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VIJNAN KARMEE

journal of the association of scientific workers of India

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VIJNAN KARMEE

Journal of the Association of Scientific Workers of India
(Founder-President : Shri Jawaharlal Nehru)

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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.

46th Session of Indian Science Congress

The annual Science Congress meeting is over. The meeting of Indian scientists in the Capital has been significant enough ; it may be pointed out that the last meeting held at Delhi twelve years back heralded the independence of the country.

It is obvious that political situation casts its influence on scientific and allied activities of a country; this will be evident from the record of scientific and industrial progress of India during the last decade. But, for a growing nation, this influence should not be such that Science remains ever-dependent on political figures and cannot stand on its own. Certainly, we welcome our Prime Minister, Government officials and Royal dignitaries amidst our meetings but the kind of feeling among scientists cannot be helped when we consider that the increasing craziness for political glamour, social parties etc. mar the serene and calm atmosphere expected during this annual Science Congress. In one word, the scientific attitude of the scientists is lamentably lost in the melee.

"A plethora of abstracts published by the Science Congress Association every year, the papers relating to which are never scrutinized nor even read by any competent person" clearly reveals that publicity rather than self-retrospect is becoming the watchword in the Science Congress activities. Number of papers to be read should be reduced to a barest minimum if the Indian Science Congress Association is to perform its real function of promoting scientific discussions rather than reading of papers. Besides discussions on worthwhile communications, seminars on various topics should be arranged to the benefit of budding scientists. Science Congress authorities should see that there are more of joint discussions on common problems. It would be advisable that annual meetings of the specialist scientific societies be held in any other convenient time during the year ; this would give breathing time for the main programmes of common interest.

The Association is a premier body which can and should discuss the failings of Indian science, the positive sense of unrest and frustration amongst junior research workers as alos the remedies for the above situation. The considered opinion of such a premier body would not only help the national Govt. to formulate policy on Science but also encourage and guide all men of Science.

"Making the general public realise the importance and values of Science" is a self-imposed duty of the Association from which it can hardly shirk. We are thankful to the Association and the authorities of the Delhi University for their arranging the nice exhibition on 'Scientific literature in Indian languages'. But what should be done with the literatures ? The policy of the Association towards the language of science to be adopted in India has not been properly formulated. (Dr. Mudaliar, in his presidential address said that international language of science was too essential to be discarded but did not stress on the fact that national languages were also too important, in the matter of propagation of scientific education, to be neglected !) Spreading of scientific education amongst public can not be done by several 'Popular Lectures' alone; the Association should give the nation a lead by adopting an intensive and round-the-year campaign for popularisation of science amongst the masses.

Our national Govt. is no doubt thinking about the various problems, referred to above. It would however, be a pity if the scientist members of the Association, who are more connected with the problems, adopt a complacent attitude and remain satisfied with yearly meetings, a speech from the Prime Minister, parties by President and State Governors and cultural programmes in the evening.

We mourn and record with deep regret the sad demises of Dr. J. C. Ghosh (b.—Sept. 14, 1894; died Jan. 21, 1959) and Dr. B. B. Dey (b.—Nov. 1, 1889; died Jan. 17, 1959) in the month of January.

Dr. Ghosh, Member, Planning Commission, Govt. of India, past Director of Indian Institute of Science, Bangalore, Indian Inst. of Technology, Khargpur etc. and Dr. Dey formerly Hony. Director, Central Electro-Chemical Research Institute, Karaikudi were two great stalwarts in the field of Indian science. The losses sustained by the Nation are irreparable. May the souls rest in peace.

Presidential address delivered by Dr. S. Husain Zaheer on the occasion of the 12th Annual General Meeting of the Association of Scientific Workers of India on January 24, 1959, at the Delhi University

S. HUSAIN ZAHEER

Regional Research Laboratory, Hyderabad

First and foremost I must express my grateful thanks to the Prime Minister for having kindly agreed to our invitation to inaugurate the Annual Session. It is also with great pleasure that I express my thanks to Prof. Humayun Kabir, Minister of Scientific Research and Cultural Affairs, who has kindly responded to our invitation by being present here this morning.

The Association was formed 12 years ago in Delhi with Shri Jawaharlal Nehru, Prime Minister of India as its first President. Looking back, I believe we can justly claim that after the inevitable period of teething troubles, we are today reasonably well established as the organised and representative body of scientific workers in the country. We have reached this position not only because of the commonly accepted and obvious need for such an organisation of scientific workers, but also through the enthusiastic and untiring efforts of a large band of active and conscious young scientific workers spread throughout the country—"conscious" not only of their rights and privileges but also of duties and obligations as scientists and technicians. The unfailing encouragement we have received from the Prime Minister of India has inspired the scientific workers in their task. I must also express the thanks of the Association for the sympathy and the financial assistance which the Association has received from the Ministry of Scientific Research and its Secretary, Prof. M. S. Thacker whom we are fortunate to count as one of our very active members.

