides everything and strategy very little. There is much truth in both these objections, especially as applied to science, for science is a new social art compared to warfare, and we are only just out of the heroic period where one man almost unaided could win the battle. Nevertheless, although there may be always obscure fields of science where this will still be true, it is no longer so in the main ones. The big battalions have come to stay. Our danger is rather that we fall into the other extreme, and consider that quantity is enough and that nature can be made to yield its secrets to mass attack.

There is no question here of deducing a correct strategy for scientific research *a priori* of trying to transfer mechanically to research types of organization or procedures borrowed from other social activities. Here, as in most cases of human endeavour, in searching for a suitable method of design and control we can start by seeing what happens without such deliberate control. This was the case in the early stages of the control of nature: for example hydraulic engineering from the study of river channels and bars, which were later imitated in the form of canals and dams. Here it is a matter of studying the social process of the advance of science as an unplanned sequence of interactions between one science and another or between science and techniques in order to find out little how to contrive deliberately the conditions which have favoured success in the past. There are certain aspects of science, notably in applied electronics and polymer chemistry, where already the position of deliberate control of research is almost reached; there are others, for instance in fundamental biology, where it is probably still very far away.

Nevertheless a general pattern of advance of science is apparent: it can be likened more to a network than a tree. The bulk of scientific work, the straightforward following through of problems or applications, can be represented by the meshes of a net: the knots between them mark the convergence of experiences and ideas and are nodal points of discovery from which a number of different applications and disciplines spring."

"The drive in science is not aimless curiosity, it is the desire and need to solve more or less determinate problems. In the old days these were rather vague and apparently simple, such as the nature of fire or how to raise water. In the course of time they have become more precise but also more complex, such as: to determine a rational scheme of mesonic transformations; to link the biochemical, structural and mechanical aspects of muscle contractions; to design an efficient nuclear reactor or space ship.

A most important stage in the growth of science is the formulation and choice of problems be they presented from outside to meet some economic or technical need, or arising within existing fields of science. Because of their intrinsic novelty it is usually harder to formulate problems than to solve them. With limited man-power and equipment there are always far more problems outstanding than can be tackled at once and the beginning of strategy is the choice between them. Significant problems must be sorted out from the mass of insignificant ones in which they may be confused. It is only rarely in science that the significance of discoveries is unmistakable at first sight, like that of X-rays or nuclear fission. At least to the scientist it is evident that such breakthroughs must be followed up with every available resource. More usually it takes long to appreciate significance, as for instance in the case of antibiotics where ten years elapsed before Sir Alexander Fleming's original observation was thought to be worth following up seriously.

Once the problem is seen and recognized to be important, interest round it accumulates until someone finds a solution, even a partial one. Then there usually follows a period of rapid advance, a whole sequence of discoveries which in turn generate new problems. At this stage more and more workers are attracted into the field, as results can now be guaranteed with possibilities of applications, and money—in quantities far greater than would have sufficed to spend in the first stages—becomes easily available. In the end, unless revived by a radically new discovery, the subject becomes an established one, it wins its way into the textbooks and most work done in it consists of trival variations. The development of the theory of light from the time of Isaac Newton to that of Thomas Young is a case in point.

The sequence of initial difficulty, success and stagnation is a natural one but it does not follow that it cannot be modified to advantage by giving some thought to it. The evident hindrances at present are first, the lack of any systematic help in finding problems, secondly, lack of financial assistance in the critical early stages of their solution, and finally, excessive complacency and traditional orthodoxy in the later stages which not only waste effort but set up barriers to further radical advances."

"Although a certain element of chance must enter into the return, scientific or economic, to be expected in the earlier stages of any idea, this is no excuse for a random picking of those to support. At any stage it should be possible to give an estimate of the minimum effort required to achieve a definite result and also of the advantage which might accrue if that effort were successful. Priorities may be given roughly in the order of the ratio of advantage to effort, having in mind also that effort is not indefinitely divisible and that, though it may be rarely worth while to back one project with all available resources, there will be a certain loss if every plausible proposal gets some support but none get enough. These were the principles which P.M.S. Blackett used with such success in scientific anti-submarine warfare. Their applicability is not limited to military or to industrial research. Though there is no unit in which scientific importance can be quantitatively measured, a qualitative scale of values, giving the greatest importance to the introduction of radically new ideas and measuring effort in terms of the ability of men rather than in money, can be used instead. This is what in effect the great scientists of the past have done, deliberately neglecting work in which they would have certainly succeeded for ventures with little assurance but offering unlimited possibilities of fundamental advance.

One common feature of scientific strategy in the fundamental and applied fields is the subordination of detailed additions and improvements to radical revisions or innovations. The essential of strategy as contrasted with tactics is the ability to stand back and take thought. It is necessary to formulate long range objectives, often by bringing into consciousness directions which on reflection can be seen to have striven for unconsciously.

Having done so, it is necessary to inquire in the light of all available knowledge, whether such objectives could be achieved by a more direct route. An example from the history of technology is the difference in the procedures of the scientifically minded engineer John Smeaton in his rational improvements to the Newcomen engine which doubled its efficiency, and the analysis of function which enabled the real scientist James Watt to revolutionize it by adding the condenser and quadruple the efficiency again.

The method of bringing to bear all available knowledge on one definite problem and creating more knowledge as required has been the ideal, very rarely achieved, of much applied research. As the complexity of science grows it is becoming applicable—and indeed necessary—in fundamental science as well. In this type of inquiry, which was known as 'objective research', during the 1939-45 war but which might perhaps be better described as 'convergent research', many fields of science and technique are called upon to contribute. This implies at least three categories of work: that carried out by the mixed teams of research workers in the main fields concerned; the use of a range of consultants and advisers in less immediately related fields; and a wide, continuous and discriminating search through the literature."

"Convergent research represents an ordered preparation for discovery or invention but as these are made further research of a different character is required to see that full use is made of them. This is the kind of research which is usually termed 'subjective' because it deals with one subject in its various ramifications, but it seems preferable, to indicate the directions of the work, to call it 'divergent'. Until recently divergent research was largely left to itself. Through casual contacts or reading, scientists often learned years later of developments in other fields which would be of use to them. For instance, the recent developments of phase and interference microscopy depend on advances in physical optics more than fifty years old, but it was nobody's business to inform microscopists of what was possible in optics or physicists of what was needed in microscopy.

This situation is rapidly changing and divergent research is finding its appropriate organization."

"Both convergent and divergent research find their natural place in the general network of scientific and technical advance. What is needed is a survey of the whole field to see how far other sectors would also profit by appropriate types of organization, for it does not always follow from the absence of organization that one would not be welcomed if someone took the trouble to start it.

It will be noticed that this type of detailed organization cuts right across the divisions of basic and applied research; indeed that is one of its most useful features. By bringing scientifiic workers together, their common interests as well as their different objectives and methods are brought out. It is seen that basic and applied research represent the two ends of a continuous spectrum. It ranges from research where the number of variables is reduced to a minimum so as to be closest to theoretical conceptions, to one where a large number of variables have to be accepted in order to produce a reasonably close approximation to practical conditions. Workers may be drawn temperamentally to either extreme or even find the best scope for multiple interests in the middle. Nevertheless much has been lost in the past by mutual ignorance of work of a different kind and there is much to be gained by spreading not only the knowledge but the practice of each research worker over both fields of basic and applied research. I have found in my own experience and those of my colleagues, especially during the war, that for a pure scientist to take into account technical and economic factors and a mixed range of sciences widened his experience and produced ideas later applicable even to narrow specialities. I hope that the effect on the more applied scientist was equally beneficial."

These general conclusions on the strategy of research must necessarily be applied differently in countries in different stages of industrial development. The grand strategy of a country which has its development retarded will be in the direction of first surveying and then utilising its primary natural resources, building up its heavy industry and creating an educational system capable of turning out an adequate number of scientists and technologists. The inspiring developments in China are an example to the rest of the world of how this can be done but we should try to learn not only from their successes but from their mistakes and failures.

In an old, highly industrialised country, the problems are quite different. There it is the human resources in working tradition, training, and intelligence that need to be fully used with the object of continuously turning over the industrial production from regions of mass production where younger countries can do better, to pioneer applications of science producing goods containing the least material and the greatest ingenuity and at the same time continually raising the standard of scientific education and research.

As to the global strategy of science, this is being held back by the division of the world and the enormous concentration on military science that this entails. Even now, however, we can see from examples of the Soviet Union and China something of the form it would take. It implies an extension services, an exchange of personnel for shorter or longer periods, a system of planning conferences linking complementary economies and sciences. The particular advantages of one country in climate, natural resources or scientific tradition and personnel, should be developed to the full for the benefit of all. All these are objectives of our Federation and we should not wait for the settlement of international differences atleast to plan what can be done in this way.

In a world very unevenly developed scientifically, the first task would be to bring all countries up to the level of the best. Nor would this be a merely one-sided co-operation; the reserve of scientific talent in the underdeveloped countries must be many times what it is in the old industrial countries. After the first few years, its release would make itself felt in a marked impetus to fundamental and applied research alike.

All these changes imply, however, a planning of science on an ever increasing scale and the consideration of this cannot begin too soon.

# Moral Crisis in the Modern World

By

**Priyadaranjan Ray**

*Indian Association for the Cultivation of Science*

It cannot be denied that the world is passing through a moral crisis at the present time. This may be viewed as the natural outcome of the growth of human civilization and the evolution of human intellect, to which the remarkable achievements of modern science bear an eloquent testimony. The result has been that man has succeeded in developing highly complicated and efficient Societies and States, which for their security, stability and general welfare require equally intricate and great adjustments and control. Discoveries of science and their application have placed in the hands of man an immense and unprecedented power which may be utilized both for his endless good as well as for an unlimited evil. Application of science has enabled man to solve many pressing problems of his existence, but at the same time it has given rise to many more, offering a perpetual challenge to his mind. Thus, for instance, the development of rapid and high speed transport has reduced the distance of time and space for man to an extent which could not have been previously dreamt of, and this has brought the nations and countries physically closer together for mutual help in times of distress and difficulties. But, on the other hand, it has also reduced the striking distance for the movement of armed might to flatten everything in its path, to deal indiscriminate destruction and death all around, and to shatter ruthlessly the foundation of all values that man has learnt to treasure. Many people are, therefore, inclined to think today that this machine age and material civilization, of which we are so very proud, can represent no real spiritual advance; and that the application of science or technology has failed to deliver men from the yoke of their follies and sins. As a matter of fact, inspite of the vast progress man has made in respect to his material welfare and intellectual attainment, there has certainly been little decline, if not a large increase, of selfishness and corruption in any class. If it be pointed out that some evil has been extinguished from the society, one can at once refer to some new enormity that has sprung up to balance the success. How many are there who are moving about in feverish excitement to basely avail themselves of the ease and luxury of the modern civilization and how few to feel its obligations and be ready to discharge the same? This complicated and industrial civilization provides a congenial atmosphere for a sort of intellectual sensitivity and irritability in men, but it cannot help to stimulate a hardy spiritual life and a moral thoughtfulness or wisdom within him. The conscience of man under these circumstances remains more or less wholly asleep, and finds little opportunity to be awakened in the midst of inebriating intellectual activities, directed mostly towards the acquisition of material power and material wealth. It is indeed a picture of brilliant colouring so far as it relates to the material aspect of human life, but presents a preternatural contrast of blackest shade in respect of its spiritual phase.

The exclusive absorption in the pursuit of material power and material gain, provided by the unrestricted application of science, has debased even science itself ; it has blinded the human vision, clouded the human reason, and engendered the abuse of human intellect. It has given a twin birth of monsters in the form of two power blocs sustained by two different ideological doctrines. An ideology, as is well known, when followed with fanatical zeal, does incalculable harm to the society like a religious faith similarly pursued. For, fanaticism invariably leads to intolerance and violence. The ideological differences regarding the socio-economic structure of States in the world today have generated an unreasonable and almost intolerant conflict between man and man, both as individuals as well as members of an organized body. Science is being dominated by this conflict and many scientists are also working in partnership with it. This has now assumed the shape of what is popularly and significantly described as cold war. Furthermore, this cold war, instead of remaining always cold and passive, occasionally boils and bumps up, giving rise to local and undeclared hot wars with its toll of destruction and death. People all over the world are upset today by the dismal prospect of such undeclared hot wars spreading into a general conflagration like wildfire and assuming the shape of a third global war waged with uncontrollable and devastatingly destructive atomic weapons, that may spell the end of humanity and civilization. Yet man has so blinded his vision and clouded his reason by passionate adherence to his pet doctrine, that he fails to perceive the folly of representing it as the height of perfection and the basis of ultimate truth.

Dazzled by the glamour of the material civilization man has relegated today his moral sense to a dark and remotest corner of his mind, where it lies dormant and depressed. We, therefore, find that while science is engaged in the pursuit of truth and aims at the establishment of a republic of reason, diplomatic platitudes and sanctimonious pretences are regarded as the most popular currency regulating the human relations. Reason, which should hold a supreme command over the human conduct, plays the role of a subservient agent to passions and prejudices of man. What is generally condemned as a crime or sin in the case of an individual in a society is paradoxically extolled as a glorious or heroic deed, if committed in the interest of an organised body or community. Robbery and murder are abhorred as heinous crimes and are punishable by death or imprisonment in every State, but commited in course of war when countless numbers of innocent and non-combatant people, irrespective of age, sex, or health, and killed outright and mutilated and the destruction of wealth and properties occurs on a huge scale, they are hailed as great achievements, and the perpetrators thereof are honoured or acclamed as national heroes. Then again, while men all over the word are crying for peace, powerful nations are zealously engaged in preparations for a large-scale war with ever-increasingly powerful weapons of mass destruction. This resembles an attempt to extinguish fire by intensive preparations for lighting the same. If the colossal waste of energy, material resources and man-power of the world, that is involved in wars and in the preparations for war, could be avoided, then many of the problems of the modern civilization, relating to the necessities of life, might have been readily solved. But man is not guided by his reason unless the conscience commands.

It may, therefore, be stated that there is an all round loosening of moral faith in the present age. This materialistic civilization has made man to look upon enjoyment as the great end of existence. As a result, his sense of right and wrong is in a continuous fluctuating state, his mind feels a delight in an indiscriminate advocacy, for lure or favour, of any cause irrespective of its goodness or moral value, and his conscience is emasculated, doubting whether anything is wicked that is not cruel, and reconciling even to that on sufficient considerations of advantage. What is still worse, we even hear of breach of faith in States or violation of treaty obligations by them, of unprovoked or unwarranted aggression by more powerful nations over weaker ones, of shuffling expediency in public life, and of outburst of national, racial or communal malignity, defended and admired by many statesmen who should elevate and not deprave a nation's mind.

It is, therefore, no wonder that the modern age is faced with a moral crisis. All attempts to overcome it by intellectual devices in the form of United Nations' Organization have proved inadequate and ineffective, as the recent events in Korea, Indo-China, Egypt and Hungary, as well as the failure of all proposals for disarmament, demonstrate. Self-interest, national prestige, racial feeling, pride of power and higher standard, ideological differences, mutual fear and various material considerations stand in the way of a just solution and mutual agreement. In the ultimate analysis, it turns out to be a moral issue and hence requires the development of a high moral sense on the part of every member for a lasting solution. There has been an extraordinary development of human intellect in the modern age, and men can claim a superior knowledge of good and evil; but this does not involve any change in the proportionate love of them. For, a mere statement of moral law cannot induce people to follow it, just as a sinner cannot be made god-fearing or pious by prayer available through printing machine or radio. Doctors may advise the patient with a bad liver to give up drinking, but that does not imply that he will do it. For this, there is needed a will to change, or a change of heart as Gandhi used to call it. Such a change cannot occur unless the moral sense, or a sense of higher values in life, is awakened in men. All settlements or adjustments of difference in human affairs by means of mechanical device and intellectually planned system, unless based on eternal moral laws, are known to break down under clashes of conflicting interests. For, with lawyer-like advocacy one can evade the control of social and State laws which are more or less enforced by majority opinion or external power. Willing loyalty may be lacking in their case, when they go against one's own interest or benefit. All imposed settlements by pressure of physical forces, or through the so-called balance of power dictated by policy of strength, can seldom last long. Their basis is fear, mutual or one-sided; and fear breeds dislike and enmity. The result is an armed peace or cold war.

The problem, therefore, is how to bring about the desired change of heart or the awakening of moral consciousness in men, in order that the moral crisis of our time might be controlled and a third global war with its grim and frightful consequences averted. Fortunately, the way to its solution has already been indicated and demonstrated by Gandhi—the greatest man of our time. As a remedy to all evils, he has suggested the adoption of two moral codes of conduct by men and nations. These are, as is now well-known, the pursuit of truth and the practice of non-violence. By non-violence, he insisted upon non-violence in thoughts, words and deeds. He thus advocated that all evils are to be fought by means of non-violent non-cooperation and non-violent resistance. This may entail considerable sacrifice and suffering, but compared to death and destruction resulting from armed conflicts with modern weapons they are of little or no significance at all. This is the only way to bring about a change of heart of both the parties in a dispute, and thereby to guarantee its peaceful and permanent solution. Gandhi used to hold that non-violence is not a sign of weakness, but indicates a remarkable strength of mind. For, to resist violence without retaliation requires a much greater courage than to meet violence with violence.

Now, what can we do in propagating these moral codes of conduct enunciated by Gandhi, who demonstrated their efficacy by his own actions? We, who have adopted science as our career and profession, are used to proclaim pursuit of truth as the aim and purpose of science. But in reality it appears to be confined more or less to our scientific observations, and leaves our social, political and other relations somewhat unaffected. It should be our duty to advocate pursuit of truth in all walks of life, not only for ourselves but for all people of all lands. We should also adopt as our creed the practice of non-violence in thoughts, words and deeds, and make all efforts to popularise these basic concepts.

These are the main weapons of human spirit that can meet the challenge of atomic and hydrogen bombs, the two most powerful but monstrous offsprings of human intellect. It must not be forgotten that evils can be overcome only by good and seldom or never by counter-evils. For, in the latter way there lie only conflicts and clashes ending in ruin, disaster and death. On the other hand, one who resists evils or violence by non-violent means readily wins sympathy from all, and sooner or later the whole world stands behind him. There lies his moral victory, and ultimately the cause he espouses achieves its end.

Finally, it is worthy of note that in the early days of civilization religion based on blind faith stood in the way of pursuit of truth by science; but today man is in need of an enlightened religious faith which will avert the threat of extinction of his civilization and his species from the abuse of science and its application. This is possibly in accordance with the law of evolution; for, as Hegel observes, in all historical developments the steps proceed from a thesis over an antithesis to a higher synthesis. May the spirit of man rise to achieve this synthesis! *

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* A paper read in absentia before the Annual Meeting in September, 7, 1957, of the Society for Social Responsibility in Science (SSRS), held on the campus of the University of Pennsylvania in Philadelphia, U.S.A. A summary of the paper has appeared in the SSRS News Letter, November, 1957.

# International Geophysical Year (IGY)

By

**Dr. M. Krishnamurthi**

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The recent launching of artificial earth satellites first by the Soviet Union to be followed soon by the United States, in connection with the International Geophysical year (IGY) has naturally electrified the whole world and there is a general awakening of popular interest in the IGY. In the following pages are being presented some of the more important features of the programme. One thing must be emphasized at the very beginning and that is, the baby moon is still very much of a baby so far as IGY is concerned and its future triumphs should not in any way detract from the importance of the IGY programme, as a whole.

One of the most important features of the programme is its almost world wide nature. Although there have been a few precedents of international co-operation in geophysical research—the most recent examples being the two polar years, one in the 1880 and the other in the 1930—they were very limited in scope as also in the geographical area involved. The present programme, on the other hand, is being supported by as many as 64 nations of the world. Every nation that is doing any kind of geophysical research at all is participating in the programme. It covers nearly a dozen branches of geophysics.

Many fields in geophysics have reached a stage where, without team work, further progres is extremely difficult, if not impossible. Furthermore, the exact inter-relation and correlation of various geophysical phenomena cannot be put on a firm basis unless scientists working in different branches of this subject collaborate closely. Hence the International Council of Scientific Unions decided in 1953 to set up a Committee under the chairmanship of Dr. Sydney Chapman of Great Britain. It is a great regret that Dr. Chapman died only recently without seeing through a programme for organization of which he was so much responsible. The world has lost one of the leading authorities on geomagnetism and connected phenomena. It has to be realised that while the participating nations have almost complete independence of action, all the data collected will be made available to a world centre located near Brussels in Belgium. Further details of the administrative and other coordinating aspects of the organisation will not be dealt with here.

The International Geophysical Year started from 1st July 1957. It will last till the end of December, 1958. It was not through any accident that these dates were chosen. The 1957-58 period includes the most intensely active period of the eleven year Solar cycle. The year has been extended to eighteen months so that comparison could be made between the observations obtained during Solar activity and those made in its absence. This will enable conclusions to be drawn on the effect of Solar activity on various geophysical phenomena such as the weather, earth's magnetism, ionosphere etc. Besides continuous observations during these eighteen months, special periods of intense observation have been set apart. They are the regular world days, world meteorological days and special world intervals.

(a) The regular world days are sixty-four in number and are three to four days in each month. They are chosen to coincide with the new moon, quarter moon or with known meteoric showers.

(b) The world meteorological intervals coincide with the solstice and equinox when it is supposed that some stratospheric winds change direction. During these intervals, therefore, weather observations will be intensified.

(c) Special World Intervals will be called to alert far flung observation posts to the occurence of solar flares—eruptions on the sun's surface. Reports that turbulence seems to be building up to give out a flare on the sun will be assessed at a central station and if found true, the world will be alerted by radio. Intense observations on the ionosphere, aurora etc., will then be made.

There are about 2500 stations participating in this work. They are located in five meridianal zones from pole to pole. The greatest difficulty in locating stations was in the southern hemisphere where most of the space is occupied by the oceans. But USA, USSR and Commonwealth have set up more than 40 stations on ship and land in this area, one of them being the American station right at the south pole. Lot of credit must be given to the scientists and engineers who, at great personal risk and prolonged personal discomfort, have set up these stations and have agreed to man them for two or three years completely cut off from the rest of the world. The total cost of the programme is supposed to be around 500 million dollars, a large part of which is coming from USA and USSR.

The programme involves mainly the following branches of geophysics : Meteorology, Oceanography, Glaciology, Solar Activity, Ionospherics, Aurora, Geomagnetism, Cosmic Rays, Gravimetry, Geodesy and Seismology. Some of the main problems that will be tackled under these different heads will now be described briefly :—

(1) *Meteorology* : The entire globe —its polar regions, its oceans and its uninhabited land masses included—will be dotted with 2500 stations equipped with various instruments. Balloons will be sent up 15 miles high into the atmosphere simultaneously from a number of these stations at midday and midnight GMT everyday and then wanderings tracked by radar. This will enable wind velocities to be plotted at different altitudes. Similarly rockets and satellites will be equipped with telemetering equipment to give us information on this aspect at higher altitudes.

The antarctic region is noted for the most violent storms on earth. The IGY programme hopes to establish whether any connection exists between these storms and world-wide weather conditions.

Another problem that will be studied concerns the increasing content of carbon dioxide in the earth's atmosphere. Due to rapid industrialisation throughout the world the carbon dioxide content of the atmosphere is going up perceptibly. How far this is tending to make our climate warmer will form a subject for study.

(2) *Oceanography* : Among problems to be studied under this head, the gulf stream which controls the climate of

the American and European continents will be mapped accurately using a number of ships specially equipped for this purpose. The manner in which heat is flowing from the core of the earth to the bottom of the oceans and how long it takes for water from the ocean depth to recirculate to the surface will be two other problems that are to be investigated. Tides and other sea level changes in oceans will be observed and correlated with weather and climate changes. It might be possible to predict years in advance about the occurence of cold & warm seasons.

(3) *Glaciology* : Until recently it was assumed that all the glaciers and ice sheets in the world are gradually shrinking or contracting. But recent evidence shows that the Antarctic ice sheet (which contains 90 per cent of the world's ice) is at least stagnant if not actually expanding. By starting investigations now, it is hoped that future generations will be able to settle this problem one way or the other. Tractor parties will detonate charges at regular intervals of a few miles in the Antarctic region and by measuring the echo period from the rocky bottom, the thickness of the ice sheet at various points will be determined.

A world wide survey of glaciers is also planned, particularly ice chips from various depths of the glaciers will be tested for their content of the isotope of atomic number 18 of oxygen. As the ice layers in the glacier of earlier periods are formed deeper than the more recent ones, the $O^{18}$ content in these various layers will reveal the climate conditions at different periods of earth's history.

(4) *Solar Activity* : The sun is believed to be a sort of hydrogen bomb in continuous explosion. Its radiation or that part of it which penetrates the earth's atmosphere sustains life on this planet. Much of the radiation like the ultraviolet, X-rays, cosmic rays are absorbed in the upper atmosphere giving rise to secondary effects. One of the main purposes of the rocket and satellite programmes is to study these radiations before they reach the earth's atmosphere. For this purpose, they are fitted with a number of electronic instruments which can record, and retransmit to the observation posts information on these aspects.

(5) *Ionosphere* : It is well known that between 50 and 300 miles above the earth, there are a number of layers of ionised gases at extremely low pressures. In fact, it is these layers acting as reflectors that make possible short wave radio communication over very long distances. The rockets and satellites will study these layers at close quarters. At the time of solar flares, there are intense disturbances in these ionic layers causing radio fade-outs. More information on what exactly happens on such occasions will be obtained.

There are what are known as Radio stars in the Universe like *Cassiopeia* which are stars or astronomical bodies sending out radio waves. To reach the earth, these waves will have to pass through the ionosphere and there they undergo periodic absorption. By studying these 'scintilations' one can get a good knowledge of the conditions in the ionosphere. A number of radio observatories are concentrating on this aspect.

(6) *Aurora* : The bright displays of light in the sky near the polar regions are visible almost every clear night. Experiments have shown that these occur in in ionosphere. During solar flare periods, they have been observed to increase enormously in intensity. Special instruments and all-sky cameras have been

installed at various places in polar regions to investigate these phenomena. On cloudy nights and during day time these displays are being studied by Radar.

(7) *Geomagnetism* : The earths magnetic field extends thousands of miles out into space. At the equator the lines are roughly horizontal and at the poles they point downward. During magnetic storms which seem to originate with disturbances on the sun, the horizontal magnetic force becomes markedly weaker. This has been explained by supposing that at such times immense electric currents in space girdle the earth at the equator and also nearer the magnetic poles. This theory will be tested by rocket firings and surface stations. The diurnal and long term variations in the earth's magnetic field will also be investigated.

(8) *Cosmic rays* : Besides studying the characteristics of cosmic rays before they reach earth's atmosphere directional studies of cosmic rays will be undertaken both on the surface of the earth and at high altitudes. The results will greatly improve our knowledge of the magnetic field of the earth and also of the presence of charged particles in the space surrounding the earth.

(9) *Gravimetry* : The gravitational field of the earth is by no means uniform. It depends on the shape of the earth, the distribution of mass etc. A device has been perfected in U.S.A. which can detect variations in gravity of the order of $10^{-9}$ which is equivalent to changes in the distance to the centre of earth by about $10^{-2}$ of an inch. This instrument has already shown that the Hawaiian islands are being pushed up and down by tidal waves in the Pacific Ocean by as much as a few inches. Other gravimeters have been developed which can be used in submarines in motion. All these instruments will be used for accurately mapping earth's gravitational field especially under the oceans which cover three quarters of the planet's surface.

(10) *Geodesy* : The actual location and extent of various continents and other land masses will be determined. The theory of continental drift that various land masses on the globe are drifting apart will also be tested. The position of the moon in relation to the stars in the background will be photographed simultaneously from different points of the earth thus fixing the positions of these points in relation to one another. This information will be used in the future when, by similar experiments, it can be determined if there has been a drift.

(11) *Seismology* : The major earthquakes as well as the microseism and tremors that always are present in the earth's interior will be studied. For this purpose, seismological stations have been set up at several new spots.

So far mention has been made only of what is planned to be done during the IGY. Much of the work scheduled under the programme has been started and progressing quite well.

In conclusion, it may be remarked that the IGY is a period in which scientists all over the globe will be living in 'One World'. It is the author's fervent hope that world's politicians will follow the example of the scientists and very soon we shall all be living in 'One World' for all time.

*London Letter.*

# The Passive Scientific Worker

All the friends of Indian science here are very pleased with the attention the National Institute of Science of India is giving to the question of correlating research with economic development plans of the country. The symposium held by the Institute in January 1957 and the Address of Prof. Mahalanobis this year are unmistakable signs of the fact that Indian scientists are awakening to their national tasks. This is all very good and taken in conjunction with many official steps such as the creation of the Panel of Scientists to advise the Planning Commission one could feel quite optimistic about the immediate future of science in India.

However, on the basis of intimate conversations with Indian students and scholars here, I have gathered an impression that they are quite unenthusiastic—and even cynical. Anyone who has spent some years in scientific work at home after obtaining his last degree would come out with complaints—and these complaints seem to have a general pattern which goes further than mere personal grievance. In fact when I hear all this in the perspective of my other contacts in various research centres in India I cannot help recalling the speech by Dr. J. C. Ghosh—the speech that inaugurated the 1957 NIS symposium. In other words, the shortcomings and problems of scientific research in India are well recognized, and there is no doubt that it is due to these shortcomings that scientific workers feel so different about research in India—so despondent and discouraged when the potentialities are so great!

Unfortunately, any schemes which do not change the attitude of mind of these scientific workers are not going to contribute much to national advancement through science—and it is at once our duty and responsibility, therefore, to propose positive steps to change this state of affairs.

### Why this Cynicism

I have given some thought to this question and have often discussed it with others both in India and here in London. It may sound as if I am simplifying the whole thing, but to put the main point briefly—I would say that this cynicism is produced somewhat like this. A bright student obtains his Masters degree usually without incident, and he may desire to enter the field of research—without inhibition, full of optimism and enthusiasm. He is somewhat of an idealist, and his first experience of colleagues (previously his teachers), their work and personal relations is disappointing, to say the least. In addition to the unhealthy atmosphere of personal rivalries, lack of consideration for the truthful and the just, backbiting—and what is more, the apparent success in terms of money and position of precisely the less deserving—he gets into an intellectual position of being able to see and judge for himself the quality of "research" that goes on, and the effort that goes on to boost it up for the sake of publicity and grants. Before long—often due to his inexperience, he is forced to take sides in this game—which to any honest man is even more revealing. Thus the promising and enthusiastic entrant of yesterday is transformed either into a lackey of some kind—or into a very "doubting" kind of unhappy man. The situation is made worse by two other factors. One, that in spite of extreme dissatisfaction there is nothing he can do about it. Even the most objective sort of criticism would be either misunderstood or entirely rebound against him. Thus there are a lot of senior people, even the highest placed, who seem to be aware of what is going on, but who very discretely avoid *doing* anything (even when the necessary steps are within their power and jurisdiction) to change the situation.

Of course, I know that this is only a stereotype of the "cynical" research worker—but perhaps I am not exaggerating when I say that a very considerable proportion of our colleagues go through this process. The kind of scientific "life" or "atmosphere" which produces these stereotypes—is a very unhealthy environment for work—and I believe, it should be investigated with all the objectiveness of a piece of research—so that the conditions essential for the flowering of science and other creative activity in our country be produced.

**The Way Out**

After this sketch of why is it so, let us see the next question, namely, what can be done about it. I think that the Government and scientific organizations could remedy the situation in the following ways :—

(1) The under-current of criticism should be brought to the surface in such a manner that it changes from personal grievance to a constructive and objective evalution of the present practices and their results. The Government and managing authorities of all other research centres would do a great service to the cause of science if they instituted seminars and discussion forums where scientific workers may express their views in a responsible manner without fear of reprisals. Scientific organizations, among them our own Association could have their own symposia for discussion of such problems—and the Vijnan Karmee could could be of great help if it could procure and publish scientific views on such questions as :

* how the National laboratories (for example, the CDRI or the NCL etc.) could plan their research in consideration of and coordination with the national needs expressed in our Five Year Plans.
* how the universities could improve the quality and quantity of their output in research.
* how the Indian Science Congress Association may be reorganized to better fulfill the role of serving science in present day India.
* how the Panel of Scientists could really initiate the planning of scientific research in the service of national development.

Obviously, I suggest this in the belief that more (and not less) well-informed discussion and criticism is healthy for the growth of individual institutions and research in the country as a whole—and, instead of shying away from such criticism a democratic society should in fact invite it if it wishes to correct its shortcomings.

(2) In addition to benefiting from constructive criticism coming from the "rank and file" scientific worker there is an urgent need for placing more responsibility on such scientific workers for the actual running of the institutions. This means, to be exact, larger teacher control in the universities and research-worker control in the National Laboratories. I

say this not only because informed criticism and greater responsibility in control are co-operative factors—one having little meaning without the other—but also because the possibility of meaning and purposeful expression of views would promptly do away with a great deal of frustration of scientific workers, releasing their energy for fruitful output, and producing innumerable new ideas about how to win the specific scientific battles for the country. Just as an illustration—I feel it would do immense good to the National laboratories if at least up to 20% of their research staff were drawn into planning of the laboratories' research programme, and if at least once a year the whole "philosophy" of the work undertaken were reported and explained to the whole staff.

(3) In order to generate enthusiasm among scientific workers for national development, perhaps nothing would succeed like actual steps on the part of Government in the direction of bringing orderly scientific research in the service of the Five Year Plans. At the NIS symposium in 1957 the need for coordinating research with planning was expressed by all, including Dr. J. C. Ghosh, but strangely enough no concrete proposals have yet emerged. The Association of Scientific Workers did work out its suggestions in a fairly concrete form and they were broadly presented at the NIS symposium too; but in spite of all this no high body has answered the question. This is how we propose to bring about the coordination needed between research and economic planning! Perhaps the future Five Year Plans are already being drafted—without reference to scientific workers at all.

**Role of A. S. W. I.**

The problem for us, specifically, for members of the Association of Scientific Workers of India is how to initiate the process by which popular scientific opinion about our professional work may be expressed, by which the scientific worker may gain some voice in the running of research institutions (even as the Government thinks of greater control by workers in running of nationalized factories), and by which science may play its potential part in rapidly developing the economy of our country. Alas, the ASWI is such a small body—partly the same overall frustration keeps people away from our work, that it can help only in a limited manner. But everyone would perhaps agree that we should exert every effort in this direction.

This effect can be made (a) by members writing letters in the national newspapers inviting attention to the problems (b) by the Vijnan Karmee procuring and publishing articles particularly dealing with questions such as mentioned in para 2 above, (c) by the ASWI writing to senior scientists on whom a greater responsibility lies for bringing about the desired changes (d) by the ASWI raising the question and making concrete proposals directly in the Panel of Scientists.

And, with the permission of the Editor I would volunteer to write about university research in the next issue....

RAIS AHMED

*Our readers might be interested to comment on the suggestions and the views expressed in the above Letter by writing Letters to the Editor in Vijnan Karmee.*

*—Ed.*

# Association News

**Central Leather Research Institute, Madras—Dr. Zaheer appeals for setting up a new Branch**

Dr. S. H. Zaheer, President, A.S.W.I. and Director, Regional Research Laboratories, Hyderabad, recently addressed the members of the staff of the Central Leather Research Institute, Madras to solicit their support in forming a Branch of the Association at the Institute. Dr. Y. Nayudamma, Director-in-charge of the Institute while welcoming our President as one of the members of the family of the C.S.I.R. and as one who always looks to the interest of his laboratory and men, explained the purpose of the meeting.

Dr. Zaheer in his address first raised the question as to why the scientists in India should become members of the Scientific Workers Association. He said "Like any other trade union organisation, one of the main objectives of the Association is to fight for the rights and privileges, service conditions and salaries etc. of the scientific workers of India. Representations on the matters of service conditions and emoluments are effective only when made by a group rather than on an individual basis. In addition to the main objective of improving the conditions of service of the large body of scientific workers, there is another very important social function the Association has to perform. There are still very many amongst scientists in our country and abroad who think that it is derogatory to their scientific effort, to science, itself, if they join as members of any Union whch is not of a purely academic nature. Fortunately, however, events today are moving forward in such a manner and in such a direction that it is making this attitude as obviously incorrect and universally given up except by a few unusual people. The recent developments in science and technology have faced the scientists with a serious dilemma. If scientific effort is used for destructive purposes it may completely destroy human civilization while through its peaceful application a world of plenty in which men can enjoy leisure and develop their culture can be brought about. The obvious duty of scientists should be to point out both the dangers of the misuse of science as well as the wonderful potentialities for constructive effort by the peaceful application of science. This can mainly be done through a conscious organisation of scientists."

Dr. Zaheer stressed that the scientists of today should not only necessarily be first class physicists, chemists, technologists, biologists etc. but it is also quite necessary for them to know the social consequences of their work and effort. It is not only in the interests of scientists but in the interests of the development of science and technology that they must have a correct social background. It is only when science has attained certain moral prestige, it is only when it has won popular esteem, the necessary means for carrying out scientific work such as grants, buildings, apparatus etc. will be made available to the scientists. It is only then that the personal status of the scientist himself will be raised and his views, advice and position in society will command greater respect than now. It is only then that the scientist will cease to be the 'back-room boy', and the administrators and politicians will pay due regard to his advice and implement his recommendations which is mostly ignored now. Dr. Zaheer concluded his address after thanking Dr. Nayudamma and other members with the appeal to start a Branch in the Institute at the earliest and from there to spread it to the scientific and technological organisations and institutes in Madras.

After his address there was a lively discussion on the functioning of the Association so far. Dr. Zaheer and Sri D. V. Varma, General Secretary (Organisation) tried to answer the various points raised by the members present.

Mr. M. A. Ghani, Senior Scientific Officer and Dr. S. Ghosh, Junior Scientific Officer were appointed as convenors for enrolling members for the Association and we can look forward to the formation a Branch at the Central Leather Institute soon.

**Calcutta Branch-Annual Report of Activities for 1957**

The Annual General Body meeting of the Calcutta Branch, A.S.W.I. was held on 21st December, '57 in the Department of Applied Chemistry, University College of Technology. The meeting was well attended by members from different units. The outgoing Secretary of the Branch presented an annual report of activities at the meeting the main points of which are given below.

During the year it was possible to consolidate the activities of the Branch in a better manner than before and it was hoped that with the level of activities that was maintained during the year it might help towards the growth and diversification of the Branch activities next year. The participation in the activities of the Branch by the general rank and file members was however negligible and it was only through the energetic cooperation by some active members that it was possible to do some effective work.

At the last Council meeting held in Calcutta in 1957 the Editorial Office of 'Vijnan Karmee' was shifted to Calcuta under the Editorship of Dr. S. K. Mukherjee, the President of Calcutta Branch. Dr. Mukherjee left for Indonesia as a visiting professor sometime during the middle of the year and the Branch Secretary acted in his place for the rest of the year. This formed one of the major responsibility of the Branch and it was discharged fairly satisfactorily. Here again the cooperation received from general members was not at all encouraging and the whole burden of publishing the journal regularly every month was carried by three or four members only. The Secretary proposed that a Permanent Committee of members of the Branch should be formed to assist the members of the Editorial Board in the running of the journal.

The membership of the Branch increased from 130 to 225—an increase of about 100 new members, during the year. Contact was reestablished with the National Instruments Factory Unit of ASWI after a long lapse of time and this helped to increase the membership of the Branch considerably. Ten new members were enrolled at the All India Institute for Hygiene & Public Health, Calcutta.

There were nine meetings of the Executive Committee and two General meetings. In the first General meeting held in April, the question of Nuclear Explosion Hazards was discussed by a Panel of speakers including Dr. B. D. Nagchoudhury, Prof. B. C. Guha, Dr. S. K. Bose and others. A resolution adopted at the meeting was sent to the Embassies of the Govts. of U. K., U.S.A. and U.S.S.R. and to the Prime Minister of India. In the other General meeting, Dr. M. M. Chakrabarty, Vice-President of the Science College Unit gave a talk on Education in China after his visit to the People's Republic of China as a member of delegation of educationists.

The Executive Committee prepared a comprehensive memorandum for submission to the Commission of Enquiry Govt. of India through the Centre and most of the recommendations were included in the memorandum submitted on behalf of A.S.W.I. The difficulties of the members of the N. I. F. Unit in their newly reorganised set up were brought to the notice of the Centre and through its timely intervention some relief was obtained. There are still some other outstanding problems of the members of the Unit in regard their rights and privileges which needs satisfactory solution.

Of the five Units of the Branch, Units at Jadavpore and School of Tropical Medicine did not function quite satisfactorily. Even the Science College Unit which was at one time one of the most active Units appeared to have become dormant—the new Executive Committee formed recently is expected to rejuvenate it again.

The main problem of the Branch seems to be the lack of active cadres who can enthuse other apparently passive members and maintain the activities of the Branch all around the year. The Units still look to the Branch for outlining the programme of activities and this sense of dependence brings about the passivity that seems to increase every year. The creation of autonomous self sufficient Associations in place of the existing Units which can federate among themselves for their common problems might help to bring about a satisfactory solution.

After a discussion of the Secretary's report, some resolutions were moved to be placed at the Council meeting at Madras (*adopted since then and printed V. K., March issue*).

The following Officer bearers and Members of the Executive Committee of the Branch for 1958 were then elected unanimously :

*President* :
Dr. S. K. Bose (Science College Unit)

*Vice-Presidents* :
Sri K. M. Chatterjee (N.I.F. Unit)
Sri J. C. Pal (G.T.H. Unit)

*Secretary* :
Sri M. Adhikari (Science College Unit)

*Jt. Secretary* :
Sri S. K. Das (G.T.H. Unit)

*Treasurer* :
Sri Susanta Chatterjee (Science College (Unit)

*Members* :
Dr. A. S. Bhaduri (Science College Unit)
Sri A. K. Ray (N.I.F. Unit)
Sri G. C. Das (G.T.H. Unit)
Sri S. Dutta (Science College Unit)
Dr. N. K. Bose (Jadavpore)
Dr. S. Ganguly
Unit Secretaries (*Ex-offlcio*)

**Hyderabad Branch-Annual Report of Activities, 1957.**

*Meetings* : Two General Body and six Executive Committee meetings were held during the year. A special meeting of the Branch Executive was held to consider the case of Dr. K. B. Deshpande of the Osmania University and a member of the Association against whom the University was proposing to take disciplinary action for publishing a pamphlet entitled 'Democratization of our Universities' which was sent to the Association and some of its members by Dr. Deshpande. A resolution was passed requesting the University authorities that the publication be viewed in the proper spirit of toleration and liberalism and the criticisms and suggestions made may be taken in the proper perspective.

*Sub-Committees* : At the beginning of the year the Executive Committee formed a few Sub-Committees such as Bulletin Sub-Committee, Assembly Sub-Committee, Hyderabad Science Association Liaison Sub-Committee, with individual members of Executive Committee as their convenors. Some members of the Branch associated themselves actively with the efforts of the Hyderabad Scientific Association for establishing a Science Museum at Hyderabad.

*Lectures & Language Classes* : The Branch arranged a lecture by Dr. Krishnamurthi of the Physics Deparment, Osmania University on 'Artificial Moon'. The Branch Secretary was invited to attend the business meetings of Tagore Day, Tulsi Jayanti and Premchand Day Celebrations organised by Hindi Prachar Sabha. The Regional Research Laboratory Unit organised German classes for the benefit of its staff during the year.

*Deputations* : A deputation consisting of the President and a few members of the Regional Research Laboratory Unit of the Branch met the the Director General and other officials of the C.S.I.R. and explained to them the situation arising out of the Laboratory being taken over by the C.S.I.R. as far as the service conditions, scales of pay etc. of the employees of the Regional Research Laboratory were concerned. The Unit was successful in persuading the C.S.I.R. to agree to the terms put forward by it.

*C.E.C. Meetings* : The Branch was represented at all the C.E.C. meetings held during the year at Calcutta, Delhi, Hyderabad and Madras by its members who made valuable contributions to its proceedings.

The Branch drafted a number of resolutions and sent them to be considered by the C.E.C. and at the Annual Council meeting on subjects like science, planning and administration etc. On behalf of the C.E.C. the Branch took upon itself to pursue the Railway authorities for granting railway concessions to its members for attending meetings. At the request of the Branch, the C.E.C. held its meeting at Hyderabad on 17th and 18th August. One of the members of the Branch Dr. S. H. Zaheer has been re-elected the President of the A.S.W.I. for the year 1958.

The paid membership of the Branch is 61 while its potential membership is easily about 150. The Branch office has been shifted to the city in one of the rooms of the Narayanguda section of the Regional Research Laboratory through the help of Dr. Zaheer. The Branch received a generous grant of Rs. 500|- from the Govt. of Andhra Pradesh for which it is thankful.

**President's Congratulations to the Prime Minister and Minister for Scientific Research and Culture :**

Dr. S. H. Zaheer, President A.S.W.I. recently sent congratulatory telegrams to Sri Jawaharlal Nehru, the Prime Minister and Sri Humayun Kabir, Minister for Scientific Research and Culture, Govt. of India for the recent adoption of the resolution on Science Policy, by the Government. Sri Kabir in his reply to the telegram expressed the hope that he would have the cooperation of all scientific workers in his new field of work.

# News Roundup

**Technical Personnel.**

News about technical personnel has been very much in the forefront lately. The National Register Unit of the C.S.I.R. has collected valuable information about Indian scientists & technicians working abroad and who are desirous of returning to the country. The register is not complete by any means but is a very welcome step. The point that remains to be seen is if these people will be offered suitable posts. Most of them are working abroad because they could not get sufficient emoluments or suitable work here in the country.

The Planning Commission has recently carried out a survey of the coverage in the National Register. According to a press report, 40% of graduate engineers at the end of 1955 were covered and diploma level engineers were covered to a lesser extent. The older age group of engineers is better represented in the Register. An analysis of the data shows that a higher proportion of younger age engineers are in the employ of the government.

Prof Mahalanobis, addressing the conference of State Man-Power officers, stated that work has to be provided to the largest number of people and output per worker has to be stepped up. He said that as against 70,000 graduates & diploma holders in India, USA has 600,000, and increasing them at the rate of 30,000-50,000 a year, USSR has 800,000 & increasing at the rate of 70,000 a year, comparative figures for U.K. were 80,000 & 3,000, China—80,000 & 20,000. By 1961, India would need an annual intake of 15,000 men in technical colleges & universities. A Committee has been set up by the National Productivity Council to carry out a survey of available technical personnel in three months, headed by Mr. N. S. Manikker, Chief Adviser, Factories, Union Ministry of Labour & Employment. It will cover scientific management, time & motion study, human relations & industrial engineering & documentation.

The Home Minister in a reply on 10th April said in the Lok Sabha that the recommendations of the Public Services (Qualifications for Recruitment) Committee have been published. It has recommended that for Class Two services University degree should not be compulsory, but Graduates should be allowed to compete if they so desire, while for Clerical services they should be actively discouraged and only those between the ages 17 & 19 should be allowed to compete. A Committee of Secretaries which examined the recommendations disagreed with the first recommendation for which they suggest that graduates alone should be permitted.

**Cost of Compulsory Education.**

The Estimates Committee has calculated that out of 4.5 crores of children of age group 6-14 years, 3.0 crores i.e about 60% will be on the school register during the Second Five Year Plan. In the age group 11-14 with a total number of 2.7 crores, only 20% will receive education during this period while the balance of 2.2 crores will be enrolled at the beginning of the Third Five Year

Plan. Thus a total number of 4 crores of children of the above age group will require education during the Third Five Year Plan—80 lakhs will have to be enrolled every year.

On the basis of 40 children to a teacher, every year 2 lakh teachers will be required. Non-recurring expenditure per batch of 40 students would be Rs. 1400 per annum while the recurring expenditure will be Rs. 1080 per teacher per year plus Rs. 150 on other items making a total of Rs. 1230 per annum. The non-recurring expenditure of 2 lakh students in batches of 80 lakhs per year would be Rs. 140 crores for the whole of the Plan period and the total recurring expenditure during this period would be Rs. 375 crores, a total of Rs. 515 crores. Another sum of Rs. 155 crores would be required for the Inspection Staff—a grand total of Rs. 670 crores.

Would it be difficult to find this money ?

**Patents in India, 1956.**

The Annual Report of the Patents Office for 1956 gives some interesting figures. The number of applications filed in 1955 was 2736 which increased in 1956 to 3067 of which 419 were personal specifications. This statewise distribution of the patents filed is as below :

West Bengal—162, Bombay—140, Delhi—90, U.P.—37. Madras—34, Andhra—19, Mysore—19 and Bihar—11.

The trends of inventions as revealed in the patents is summarised as follows :

*Chemical Industry* : Different types of compounds mostly biochemical preparations, fuel elements, moderator materials for thermal and mineral reactors.

*Metallurgy* : Mostly from outside the country pertaining to iron and steel industry and radioactive metals.

*Food & Agriculture* : Most of the designs of agricultural appliances were from abroad. Indian patents pertained to sugar industry, tiffin carriers and smokeless ovens.

*Health and Sanitation* : Mostly pertained to antibiotics and vaccines.

*Mechanical Engineering* : Indian inventors were busy adopting English typewriters to Indian languages !

*Electrical Engineering* : Mostly from abroad, like last year mostly on automatic telephone exchanges.

# Book Reviews

**International Guide to European Sources of Technical Information. Paris, European Productivity Agency of the Organisation for European Economic Co-operation, 1957. 489 p.**

The rapid growth of industrial development during recent times has necessitated quick exchange of information among research workers in various parts of the world. The sources of technical information are generally spread over in different countries; their scope and functions, the nature of cooperation and assistance available from them should, therefore, be made known to them. Similar information may be found scattered in different guide books usually on the national level. Moreover there is no uniformity in the standard of information included in those guides. Therefore, much time has to be spent to locate a particular information. The European Productivity Agency of the O.E.E.C. must be congratulated for bringing out a consolidated guide to selected organizations which act as sources of technical information in each of the Agency's member countries. The countries covered in the guide are Austria, Belgium, Denmark, France, Germany Greece, Italy, Netherlands, Norway, Sweden and United Kingdom. The member countries omitted are Iceland, Ireland, Luxemburg, Portugal, Switzerland and Turkey. The guide is in two parts. The first part gives general sources of information which among others includes Documentation Offices, Professional associations, Universities, Colleges of technology and Standardization organizations. In the second part, which forms the bulk of the guide, the specialized sources of information are listed. The body of the guide is arranged according to Universal Decimal Classification scheme, sub-divided by country. The details about the selected organizations are given in a standard form which mostly cover the scope of activity, current research undertaken, and other general information like the library facility, photocopying service, working hours etc. Non-English names have been translated into English. A total number of 337 organizations has been included in the guide, the countrywise breakdown being as follows :

Austria-25, Belgium-19, Denmark-27, France-36, Germany-50, Greece-10, Italy-29, Netherlands-25, Norway-27, Sweden-19, United Kingdom-70.

The body of the guide is preceded by a list of national technical information centres of all the O.E.E.C. countries through whom all the enquiries should be channelled.

An exhaustive alphabetical subject index and an index by organisations have been appended to facilitate its use.

The guide has its limitations in that it "is based on a selection of sources of information" and naturally we cannot totally do away with the national guides providing "a more exhaustive compilation of technical information sources".

Another international guide, which necessarily overlaps with this work in places is the "Directory of National organisations in Europe and U.S.A. and International organisations, concerned with iron and steel (Quin Press for United Nations, 1957 20 h).

—A. K. Dasgupta

**The Alkaloids—The Chemistry of Natural Products.**

VOLUME 1.

**By K. W. Bentley,**

Interscience Publishers, New York,
London 1957, pp. 245, $ 4.00

A dearth of elucidating text books in the field of chemistry of natural products has long been experienced by all who are engaged in teaching or research in this area. Of all the hitherto existing exhaustive treatises, Manske and Holmes' "The Alkaloids" somewhat satisfy the partial needs of the experienced research workers and advanced students. Nonetheless, for the undergraduates and also the uninitiated graduate students seeking basic knowledge in natural products, the need of general text books can hardly be overemphaised. The decision of the Interscience Publishers 'to fill this gap' through a series of volumes under the editorship of Prof. Bentley of the University of Aberdeen would certainly excite eagerness in all students of organic chemistry.

The first volume on 'The Alkaloids' authored by Dr. Bentley reasonably satisfies the promise to present the skeletal facts of the major alkaloids with class-room intimacy and the author's mature experience in teaching and active research reveals itself in this brief volume, especially in the chapter on Morphine alkaloids, where his contributions are already well recognised.

The volume consists of an extremely well-written introduction detailing the basic ring systems of the alkaloids. This is followed by separate chapters on the individual alkaloids of the pyrrolidine, pyridne—piperidine, isoquinoline, morphine, quinoline, indole and erythrina ring skeleta and on colchicine. A concluding chapter on biogenetic relationship successfully attempts to impregnate imaginative insight in the reader.

One will have to play 'hard to please' to find omissions and commissions in this volume. However, a general emphasis on the methods in stereochemical elucidation of the alkaloids *via* conventional chemical and physicochemical methods as well as spectroscopical data would have exposed the students to some sophistication. One important exclusion in the text is, perhaps, a discussion on reserpine under yohimbine alkaloids, whose recent synthesis by Woodward group will be remembered as an all-time classic in organic chemistry.

—D. K. ROY CHAUDHURI

Regd. C 3982



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## CONTENTS



*The views expressed in the journal are not necessarily those of the Association of Scientific Workers of India*

Articles, Book Reviews, Letters to the Editor etc. are invited from our readers.

Materials should be sent to the Editorial Office, Vijnan Karmee, 92, Upper Circular Road, Calcutta-9.

## A Convention of the Council of Scientific and Industrial Research Scientific Workers

It is proposed to hold a Convention of Scientific Workers from the Laboratories and offices under the CSIR sometibe in the end of July or beginning of August, 1958, in Lucknow. The purpose of this Convention would be to bring together Scientific Workers from various Laboratories who could pool their experiences and suggest changes for improvement in the work of the laboratories vis-a-vis scientific and technological requirements of the country. C.S.I.R. is to-day the principal organisation for scientific research and technical development. It also employs the largest number of research workers. The 19 National Laboratories, their research programmes, research schemes financed by the C.S.I.R. represent a major scientific effort and investment for the future. It is of vital importance that scientific workers of the C.S.I.R. be conscious of their responsibilities to the country's development. It is equally important that the conditions of work, the research atmosphere, the administrative machinery aiding research and the anciliary services function in a manner conducive to the maximum output of scientific research.

The Association believes that scientific workers engaged in research and development at various levels should give serious thought to organisation problems of Science in India and take an active part in the formulation of scientific policies and programmes of research. The Association believes that the administrative machinery should be streamlined in a way that its practice, rules and procedures help and not hinder the progress of research. With this end in view the Association has invited a Convention of Scientific Workers to be held at Lucknow by the end of July or the beginning of August 1958. It will help discussion if scientific workers present papers on which discussion could take place. The following are the main spheres :—

(i) Historical evolution of C.S.I.R., establishment of the National Laboratories, pattern of research organisation ;

(ii) Organisation of research, planning of research, selection of research problems, collaborative and team work, organisation of developmental and pilot-plant work, utilisation of the results of research, research and the requirements of the National Plans ;

(iii) Technical information services, internal communication of information within Laboratories and within C.S.I.R. Laboratories, regional liaison and liaison with industry, government departments, defence organisations, state governments and their specialised agencies ;

(iv) Exploitation of results of research, patents, Indian Standard Specifications, the role of the National Research Development Corporation, industry and research ;

(v) Ancillary services in the Laboratories such as Laboratory, workshop, and the facilities provided for their efficient functioning ;

(vi) Administration : The pattern of administrative services in the C.S.I.R., their role and attitude to research. Type of organisation best suited to promote research ;

(vii) Working conditions : Working hours, vacations, holidays, deputations and facilities for attending scientific conferences.

(viii) Social amenities : Housing for research workers, Cafeterias, transport, clubs and recreation services, etc. ;

(ix) Scales of pay of scientific workers : Present scales of pay, classifications of the staff into its categories and whether this is conducive to promotion of research, scientific civil services etc.

In order to discuss these problems of vital importance research workers from the National Laboratories are invited to participate. The interests of a purposive discussion and drawing up of conclusions would be facilitated if papers are also presented. All correspondence and papers meant for this Conference may be addressed to Dr. V. C. Vora, Central Drug Research Institute, Chattar Manzil, Lucknow.

D. V. VARMA,
*General Secretary (Organisation)*
A.S.W.I.

# Reflections on Plan Crisis

By

B. N. Tewari,

TDE Textiles & Clothing, Kanpur

"The most decisive mark of prosperity of any country is the increase of the number of its inhabitants", thus observed Adam Smith the father and founder of economic science. If this criterion were to be true, India today would have been the most prosperous country in the world next only to China. But the fault, as said Shakespeare,

> "The fault, dear Brutus,
> is not in our stars, but in our-selves".

The romantic exaggeration of the happiness of the past ages, the munificent wealth of ancient India have occasionally given place to the terrible sufferings and sorrows, as is borne out by the factual description in Ancient Economic Science of London or in Kautilya's *Artha Shastra.* The brief survey of Indian literature contains nothing but the hallowing description of mankind's miseries from want of physical needs. India under the Muslim rule has been, according to the heart-rendering descriptions of native and foreign writers of fame, the worst sufferer from poverty in general and severe famines in particular. The proverbial splendour of Rajah and the fabulous wealth at the courts of Moghul Emperors were perhaps the signs of high concentration of all that was valuable in the courts and capitals so much so that low paid services and the countryside promised nothing but sweat of labour and conditions degrading and derogatory. There was nothing like enlightened public opinion to guide the country and no uniform and rational policy regarding the removal of poverty from the country. The suffering was intense in character. But at present by poverty and famine it is meant not acute suffering on the part of the people from absolute dearth of things but wide-spread unemployment and consequent misery. This is the change in character of poverty in modern era.

Poverty was therefore, in India even during those imaginary golden age and will continue to exist in future too. Because by poverty it is generally understood the insufficient production, unequal distribution and waste. Poverty in this sense exists all the world over and India is no exception. At the present moment in India, the consciousness of poverty is greater than it ever was. Contrast is a strong factor of poverty, and when people are unable to purchase the new known goods of each period they regard themselves as unfortunate and poor. This psychological attitude is of considerable importance when we talk of poverty in modern India.

What does the economic structure of the country constitute of? Clearly, all those economic activities of individuals, organisations and institutions. But the evolution of these institutions in course of time, spreading over many centuries, is the resultant of innumerable social ideals preached and practised by men in power and position during different periods by different men in authority. Thus the different schools of thought from times immemorial upto the modern period—when we are aiming at socialistic pattern of society—have moulded the economic structure of India. The socio-logical framework of the society has penetrated deep—as it will be further in future—into the economic structure and any defects in the economic institutions have their share and counterpart in the social make up of Indian society as a whole.

Today India is no doubt seeking planned development of the country; development envisages stability. Countries, such as India, which are trying to break through the initial barrier of low savings, low investment and extreme poverty, could not afford to curtail demand of cutting back investment to any significant extent. To do so would be to slide back inevitably into the groove of stagnation. Reasonable financial stability is, therefore, necessary before development, but mere stability is not enough. Our economy can help generate an ever-better lot for our people in general and scientists in particular, if we are both forward-looking and prudent in our private and public policies. The task ahead seems to foster healthy economic growth. As President Eisenhower while inaugurating the IMF Conference the other day stated "we must have growth that does not endanger stability; we must have stability that does not throttle growth".

It has been complained that the organised private sector has had more than its due share of attention paid to it at the cost of the security and integrity of the official plan. If that is so, is the Plan more exposed to danger from inflation because of certain investments which unlike many others, hold promise of adding to current production earlier than expected? It is not as if organised industry did, or even if it wanted could, appropriate to its own purposes any of the resources available to the other sector. On the other hand, it has functioned in the context of new taxation of the order of Rs. 150|- crores per annum imposed since 1955 and of a scheme of compulsory deposits which places its resources at the disposal of the Govt. The grievance, if any, can only relate to a disproportionate share of foreign exchange being utlised by the organised sector. But was there a well-drawn up exchange budget at all in the planning that preceded the publication of the Plan?

Instead, the real gravamen of the charge against the framers of the Plan has all along been that, as a result of a indefinite policy even until May 1956, to shirk the issue of resources, the Plan had a large element of insecurity planted in it. It would be wrong to argue that only unexpected developments changed the situation, since the dangers were already foreseen and stressed by at least one member of the Planning Commission. Since the question of priorities was never seriously faced at this stage, the Plan cannot be said to have had adequate integrity. It is a case of failure on the part of those who had the duty to foresee that resources, internal and foreign, would fall short and raise a problem of what to cut and what to keep.

This failure on their part should not make them oblivious of the fact that economic development is a home-spun product, the result of a people's own work and determination. It is a product that cannot be imported from abroad. It is in this context that our Prime Minister had stated while inaugurating the UNESCO meet in India that "the future of the country depends not on politicians and businessmen but on scientists"! The scientists (scientific and technical workers), placed as they are, can help the country by providing guidance and encouragement through their special fields of knowledge and competence, such that every aspect of human affairs become infused with a scientific approach.

Discovery, progress and technological advancement now-a-days cost money and, therefore, require planning. Accordingly, the relation between science and planning should engage the serious attention of all, especially those in authority. A socialistic pattern of society cannot be based on a nomadic, intellectual economy. Crops must be intensively cultivated, their fertility studied. It is not enough to pay for ideas in royalties; laboratories and salaries must be maintained, otherwise ideas remain pipe-dreams and, much important, techniques known to be profitable and even essential cannot be exported through lack of training and experience. If the goose is not fed, no golden eggs will be laid. And if the feeding needs trimming of the Plan, no prestige need be attached to the modification of the Plan or an extension of the Plan period. In the present climate when in every sphere, there are demands for higher wages and higher standards of living, it is feared, appeals for greater sacrifices from the people for the implementation of the Plan would hardly cut any ice. We have known people gladly making great sacrifices during the freedom struggle because the stakes were then high and the conditions were altogether different. If further sacrifices were demanded of them, they might well retort like the Frenchmen: "What has the posterity done to me for me to suffer for it".

As regards the disparity in the pay structure of Central and State Government employees, the problem is not of recent origin. Ever since civilised government came to be established, the differences in the pay structure of various categories of employees were deliberately maintained in view of the capitalistic economic structure where though the nation was rich, income per capital displayed only a mockery of the richness. However, with the advent of independence, greater and greater stress has come to be laid on the equality of wealth, proper and balanced distribution and in fact the socialistic pattern of society itself. But little has during the present decade been done in practice to remove the age-old disparity. The disparity is there as between an ICS and an IAS, a gazetted and a non-gazetted officer, an industrial and a non-industrial staff; in fact there is not one but a series of disparity even between the employees of the same employer performing identical jobs. Examples are in abundance.

What is needed is not the assertion and re-assertion of the continued prevalence of outmoded disparity, but a sustained and systematic effort backed by a willingness to weed out the ever-growing ills that have been so deeply implanted in our socio-economic structure. For if there is the difference in the living wages, there is the corresponding difference in the standard of living as well. An ordinary peon lives in slums, a Baboo in a congested tenement, a Sahib in a well-ventilated bungalow. While paying thousands of rupees to a Sahib, how many hearts have bled and if bled with what concrete result—finding that there are other employees who have barely means of subsistence?

So this disparity between the pay structure of employees of various employers should not be an argument for the Central Govt. to obviate a dynamic review of the pay scales and allowances of their own employees. State Govt. can themselves review the pay structure of their employees. In fact in some States they have already been done and the Central Govt. have also extended their helping hand in so doing. But the problem remains that whatever the Govt. may do, the advertised disparity is not going to be converted into parity overnight. Halting the Central Govt. from carrying out the much needed reforms, due to paucity of funds at the disposal of State Govts. to do so on a similar scale, sounds a bad logic.

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# On The Origin of Life on Earth

*By*

L. KALINICHENKO,
Candidate of Biological Science, U.S.S.R.

The origin of life on earth is an important philosophical problem. It is linked with the study of living protein and attempts to make it synthetically, and with many other biological and biochemical questions of great importance for medicine today.

Fredrick Engels made a profound analysis of the philosophical principles underlying this question, and clearly indicated the materiality and cognoscibility of the process of the origin of life and its historical character. He expressed the idea that at a certain stage of its development science will artificially produce the simplest living protein. Modern natural science, particularly the progress made in recent years, justifies the prediction.

What steps have been taken now to produce living protein experimentally from inanimate matter?

Metaphysicists repeatedly tried, by creating certain special conditions, to obtain at once highly-organised and complex living bodies from inanimate matter, but by their very idea all these attempts were doomed to failure, and where sometimes they apparently did yield visible results, the explanation for it is that certain germs got into them from outside! However, the failures did not mean that it was fundamentally impossible to produce the simplest living protein artifically from inanimate matter. To gain this end it was necessary to apply laws objectively existing in nature. Only by knowing them thoroughly is it possible to control natural processes and to accelerate them considerably. The whole history of science is proof of this. As we know, in Nature species change slowly under the influence of the conditions of life, some remaining without visible changes for thousands of years. However, breeders who know the laws of variability can obtain in a brief time varieties planned in advance.

Modern biology has established that the simplest living proteins appeared as a result of the historical process of the evolution of matter. This belief underlies the theory of the origin of life developed by the Soviet Academician A. I. Oparin. Similar views have been expressed by the British scientist John Bernal and this view was fully supported at the international conference on the origin of life held recently in Moscow.

The task therefore is to reproduce experimentally the process of evolution of matter under appropriate conditions. The problem can be solved only if we know thoroughly the laws of evolution of the existing forms of living matter, including the development of the natural conditions in which the process takes place.

Every living body, as know, "builds itself up" of food in the broad sense of the term, that is, out of substances entering into it from the environment under certain conditions. Living matter emerges, becoming synthesised from inanimate matter, substances found in the environment. The basic law of biology is the unity of the living body and the conditions of its life. There is the assimilating system—the living body, the living protein—and the substances assimilated under certain conditions. This system, which is the high stage of organisation of matter, has arisen out of substances in inanimate nature; the latter might be called component chemical parts in the organisation of the living body. To make living protein experimentally it is first necessary to produce the organisation, a structure, capable of maintaining itself by assimilating the substances entering into it from the environment. The primary task of biologists is therefore to synthesise protein out if its component parts namely, amino acids. This is one of the great tasks of contemporary science, a task equal in importance to the discovery of atomic energy.

Of great interest too is the work being done to synthesise experimentally the amino acids which make up protein. And that is natural. The labours of researchers in this direction bring us nearer to the solution of the broader problem of synthesising protein itself.

It is some years now that S. Miller, the American scientist, has been working successfully on the problem of duplicating the formation of organic compounds on the pristine earth. He has proceeded from contemporary data that the atmosphere of the primordial earth was of a reducing nature, and the source of energy for the synthesis then could have been electrical discharges and ultraviolet rays. Proceeding from these premises Miller subjected a mixture of methane, ammonia, hydrogen and water vapours, that is, the substances which the atmosphere of the primordial earth must have contained, to the action of electrical discharges in a closed vessel. This resulted in a mixture of organic compounds containing amino acids (glycine, alanine, sarcosine, aminobutyric acid and methylalanine), and also organic acids, urea, methyl urea. Similar resulted were obtained by using a mixture of nitrogen, hydrogen, methane and water. The scientists proved that the first stage in the given synthesis is hydrogen cyanide and aldehydes. His experiments have been confirmed by the Soviet scientists T. Pavlovskaya and A. Pasynsky.

Of great interest too are the experiments conducted by the Indian scientist K. Bahadur. Applying the sun's light on a mixture of the vapours of formaldehyde and potassium nitrate in the presence of ferric chloride he obtained a mixture of the following amino acids: arginine, valine, histidine, proline, lysine, serine, aspartic acid, glycocoll, ornithine and amido-asparagine.

Thus it is probable that amino acids could have been produced out of simple gases found in the atmosphere of the earth in its primitive state through the inflow of energy in the shape of ultra-violet rays and through electrical discharge. And this entitles us to believe that contemporary science has taken the first practical steps to make protein experimentally, though the problem how to make out of the aminoacids protein capable of metabolism and self-renewal is still hypothetical.

It is quite possible that in solving this problem no small role will be played by investigations into catalysts and catalytic surface which accelerate synthetic processes. It is also likely that an important part will be played by nucleic acids and other phosphoriferous compounds which are conducive to the synthesis of protein in living bodies. It should also be mentioned that according to some data a virus split up into protein and nucleic acid loses its infectious properties and hence vital activity; however, when protein and nucleic acid combine, it again acquires the lost properties. These data are being checked at the present time.

It is possible that nucleic acid is essential for the vital activity of living protein at the higher stages of the evolution of life; in the primary living protein something else takes the place of the acid. All these problems are facing science, and scientists are working persistently and consistently to solve them.

Of indisputable interest is the research conducted by the Soviet scientist S. Bresler, who has obtained synthetic protein under a pressure of several thousand atmospheres from a hydrolyzate, that is from amino acids and peptides in the presence of a ferment. It may be assumed theoretically that synthetic protein can be made under the following conditions: an inflow of energy in the shape of ultra-violet rays or other forms of radiation, reduction of energy of the activisation of molecules at the expense of the ferments or to a lesser degree at the expense of other catalysts. Perhaps it is also necessary to bring the molecules closer together by producing the high pressure to reproduce the processes taking place on the surface of the catalysts.

The possibility of the origin of living bodies out of inanimate matter is a disputed problem. However, the very disputes, the arguments offered by each side and the direction of searches, cannot but interest doctors who are following the development of contemporary science. In our view there is no reason to doubt today that this problem can be solved.

# Nuclear Weapons Tests

## —Scientists believe control feasible

For many years, the World Federation of Scientific Workers has directed attention to the dangers to our own and future generations which have arisen through the testing of nuclear weapons. Even now the magnitude of the hazards cannot be finally assessed, but may competent authorities regard it as very grave.

In view of these hazards, the World Federation has repeatedly urged that there should be an international agreement to abandon tests under a system of control adequate to ensure that clandestine infringements are impossible. Such a measure is not only a matter of vital concern to the health of large numbers of people throughout the world but could provide the urgently needed first step towards re-establishing mutual trust and confidence between the great powers.

It is now known for instance that a relatively modest control system, with posts separated by 500 miles, would make almost certain the detection of test explosions equivalent to as little as 1 kiloton. Such a system would involve a minimum of encroachment on the sovereignty of states, and its establishment in principle has already been agreed by the Powers represented in the former United Nations Disarmament Sub-Committee. Its operation would give valuable experience which could serve as a guide for setting up the wider control organisation which might be an important element in a general and widespread agreement on disarmament.

The negotiation of an international agreement to abandon test explosions could prevent the grave dangers to world peace which would arise with the unrestricted spread of nuclear weapons to other, even small, countries. It could help to ensure that the present arms race, which is already absorbing about half the technical and scientific resources of the world, shall not swallow up an even larger proportion of the treasure of states. It would therefore facilitate the application of great resources to peaceful construction, to the great benefit of all peoples.

It is well known that the question of cessation of tests of nuclear weapons has been an important subject of negotiation for many years in the United Nations Disarmament Sub-Committee, but without agreement being reached. For the reasons given above, the World Federation of Scientific Workers warmly welcomes the decision of the Government of the U.S.S.R. to suspend further test explosions. It earnestly urges the governments concerned to take a similar decision for the suspension of tests and to establish through negotiation an effective system of control to ensure its observance. This could be a first step towards general agreement on the abolition of all nuclear weapons and away from the reckless folly of an unrestricted arms race. It would be an important contribution towards a military and political settlement generally acceptable to the powers which could lead to a stable and lasting peace.

**C. F. Powell,** F.R.S., Nobel Laureate.
President, World Federation of Scientific Workers

# Past, Present and Future

*By*

Asit Kumar Ray,

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Long years ago, even at the dawn of civilisation, man was no doubt familiar with a number of scientific facts; for the arts of cooking, baking, dyeing, of pottery, extracting metals from their ores as well as the art of that primitive scientist, the medical man of early times are in all in their essence, chemical. The idea of transmutation of matter germinated from the first meeting of chemical theory and chemical fact in ancient Alexandria when the Greek philosopher's concept of matter as a combination of four element earth, air fire and water, merged in the practical knowledge of the Egyptians. The philosophers failing to turn Lead into Gold realised that transmutation is brought about by some special extraneous substance, "Philosopher's Stone". From then on the quest for "Philosopher's Stone" continued.

Centuries intervene before we arrive at the distinct landmark of civilisation in the fifteenth centrury when people believed that knowledge had a reality outside human minds and knowledge was collected only for practical ends.

In Western Europe in the middle of the fifteenth century Italy came forward with lofty genius, thoroughness in craftsmanship and with marvellous wealth of ideas and ushered in a "renaissance" in science. Men wanted to study varieties of Nature. In every sphere of life there arose a cry for the utilisation of scientific knowledges gathered in different centuries.

There appeared the first gleam of dawn when Richard Bacon came forward to convince people that it was the "glory of God to conceal a thing and the honour of the Kings to search it out". It was for the scientists to search and unlock many of Nature's secrets.

"Could some order or evolution be found in this diverse Nature such as Darwin had found amongst the multiform varieties of Organic life"? The dreamers and philosophers of applied and theoretical science wandered to find out the key to this heterogenous collections of Nature. Then came Newton, the naturalist philosopher, presenting the world with the theory of Gravitation—and with the advent of the Industrial Revolution there was a complete change in the outlook of man. Gradually scientific knowledge gained more ground and rose up to the peak after the discovery of electron, proton, neutron, x-ray, wireless, television, radium, radioactivity and atomic power.

What a new field was opened up by the scientists for the new generations to come? The minds of the scientists reeled at the thought of the virgin fields of science rich in mighty harvests. It was a brilliant day for science and scientists.

Scientists had "landed in the new world".. Their success would bring 'basic changes to life in the world'. The forces of peace and progress would consolidate themselves to divert the threat of annihilation by atomic war, and to utilise the greatest discovery by the human brain for the benefits of mankind.

But in vain. Instead of shielding mankind against the threats of annihilation the best fruit of scientific knowledge was utilised in the form of atomic bomb to win the war. The whole world was cast under a shadow of horror of "absolute and swift annihilation".

The devastations caused with hydrogen bombs and atomic bombs only indicated that humanity shall perish in a short time. Each atomic explosion cursed mankind with dangerous diseases like leukemia, bone cancer, and lastly with positive genetic disorders to put an end to the human race.

The fact that future generations may run the risk of severe genetic damages i.e. mutations, has arisen only through the test explosions with hydrogen and atomic bombs which spread radioactivity all over the world. It has been found that every "mutation is eventually eliminated from the population in premature death or failure to reproduce"—then it becomes evident that practically every mutation represents a "postponed disaster". The genetic damage to later generations caused by a given radiation is seen to be far greater than the damage to the exposed individual himself. "There are children born to survivors of Hiroshima and Nagassaki, but unfortunately they received a significant amount of genetic damage." The Japanese scientists predicted that the test explosions carried out in the vicinity of Japan at the present experimental level will wipe out the Japanese race in 25 to 30 generations.

It is only with the help of the scientists that people today think of the peaceful uses of atomic power in all spheres of life. Age-old uncivilised man faced the tide of evolution, and survived as fittest in the struggle for existence to become the civilised man of the present day. Although humanity today has come to a colossal scale of progress still it can hardly be denied that mankind faces, in this atomic era, one of the hardest and crucial problems ever to come in the history of human civilisation. The problems of this atomic age are something unthinkable and against the principles of evolution.

The total mass of human race marches continually towards an ever-increasing perfection. Progress is not an accident but a necessity. Progress of mankind depends upon the improvement of conditions or environment. Human race will have to face the task of adjusting itself to an environment continually changing to forms less favourable to human life. Poet Tagore said—"for our perfection we must be vitally savage and mentally civilised; we should have the gift to be natural with Nature and human with human society. Perfection is beyond us for it means the end, and we are journeying, trying to approach something that is ever receding."

It is hightime to abandon the craziness in the misuse of atomic power. If the ideas of progress, and the ways of peace are cornered and the atomic craziness is allowed to creep in human minds it is sure that this will cost humanity all its passion for artistic beauty and aestheticism—"there will be universal death—sudden only for a fortunate minority, but for the majority a slow torture of disease and disintegration."

*London Letter*

# Scientific Research in Indian Universities

First of all, perhaps, I should explain why the London Letter is concerned with scientific research in Indian universities. The reason is simple : I have some direct and indirect experience of conditions under which research is carried on in our universities, and the opportunity of working at a British universitiy has provided a contrast or relief for that experience. Of course, I am putting down my ideas in the form of a letter particularly because I am aware both of the limitations of my experience, and the immense complexity of the question under discussion.

The complexity of the question arises from the fact, that both quantity and quality of research are entities which cannot be lightly assessed. I remember one of our foremost physicists telling me in respect of the report on 25 years of research compiled under the auspices of the Science Congress Association, that it was unbalanced in the sense that perhaps the significance of each piece of research in the whole body of the particular discipline was estimated subjectively and therefore unrealistically. In other words, scientific research may in part be judged from the applications it finds ; in part it may be evaluated by comparing the contribution of a country with the whole range of development in the subject within a given number of years—and then the particular contribution would have to be assessed in the light of the facilities and conditions under which research was carried out.

I would like to pose the question from a more provocative point of view to arrive at the point I wish to make. Let us look at the figures below taken from the Commonwealth Universities Yearbook, 1958 :

| | | 1939 | | 1958 |
|---|---|---|---|---|
| Number of Universities : | Britain | 21 | Britain | 25 |
| | India | 18 | India | 31 |
| Named Teaching and Research Staff : | Britain | 3800 | Britain | 10,500 |
| | India | 2100 | India | 5,700 |

These figures would suggest that in the last twenty years we have had about half as many teachers and research workers as there are in Britain—and now does anybody suggest that in the various branches of science the contribution of our research has been, in the last twenty years, half, a quarter or even an eighth of what has been the output in Britain. The obvious answer is "No—but the conditions in India cannot be compared with those prevailing in Britain". And, my purpose is served : these specific conditions which prevent our research output from being better than it could be, need to be investigated. Evalution of research is complex, but let us not make it an excuse for allowing things to remain as they were. I submit that if we do not have a closer look at the specific impediments, both the quantity and quality of research put out from the universities of our country will remain indifferent. The cynicism and apathy which, I believe we would agree is prevalent in our institutions—would continue, and greater monetary grants will only disproportionately increase the cost of research output.

### Half the Reason

Some of the reasons are so obvious that they have been discussed a lot—and we would all have been much happier if something had actually been done to change them. Even at the cost of repeating what has been much more forcefully stated by others, I should at least briefly mention these reasons.

The elementary conditions which would merely give one an opportunity to do research may be listed as (a) the proper academic preparation of workers (b) the setting of economic factors so that the probable workers are not led into other professions (c) the provision of time for research and (d) the provision of suitable laboratory and library facilities. One may say that in our country practically all these simple conditions are non-existent in general although the degree of each varies from institution to institution. That academic standards are in fact declining is felt by most university teachers in India, and I learn from teachers here, who have had Indian students doing research under them, that inspite of individual ability our training and education leave much to be desired. The economic conditions of the scientific profession have improved slightly in the last ten years, but the point is that in salary and responsibility other professions are still far and away better than that of research—and this profession, which makes the future of our forces of production and enriches our intellectual resources to tackle all other work (for example through its effect on education) still does not attract the best talent we have.

### Teachers and Research Work

Again, in the universities a major part of research is expected to be done by members of the teaching staff and it is these people precisely who are left with no time for research. A young teacher in an early stage of his academic career, when he needs to do research with his own hand directly is saddled with between 20 and 30 hours of teaching per week. (In England, if a teacher had even six hours of teaching to do each week it would be considered an intolerable burden!) This makes research practically impossible at that stage. Later on, when a teacher grows older—and in England for example, by virtue of his enlarged research experience is called upon to guide other research workers and to participate in administrative and committee work—in India he is likely to administer and guide without himself having had the opportunity of doing effective research! The evil consequences of providing a teacher no opportunity or encouragement to do his own research at an early stage, start to snowball finally it leads to what may be crudely called "bluff" in the sphere of research and even teaching. There is emphasis on getting a research degree by some means, as soon as possible—and to forget the whole episode. On the other hand, the number of those who are unable to complete even a simple kind of research increases—and on the basis of my experience with several institutions I can perhaps state with confidence that out of the total number of people who register for Ph.D. degrees in our universities, not more than 25 per cent would be actually getting the degrees. This is a horribly low figure from the point of view of universities in Britain—and the waste of money and intellectual sources (and spiritual suffering too) it represents is certainly much more grievous for a poor country like ours.

**Inadequacy of Funds**

The inadequate laboratory and library facilities for the vast majority of university teachers in India is too well known to comment on. However, the common denominator of the above-mentioned problems is the lack of funds for the enterprise of education and research in our country. I would be the last person to distract attention form the fact that grants for education and research have already multiplied several fold during the ten years of independence—but what the foreign rulers spent on these items is hardly a sum with which we should compare the present allocations—with economic advancement and even the goal of socialism as our national objective and aspiration. I remember being a member of a university delegation which went to see the University Grants Commission in connection with expenditure on the teaching profession. The Commission was quite sympathetic to us, but they said that in the matter of funds they had often to chose between two very desirable objectives—for example, do we want more teachers in each university (so that a teacher can get time for research) or do we want more universities. My reaction would be : we want both—and what is it that is nationally more important than immediately doubling the university teaching and research grants ?

But while I say this, I cannot desist from mentioning the thing which young scientific workers feel very angry about —the waste of money which goes on in the universities and research institutions even when we are so short of funds. I refer, of course to the construction of laboratories which look more like palaces —and to the wasteful purchase of apparatus which is bought for laboratories simply because the allocated money has to be spent by a certain date if more funds are to be obtained in the next budget.

These difficulties, serious as they are, form only a part of the reason why more effective research is not done in our universities.

**Lack of Organization**

The second major impediment to research in our universities is the lack of organization and quality control. Perhaps this factor acquires greater importance because it has been so sadly neglected that, I think, even the otherwise most valuable report of the Indian Universities Commission completely misses the point in this respect. The crux of the matter lies in the fact that while our universities are run and organized on the British pattern, they work in an environment which is different both in its economic and social pattern and outlook. British universities, like other institutions, grew up to serve the needs of this society —their education and scientific research grew up contemporaneously with privately owned industry and with considerate funds from such industry. Indian universities—(their academic bodies, research committees, rights and privileges of professors and other teachers, attitude towards individual research worker, etc.) were founded and made to run on a similar line even though they were associated with a stagnant economy—and even though today they are expected to hasten our progress towards socialism, when funds are largely allocated by the government and when science is capable of consciously being applied to the development of all means of production.

For example, we could refer to the question of how the quality of research in British universities is generally maintained at a high level. (In order to cause no confusion about distinction between "pure" and "applied" research I would conform to the view expressed by Professor J. D. Bernal. According to Professor Bernal there are broadly three kinds of research (i), that which is undertaken for application within the next five years (ii), that which is likely to be applied in about 15 years and (iii), that which will some day, certainly find an application but it is hard at present to see how that will come about). One would say that the quality is directly maintained by the personal supervision of the professor, by the larger influence of communication with other leading workers, through the various journals, and in the long run by the test of experience and application in industry and other activities like defence etc. In other words, in Britain a kind of natuarl selection has operated in the field of research in which spurious work (which can find no application) is soon stopped because it gets no monetary support from the agencies sponsoring research. A laboratory is, in course of time, obliged to maintain a certain minimum standard.

In India, the process of quality control described above, fails at every step. In spite of some brilliant contributions to science from professors in our universities, I think it is hardly deniable that our professors are, by and large, not of the same calibre as those in English Universities. Not only are our professors often academically unable to produce research work of a high standard (for all the reasons given here) but also because they are so few in number they are able to dominate the whole scientific set up from postgraduate education and grant of research degrees to all kinds of appointment and expert committees. Some knowledgeable persons have estimated that only about 30 or 40 scientists form the bulk of membership of all important committees—and this is the scientific elite which, in the midst of its various burdens, probably, does not even find time to keep abreast of the most recent developments in its own special fields!

Lower down the ladder, there is a repitition of the same trend. In the advanced countries a Ph.D. is only the first step in the field of research to be most carefully consolidated by further direct work and study, often under the overall guidance of a more senior person. In India, however, the holder of a fresh doctoral degree, particularly a foreign degree, is often found leading a "team" or "school" of research in the capacity of reader in the universities. Quite obviously even the research which could have been done singly (or in association with one assistant) by such a person is smothered under the impossible effort of guiding other researchers. This academically disproportionate burden and responsibility certainly condemns many able research workers to turn more and more towards administrative work, using it sometimes as an excuse for not being able to show any results in research.

(Perhaps in parenthesis I should state that I feel there is monetary compulsion towards this situation. In the context of high cost of living only a reader's post at present offers reasonable emoluments for a person who has even minor family responsibilities. Thus young scientific workers have the desire to be selected for these posts—due to shortage of experienced personnel they do get selected —and once in, they have to "live up to it"—they claim, and sometime get, the same facilities as a reader in British universities).

The situation with respect to the long term quality control exercised by the applicability of research to industry is fundamentally different in India as compared to Britain. We do not have large industries supporting research in any considerable quantity—and, in fact, the supply of funds from the Government is guaranteed. Universities in India are as jealous as those in Britain in the matter of guarding their autonomy, and therefore at present there are hardly any means of ensuring that research funds are being utilized in the best possible way.

The absence of academic communication between the universities and industries (and other means of production) reinforces the trend mentioned in the previous paragraph. While pure and applied research problems arising from processes of production and development in our own country are unknown to our researches, they can either imagine the needs or else choose their problems from the journals published abroad. In the first case the question of quality control hardly has any meaning—and even if a piece of research is done it leads to the general complaint that results of research remain unutilized. In the second case, we have hardly the means and the background to make a telling contribution towards the solution of problems which have arisen in the context of the economics of other and more advanced countries where already means of research are concentrated towards such solutions. Even if a brilliant worker did produce an extraordinary contribution it would help the process abroad without leading to a beneficial flow in the opposite direction. Thus the general isolation of our university research—and therefore a lack of check on it, is a consequence of having a British pattern for our university organization without having the built-in guarantees of the British social and economic set up.

Here, I would like to say that this dilemma is found in so many other walks of life too. Research itself is closely connected with other phases of life—and its inherent relations may be illustrated by a diagram such as here I make below :

→ Education →
↓
→ Research ←
↓
Processes of Production
Medicine ; Culture
← ←

Obviously, while the very existence of the bilateral bonds depends on the role of research, the nature and form of these bonds depends on the society in which research is carried on. For example the bonds or channels through which research is linked to other activities, will have one form in a slowly developing or stagnant old fashioned private enterprise type of economy, and a quite different form in a society where economy is planned and socialism is accepted as the objective. The question which we have to answer is that while our economy in India is being planned and made independent of its colonial shackles, and while the nation wishes to progress towards socialism, have we found the new forms of organization and control in general—and in scientific research at the universities in particular ?

If the Editor allows me, I shall attempt to propose an answer in my next letter.

—Rais Ahmed

*Comments are invited from our readers on the above Letter in the form of Articles or Letters to the Editor.*

*—Ed.*

# News Roundup

## Science Policy Resolution

The policy resolution of the Govt. of India on the place of scientists in India does not appear to have evoked much discussion. It has ofcourse been everywhere welcomed, but to many it represents the sensitive far-sightedness of the Prime-Minister rather than the policy that would be followed by the administrators. It must however be remembered that to the extent this could become a Charter for the Indian Scientists depends much upon the scientists; to the extent they exert themselves for the realisations of the terms set forth in the statement. ASWI assumes a new significant role in this set up. And as the President said in his speech recently, a time has come when scientists should devote themselves fully to their technical work and leave their problems to ASWI completely.

The debate in the Lok Sabha revealed the lack of awareness of representatives of the people with regard to conditions prevalent in science and technology. The references were mostly general from amongst those few who participated. The point made by Mr. Goray (PSP-Bombay) needs much attention that out of a provision for 600 students at I.I.T., Kharagpur, only 95 students joined. The causes may be deeper than may appear at surface and need investigation and remedy.

Perhaps of far more significance was Mr. Kabir's statement with regard to scientists' participation in matters of policy. In his words, "we want our scientists not only to carry on their research, as they must, but also we want them to have a share in the framing of policies of national life. Unless scientists are in touch with different aspects of life, we may not always get the best possible results".

Mr. Nehru made a very pertinent reference to the split personality of the scientists, and their double way of thinking, i.e. inside & outside of the laboratories. Whereas in the laboratories they were in the atomic age, but outside them in the bullock-cart age. He also drew attention to the unsatisfactory state of teaching of science in the universities.

## Special Committee Reports

During the month various reports from the committees appointed by Lok Sabha and Public Accounts Committees have appeared with very interesting suggestions.

The one on Planning Commission has made some very interesting comments on the association of ministers and officials of the ministers working on the Planning Commission. From the point of scientists the committee has not, however, mentioned the way various panels have worked and what relation the Planning Commission should have with the research organisations to avail themselves of their advice on technical matters.

The Public Accounts Committee, apart from other things, have pointed out the delay in the execution of projects and non-utilization of funds. The revealing aspect of the matter is the reasons motivating demands for funds; such as prestige considerations and considerations of administrative practice. Delhi Govt., for instance, could not spend Rs. 3.41 crores out of Rs. 11.13 crores budget provision during 1955-56. Funds were not spent all under two heads of irrigation and commuted value of pensions.

The fifteenth report of the Estimates Committee has revealed the lack of response of the State Govts. with regard to the scheme of technical schools. The slow progress is due to the lack of sufficient coordination and cooperation between the various departments of the Union Govt. while its 17th report has suggested reform in the examination system, abolition of degree qualification for certain public services, and many other. It has stressed the need of scientific and technological education and that each university should specialise in one or two scientific subjects for intensive advanced studies, and laboratories should be improved. According to them women were pre-eminently suited for teaching profession and their percentage be increased on the teaching staff.

**Working of Industrial Enterprises**

Audit report for 1957 for the Rare Earths Factory has revealed two very interesting items. Machinery was imported from France and defects were noticed. As it was desired to put the plant into operation as per schedule defects had to be put right, without first claiming the replacements, incurring an additional expenditure of Rs. 3,86,763. The question is what to do : to wait for replacements to arrive or to go ahead with the work ? Suppose the work was done then what would be the cost to the country. The second item is the sale and value of the main product—rare earths chloride which is piling up from year to year as the sales abroad are poor, there is a storage problem and deterioration of the product and hence its value.

Mr. Sharma (C.-Punjab) raised very pertinent points regarding the self-sufficiency of the shipping industry. According to him the working of Hindustan Shipyard is a tale of "unhappy collaboration between Indian lack of experience in ship-building and French lack of competence". According to him even the fundamental principles were flouted in the construction of S.S. Andamans, and he questioned the role of French Consultants who were highly paid for the supervisory work.

The slow progress of the industry is a tale of dependance upon the West for raw materials and technical skill.

**Antiquated Beliefs as Social Guides**

Yeti has done a signal service in the columns of Statesman about the appaling hospital conditions in Delhi to show how over-crowding and excessive demands on the staff have produced a lowering of standards. In pointing out the workings of the blood banks he has revealed through a story a very interesting feature. According to him, the fear of impotency as a result of blood donation was very real. So real that a donor accused a doctor for being responsible for the birth of the child. When questioned he said that he had given blood once and was assured that by doing so he would not be able to procreate. This is obviously based on the common belief firmly entrenched in India that one drop of semen is formed from 40 drops of blood and that loss of blood would lead to impotency or discharge of semen would lead to loss of blood and bad health. Dr. Carstairs in his book "Twice Born" has very adequately discussed the sociological implications of this belief. The continuation of scientific knowledge of antiquity as a motivating factor can be very dangerous and what is required is a greater dissemination of scientific knowledge at all levels so that citizens could participate more consciously and with different set of motives.

**Brief News**

Mr. Kabir, replying to Mr. Bhargava, informed the Lok Sabha that the All India Council for Technical Education has recommended the starting of 17 new engineering colleges and that some of these institutions during 1957-58. A Higher Technological Institute was being started at Bombay during 1958-59.

A sum of Rs. 10,00,000 has been sanctioned by the Planning Commission for the development of poultry and piggery for the territory of Delhi. Delhi consumes about 1,50,000 eggs and 500 birds a day.

Replying to Shri Sharma, Shri Nehru said that an atomic power plant would be set up where other sources of power are not available.

Mrs. Tarkeshwari Sinha, replying to Dr. Subhag Singh said that under the revised policy, exchange is granted for all graduate and post-graduate courses in arts, science or technical subjects. The only exception was medicine where only post-graduate courses were allowed.

Dr. Shrimali said that in order to reduce unemployment amongst the educated, the Govt. proposes to employ 15,000 teachers during 1958-59, 20,000 during 1959-60 & 25,000 during 1960-61.

The death of Noel Brailsford has removed a great friend of India, though the news hardly noticed here. In the words of Kingsley Martin :

"I came away wishing that there was some way of letting the world know how great a man it had forgotten; how whimisical and full of fun and unexpected knowledge he was; how brave and great hearted his life had been, and how much love and disinterested work he had expended in return for so little recognition."

And as a friend wrote, for how many in India can we say that.

# Association News

**Calcutta Branch—Seminar Discussion on 'Scientific Policy Resolution'.**

A seminar meeting was held recently under the auspices of Calcutta Branch, A.S.W.I. on 3rd May 1958 in the Institute of Nuclear Physics, University College of Science and Technology, Calcutta University to discuss the various measures that can be adopted by the Govt. to implement the laudable objectives outlined in the recent 'Scientific Policy Resolution'. Dr. S. K. Bose, President, Calcutta Branch was in the chair. Prof. B. C. Guha, Prof. B. D. Nagchoudhuri and Dr. M. M. Chakrabarty were the prominent speakers at the meeting.

Prof. Guha in his address first pointed out that in the preamble part of the resolution where the pivotal importance of science and technology in the modern age has been stressed, was already realised by the Govt. of India since independence as evidenced by the setting up of a chain of national laboratories, constitution of central scientific organisations e.g. C.S.I.R,. I.C.M.R., I.C.A.R. etc. and the stress on industrialization in the Five Year Plans. In spite of all the above efforts, however, there has been a feeling in the minds of scientists in the country that the full potentiality of science was not being realised for the good of the nation. The scientific policy resolution does well by indicating the lines of progress but what is more important now is the concretization of the resolution.

One of the first measures should be to give the scientific workers atleast the same honour and the same conditions of service which are enjoyed by people in administrative and other sectors. At present the status and emoluments the Govt. gives to their permanent services are far more attractive than what is being given to scientists. Moreover the administrative control of even scientific and technological organisations run by the Govt. is vested almost completely to the civil servants even though their technical competence are not established. It is argued that scientists should not be drawn away from their specialised fields in in national interest and also that they have a 'one-track' mind and are therefore not good for administration. These arguments seem to be motivated with particular interests. It is known that civil servants consider that administrative fronts should be "reserved" for them and they have on occasions approached the Govt. so that as a privileged class, they may not be deprived of high administrative posts. The argument that scientists have one-track mind can also be proved to be fallacious.

It is the prospect of being able to give the best scientific and technical services to the country without frustration and without hindrance and of getting the recognition and status which the highest administrative officer gets in the land that will attract the ablest young people of India to the scientific and technological profession. Prof. Guha said that A.S.-W.I. should put forward the first demand that all or as many as possible of the scientific and technological organisations which are run by the Government should be placed under the administrative control of scientists and technologists. The technical executives of the Govt.

enterprises should be responsible to the Ministers directly as *ex-officio* Secretaries and not through Secretaries to the Govt.

The other suggestion put forward by Prof. Guha was that adequate scale of salaries should be given to people who come forward for a scientific career. He specifically suggested that at least Rs. 350|- to start with should be given to fresh M.Sc.s and engineers and offer them security of service if the country is serious about getting the best talents in the country into the creative pursuits of science and technology.

In implementing the resolution the Govt. will also have to pay attention to science teaching in schools, colleges and universities. Schools are by and large ill-equipped and ill-staffed for science teaching. If proper salary scales are not provided it is idle to expect a radical improvement in the situation regarding scientific personnel. Besides it is at the school stage that special efforts should be made to spot the most creative minds and give them special opportunities for development by way of high class merit scholarship, special arrangements for teaching and accommodation etc.

Prof. B. D. Naghchoudhuri termed the resolution as a Charter of Indian Science and said that like all charters it is an expression of hope and pious wishes. He thought that it was the duty of the Govt. and the people to take steps to see that these hopes were realised. He dealt mainly with the general isolation of science teaching in our schools from the broad current of scientific and technological developments both in the country and abroad. Even science school teachers are not aware of the work done in our Universities and there is a sort of caste barrier which prevents them from participating in academic activities. It is the duty of A.S.W.I. to see that this spiritual barrier is removed and the school teachers are also allowed to breathe the air of science and have close liaision with college and university teachers for exchange of ideas, and encouraging talents from the earliest levels. Equal opportunities for research and teaching should be available both at the college and high school level. He deplored the lack of adaptability of our educational system with the change in social and economic set up of the society and urged for speedier measures to introduce necessary reforms in the system, keeping in view the changed conditions since independence.

Dr. M. M. Chakrabarty spoke of the mal—and unemployment of scientific workers which is still quite acute inspite of the progress in industrialisation. Unemployment, according to him, is a general aspect of the economic situation of the country and the position in respect to scientific workers have not apparently improved since the last Convention on Mal—and Unemployment of Scientific Workers held under the auspices of Calcutta Branch, A.S.W.I. in 1954. The situation can be remedied by having a type of economy which ensures full employment for all and only a fully socialist economy can bring this about. Full priority should therefore be given to the development of a socialist economy while implementing the scientific policy resolution.

Dr. S. K. Bose in summing up the proceedings of the meeting regretted the dependence of the country on foreign technical know-how for all major industrial projects. Even in the case of iron and steel industry which has just completed its fiftieth year, we still do not possess sufficient knowledge for the erection of new steel plants. The situation compares most unfavourably with the present employment position of the scientific and technical personnel who are very often illemployed, malemployed or even unemployed. Moreover it seems to be the attitude of those in charge of implementation of industrial enterprises in the country that the development work in any industry may preferably be carried out in the industrially advanced countries —their opinion about the indigenous talent is so poor ! Indian technicians are most often employed for maintenance operations for which no high grade technical efficiency is needed. Dr. Bose suggested that one of the immediate measures that should be adopted by the Govt. is to form development sections attached to all the major projects which should be manned by qualified Indians who will be trained not only to run the plant but also to fabricate, then to improve it further and finally to compete with the West in future. The administration of these projects should be controlled by the technologists themselves who are fully alive not only to the present but also to the future.

At the close of the meeting it was agreed that the various measures suggested should be sent to the Centre in the form of a resolution for further implementation.

**Central Executive Committee meets at Delhi.**

The first (1958) meeting of the Central Executive Committee, A.S.W.I. was held on 5th April, 1958 at 39 Massey Hall New Delhi. Dr. S. Husain Zaheer, the President was in the chair. The General Secretaries informed the members of the work done since the last CEC meeting. The CEC approved the affiliation of the Surveyors' Association, Dehra Dun and directed that this be put up at the next Council meeting for ratification.

The Treasurer informed the members that the recent Govt. grant of Rs. 2500|- was barely adequate to cover the outstanding dues of the last year and the financial situation would therefore be difficult during the year. The CEC directed that an application for further grant with full statement of the case be submitted immediately. Regarding the accounts relating to the grant received from W.F.S.W. the CEC appointed Sri M. R. Raman as the Hony. Auditor and the Treasurer was directed to send audited accounts to the W.F.S.W. together with the estimates of expenses for the current year at the earliest.

Regarding the Regional Conference the progress made by the Hyderabad Branch was noted and the CEC directed that we go ahead with the contacts and other arrangements. About the sending of delegates to the Middle East and South East countries it was decided to send the proposal and programme to the W.F.S.W. detailing also estimate of the expense to be incurred on these visits for their approval. Sarvashri A. Rahman and D. V. Varma were provisionally selected by the CEC as delegates to the Middle East and South East Asian countries respectively.

The CEC decided to send Sri Baldev Singh to attend the World Conference on Disarmament and International Co-operation provided the World Peace Council agreed to pay the expenses of the delegate. Prof. B. D. Naghchoudhuri was nominated by CEC for attending the World Conference against A & H Weapons to be held at Tokyo in August| September.

Sri Baldev Singh was requested to write a comprehensive note for inviting Scientific Workers from C.S.I.R. Laboratories for a conference to be organised at Lucknow coinciding with 2nd CEC meeting to be held in July|August.

The CEC welcomed the resolution on Science Policy adopted by the Govt. of India. The CEC decided to examine the resolution in detail with a view to suggest a programme of action through which the aims and objects of the resolution could be achieved. The President was authorised to allocate each aspect of the resolution to a different branch for discussions and suggestions. It was also agreed to write articles on the various aspects of the resolution for publication in the V. K.

The following resolution were adopted unanimously at the meeting :

We, the members of Association of Scientific Workers of India, mourn and record with deep regret the sad demise of Moulana Abul Kalam Azad, Union Minister of Education & Scientific Research and Hon'ble Vice President of the Council of Scientific and Industrial Research, at his residence in New Delhi at 2.10 A.M. on Saturday the 22nd February, 1958.

**Resolution on Suspension of Nuclear Test**

**Preamble :**—The Association af Scientific Workers of India has consistently maintained that the testing of nuclear and thermo-nuclear weapons which release dangerous radio-active particles into atmosphere is a crime against humanity. Strontium 90 and Caesium 60 accumulate in articles of human consumption, such as vegetables, fish and meat etc., and their adverse effects may even be passed on to the coming generations. No country or nation has the right to endanger the future of humanity. The Association has been demanding that an end be put to the testing of nuclear weapons.

Due to the fear and mutual distrust between the nations possessing atomic and hydrogen weapons these tests have continued in ever-increasing numbers. Efforts of the various United Nations Bodies and other organisations have so far failed to bring about an agreement on banning of testing and manufacture of these weapons. The entire question of disarmament has been moving in a vicious circle because of this mutual distrust and fear.

Shri C. Rajagopalchari, Dr. Albert Schweizer and other men of wisdom and good will had advocated that the only way out of the impasse, based on fear and mistrust could be a unilateral cessation of these tests voluntarily by the great powers. This step it was claimed would evoke a universal response from humanity and compel the unwilling parties to respond to the jesture.

The Association has learnt with extreme gratification an announcement by the U.S.S.R. of their decision to suspend testing of nuclear weapons unilaterally without waiting for any agreement from the other powers. The Association considers this as only a first step which should lead to a stoppage of the testing of nuclear weapons by all nations followed by a complete ban on their manufacture, or use in war.

**Resolution :**—The Central Executive Committee of the Association of Scientific Workers of India records its deep appreciation of the bold and humanitarian step the Soviet Government has taken in unilaterally abandoning nuclear tests and appeals to the Government of Britain and the U.S.A. to do likewise. It expresses the hope shared by all scientists that this will be a prelude to a permanent ban on the production of stock-piled ones so that mankind might be rid of the greatest menance that ever threatened it in its long history.

**Resolution on the Age of Retirment for Scientific and Technical Personnel**

**Preamble :** India is passing through a phase of rapid industrial and agricultural development. The pace of progress is being speeded up through the Five Year Plans which are aimed at the maximum utilisation of the material and human resources. Due to the rapidly increasing requirements for scientific and technical personnel for scientific research, projects, new industries and newer scientific and technical publications, there is an acute shortage of trained personnel of all types.

As such, the question of retirement of scientific and technical personnel should not arise, much more so, when the country needs all its scientific talent to be in active service of the country. Under these circumstances, fixing of any age for retirement for scientific and technical personnel is a retrograde measure and not in the best interests of the country. A scientific person must be permitted to be in service till such time that he maintains sound physical mental health.

Recently, the Council of Scientific and Industrial Research has advanced the age of retirement for scientific and technical personnel to 60 years. However, this is to apply only to scientific workers 'engaged in research', but not to those in the Publications Directorate and other allied departments. This distinction appears irrational since technical hands are required as much for research as they are for handling specialised technical services on which research itself depends. Moreover, the persons employed in such departments are themselves technically and scientifically qualified and have devoted themselves to technical occupations.

As has been stated above these distinctions between those engaged in 'active research' and those engaged in 'technical professions' is without any rational basis. The Association is of the definite opinion that scientific and technical personnel should be permitted to serve the country without these invidious distinctions till their mental and physical health permits.

**Resolution :**

This meeting of the Central Executive Committee of the Association of the Scientific Workers of India, notes with surprise that a distinction has been made in the matter of age for retirements between scientific workers engaged in research and those engaged in technical work such as scientific publications etc. This discrimination has been made inspite of the fact that these technical personnel are qualified and possess scientific and research qualifications. The Association feels that in view of the acute paucity of scientific personnel and the increasing requirements for scientifically qualified people, the age of retirement for scientific personnel has no meaning and they should be permitted to serve the country so long as their physical and mental permits. However, if the age of retirement is to be fixed no distinction should be made between personnel engaged in research and those engaged in technical work. The Association urges the authorities of the Council of Scientific and Industrial Research that a uniform treatment be observed in the matter of age of retirement for scientific and technical personnel.

**Association of Scientific Workers, Ordnance Establishments, Kirkee**

The social gathering and general body meeting of ASW, Kirkee was held in Poona on 10th May, 1958. The Association had been active throughout the year in various spheres affecting the service conditions and social life of the members of the association.

*High lights of the year 1957-58.*

(a) *Membership and Finances* : Twenty three new members were admitted during the year. The subscription for the year stands at Rs. 741.50. As a result of good work put up by the finance and organisation sub-committees the arrears of members are dwindling.

(b) *Social and Cultural* : Ten Bulletins were published during the year. These bulletins kept the members aware of various activites of the Association. Fifteen new books were purchased during the year. Several pamphlets and other informative literature received from various outside organisations were made available to the members.

The cultural activities were varied and many including a visit arranged to the Archaeological and Historical Sections of Deccan College, Poona. An address of Sir C. P. Ramaswamy Aiyer was also arranged under the auspices of the Association.

The problem of general interest are being taken up by the Federation of Defence Scientific Workers of which the Association is a Unit.

**Association of Scientific Workers Ordnance Establishments, Khamaria**

The annual meeting of the General body of ASW, Khamaria, Jabalpur, was held on 15th April, 1958. The following office bearers were elected for the year 1958-59.

*President* :
Shri M. S. Subramanian

*Vice President* :
Shri S. Mitra

*Secretary* :
Shri Rajagopalan

*Treasurer* :
Shri S. D. Saxena

*Members* :
Shri T. K. Banerji
Shri C. John Vergese
Shri J. Roy
Shri V. R. Damle
Shri P. S. Subramanian
Shri H. S. Pathak

Sarvashri S. K. Chowdhuri and D. L. Ganguli have been appointed auditors.

**Scientific Workers Association, Kanpur**

The 11th General Body Meeting and social gathering of the S.W.A. Kanpur, was held on 12th April, 1958. Dr. D. S. Kothari, Scientific Adviser to the Ministry of Defence, Govt. of India was the chief guest and the meeting was also attended by several distinguished guests and about 290 members out of 419 members. Representatives from Bombay branch of the Association were also present

*High lights of the year.*

The Association carried out its multifarious activities under three Divisions.

(a) *Economic and Service activities* : This division had been mainly engaged in drawing up a memorandum for the Pay Commission (1957). In this memorandum the Association has impressed upon the Commission the necessity of fixing a minimum wage for scientific| technical workers, and redressing various other disparities which exist presently in the service conditions of scientific workers. Apart from the memorandum many other problems were taken up by this division concerned with service conditions of the members. Most of these problems are now finalised or are under active consideration of the authorities,

(b) *Organisation* : A new unit of the Association with nucleus in the Fuel Testing Laboratory, Madras, was opened in this year. This is a link in the chain of providing similar units for Defence Scientific Workers placed at outstations.

The Central Executive Committee of the Association met in 8 ordinary and 2 extra-ordinary meetings. Nine bulletins were brought out during the year for keeping the members informed of Association activities.

(c) *Finances* : The finances of the association remained quite stable during the year.

(d) *Trade Union activities* : The Association maintained cordial relations with the sister trade unions and pursued some problems in cooperation with these unions.

*Cultural and Social* : A variety programme was arranged for the benefit of the workers and their families in November. The programme was a grand success. A Mela was held in February to provide entertainment to the members and their families and included a carnival, fun and sports, exhibitions etc.

*Election of Office Bearers* : The following office bearers were elected for the year 1958-59.

*President* :
Shri D. V. Varma

*Vice-President* :
Shri K. L. Maheshwari

*General Secretary* :
Shri M. R. Raman

*Treasurer* :
Shri R. B. Saxena

*Joint Secretaries* :
Sarvashri B. Sanyal, M. S. Gupte, Y. H. Rao.

*Members of the Executive* :
Sarvashri C. F. Paul, G. C. Joshi, A. R. Aiyer, B. R. Nashikkar, S. S. Saxena, R. K. Gupta, R. G. Kaushal, H. N. Dixit, R. Ghosh, S. R. Nigam, G. B. Singh, K. K. Tripathi, Tara Singh, L. R. Srivastava.

*The General Body Meeting of S.W.A. Kanpur.*

(a) *Resolutions* : Resolutions on the following aspects were passed by the General body :

1. Rationalisation of Scientific|Technical Posts.
2. Bye laws to the constitution.
3. Reorganisation of Technical Development Establishments
4. Working Conditions in Technical Development Establishments.
5. Suspended membership.
6. Reduction of monthly subscriptions.

(b) *Address of the Chief Guest* : Dr. D. S. Kothari, S. A. to Ministry Defence, Chief Guest, emphasied on the vital role of scientists in the economy of the country in general and the Defence of the country in particulars. He urged the scientists to rise up to the occasion and devote themselves completely to their work.

Stressing on the necessity of specialisation and coordination in scientific research he asked the scientists to share the responsibilities with interest and imagination.

# Book Review

The Twice Born—
A Study of a Community of High Caste Hindus.
Dr. G. Morris Carstairs
London : Hogarth Press, 1957 30 sh
Pp. 343.

This book has received wide attention in India. It is eagerly sought and read, but the reactions of many are those of disappointment in so far as it hardly throws any more light on what they already know, others feel unhappy about the detailed description of personal aspects discussed in interviews. The book, however, is important as a first step in the study and appreciation of a phenomena which is taken for granted but hardly understood.

There are many aspects in the book which need critical appreciation before they can be accepted. The basic philosophy or the assumption, on which the study is based, is the idea of functional integration of social phenomena first advocated by Malinowski. According to this concept "cultures are like living organisms, in which every part is meaningfully related to the functioning of the whole. In this context it is asserted that the growing child imbibes certain deep seated convictions on "emotional and not intellectual grounds, which have been conveyed implicitly in the constant give and take of relationships with the persons who loom largest in the infants' early years".

It would be difficult to accept these assumptions on the grounds that they conform to certain social experience and answer many of the problems that face us. It is, for instance, baffling to a rationalist when he comes across irrational behaviour in certain people which persists inspite of evidence of facts and consistent adverse experience. The emotional basis of beliefs developed as a result of childhood experience do offer an explanation, but it would be difficult for a scientific to accept them into to. Apart from the pitfalls in the technique and its reliability, the main point that has to be borne in mind is that these explanations are based on the observations and deductions at a grosser level, which is not deep enough to take into consideration the results of scientific investigation on the structure of brain and nervous system in the context of biological and social evolution.

Further, as would be evident from the book, Dr. Carstairs has taken the conclusions arrived at on the basis of a study based on these concepts in European Society and has tried to apply them to the Indian scene and offer a possible explanation of the Indian behaviour. This application neglects a basic feature of the situation viz., the social and historical evolution of the two societies from the technological point of view.

According to him "These irrational, emotionally, determined quirks of behaviour and response are not wholly arbitrary. They are found to secure in many different contexts; and when studied carefully they reveal a pattern and interconnectedness in which the connections are not necessary logical but in many cases symbolical, and only subjectively meaningful. This theory offers, what appears to be a satisfactory explanation,, of the characteristics met with in the Rajasthan community, which might be true of India as a whole, such as lack of precision in describing details, sense of time or sticking to scheduled programme. But can this explanation be accepted? Can it not be explained alternatively through the productive function man performs in a particular type of society. In rural India where feudalism, and feudalistic outlook that goes with it, still dominates and where the main reckoning of time is guided by seasons and cultivation of sowing, cultivating and reaping harvest on the one hand and a set of ancient beliefs as guide to action on the other, the outlook and standards of a highly advanced technological societies are less likely to be evolved. A comparative study of pre-industrial European societies and pre-independance India will show the similarities and suggest a possible line, or at least an important factor, of explanation that lies in the technological evolution of society as against the purely subjective approach of Dr. Carstairs.

A neglect of historical factors of evolution of society leaves the question of cultural transformation in society with new values and new sets of beliefs unanswered. A phenomena which we are witnessing in modern India where precision of details sense of time and sticking to schedule is developing at a rapid pace by breaking the psychological barriers.

To critically examine some aspects of the books, the basic assumptions and methods followed, is neither to decry their limited usefulness nor to minimise its importance. In fact the book is a collection of some very useful information and two of the very important items being, though we are already familier with them in a general way, the prevalence of superstition and ignorance, and the dominance of antiquated beliefs, based on the scientific knowledge of antiquity, which still dominate the traditions and practices in the country. The latter has two very important and significant consequences. Firstly, what was aptly described by Prime Minister Nehru in science policy debate as the split personality of the scientists; the double way of their thinking, that of inside and outside the laboratories. Secondly they form the basis of social action and moral and ethical judgments of modern problems. A very interesting and comical example was found in the columns of Statesman. A blood donor recently accused a doctor of being the father of his child. When questioned he informed that he had given the blood and was assured that by giving blood he would become impotent. Who assured him in order to persuade him to donate blood is not known, but that it was so, can be easily explained on the basis of ancient idea of the process of formation of semen according to which 40 drops of blood give rise to one drop of semen. Consequently loss of blood leads to impotency and loss of semen leads of loss of vitality and bad health. Dr. Carstairs has explained at length the preoccupation of a large section of population with the fear of impotency and also the phantasy of the cult of Mataji and its practices which have developed around the biological facts as they were understood in antiquity and which still form the basis of people's knowledge.

The question therefore arises for the scientists in India and is vital for the progress of science: How far scientific outlook can be developed amongst the people so that a new set of values could replace those that has chained us for long? How can we except people to contribute to blood banks, for example, if antiquated beliefs contiue and if those who have knowledge not spread it? This is a vital question for modern Indian society. We can neither build an efficient society which is capable of meeting the requirements of an ever advancing and ever more complex technology through the split personality of scientists that now prevails, nor through the continuation of antiquated beliefs as a basis of social action and decision. Dr. Carstairs has done a very useful service by carrying out the study and by making the results of his researches available in an extremely lucid and readable book and it is for the scientific workers of India to draw the necessary conclusions and to do what is an important requirement of our tims.

That popularisation of science is an important and a vital need of the time, more than ever before, because India has accepted democratic form of government, which means vast masses of people hitherto subjected and exploited and who remain even now illiterate and ignorant, would be deciding upon matters of scientific policy, making or discarding technological conclusions as social decisions. How successfully they can do it depends upon the awareness they have of social issues and appreciation of technological developments. An absence of the latter would not be any thing less than a disaster, as it would mean deciding issue with an antiquated mental outlook. Recently we have witnessed, even in technologically advanced countries how a lack of proper appreciation has brought disasters to society and put the clock of scientific progress back. The suspicion and distrust of scientists created in America because of this gulf has fully been exploited by unscrupulous politicians, it can do much worse in India. India is still suffering from the effects of stagnant past, the evils of casteism, parochialism, ranchorous intolerance and a definite distrust of progress and longing for the past with revivalist tendencies, so much so that the Prime Minister Nehru had to admit opently that the atmosphere was becoming dirtier and heavier, making it difficult for a sensitive person to breathe.

This is the result of the development of some aspects of in our national life of which Dr. Carstairs has made us aware of and his work can serve as a basis to assess our task.

—A. Rahman,
C.B.R.I.,
*Roorkee.*

Regd. C 3982



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