The Association has always assigned a dual role to itself. Firstly, of course, it directs its efforts towards an improvement in the status of scientific workers and a rationalisation of their conditions of service. Simultaneously, the Association highlights the duties of scientists and technicians and the vital role they have to play in the fight against poverty and ignorance, in raising the standard of living of our people, in the building up of our industries large and small and in the innumerable tasks of reconstruction which confront us.

The Association has also directed its efforts in a small way—'small' only because of its limited resources towards popularisation of science and the creation of a "scientific climate" such as is absolutely necessary for a proper understanding and appreciation of science and its benefits. Only thus it can gain public esteem and prestige and the financial means for its sustenance and development.

While inaugurating the Indian Science Congress, the Prime Minister referred to the two faces of Science. Recent developments and progress in Science and Technology have brought mankind where it stands today—on the brink of total destruction of all civilisation—perhaps even a total destruction of mankind itself. On the other hand, the *same* scientific developments have opened up a prospect of almost undreamt of plenty and prosperity for the whole of mankind in a world from which all poverty, hunger, misery and disease would have been banished. And yet, the choice is for mankind itself to make. Quoting from the Bhagvad Gita two days ago the Vice-President said "I know what is right, I cannot adopt it. I know what is wrong, but I cannot abstain from it".

And scientists who are primarily responsible for having created the possibilities both for good as well as for evil must not shirk the responsibility of doing all in their power to see that a correct choice is made.

Permit me now to look in perspective at some of the important resolutions adopted by the Association last year.

During 1957, serious doubts were expressed in certain quarters on the possibility of achieving the targets in the Second Plan and reflections were cast on its ambitious nature. Realising the danger to the Plan and full of hope and faith in our people and ourselves, the Association felt impelled to express a sense of dedication towards the implementation of the complete plan, and the following pledge taken in January 1958 at the Madras Session gives expression to it :—

"The Indian Constitution recognises 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 and technical research. Hundreds and thousands of scientific workers will be required to carry out the numerous programmes of research and 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 wherever the scientific workers are employed the trained scientific mind will be brought to bear upon all problems in development and 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 can utilize the energy and talents latent in our country properly and effectively".

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

Though the period of acute stress and strain is by no means over, the sense of despondency which was creeping in during 1957 is no longer there and the Second Plan has made progress. There are reasonable prospects that the targets laid down will be more than achieved and already it is being said that the targets were inadequate. Our steel plants are going into production, cement production has already nearly reached the target, and the production of coal is progressing according to Plan. Even the mistake made with regard to fertilizer plants has been recognised and is being rectified. This mistake was pointed out at the same time by the President of the National Institute of Sciences and the President of the Association of Scientific Workers in their respective presidential addresses at Madras last year. This was not just a coincidnce but the result of two independent and scientific studies of the same problem. I shall read out to you two other resolutions adopted last year at the Annual General Meeting at Madras—

Resolution :

This meeting of the ASWI while taking pride at the achievements of scientific progress which have led to the launching of sputnik, remarkable achievements in ballistic missiles and the release of energy from the atom, calls upon all the nations of the world irrespective of their political differences to create 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.

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

These resolutions reflect views and opinions of almost all scientific workers throughout the world.

The Association also took an active part in obtaining signatures of Indian scientists on the petition submitted to U.N.O. by Prof. Linus Pauling praying for the immediate cessation of nuclear tests and an eventual ban on atomic and nuclear weapons. In spite of the initial success obtained at Geneva, the world still appears to be far from a total ban on atomic and nuclear weapons or even a cessation of tests of such weapons.

Similarly there appears to be no prospects of the creation of such conditions as would enable the development of science and technology for peaceful purposes and the benefit of mankind as a whole. The expenditure of national budgets on armaments has attained enormous proportions—it is estimated that the annual expenditure on armaments by countries of the world reached the figure of 90 billion dollars per annum during the years 1950—1957. We in India, as in other underdeveloped countries of the world, striving hard since attaining our political independence to raise the standard of living of our people, are particularly alarmed at and effected by this senseless waste of means and wealth. In a remarkable book "World without War" published in October 1958, Prof. Bernal has pointed out how even a thirty per cent reduction in the enormous expenditure on armaments could provide all the means and the capital required for the development of all underdeveloped countries of Asia, Africa and South America in addition to sustaining and even improving conditions in Europe and America.

About two years ago a Regional Centre of the W.F.S.W. was formed in India and it was proposed last year at Madras to call a conference of the scientific workers from Egypt, Syria, Iraq, Jordan, Lebanon, Saudi Arabia, Ceylon, Burma, Malaya, Thailand, Indio-China and Indonesia in Delhi during the winter 1958-59. Contacts were established through our embassies and the diplomatic missions of these countries in

India, with a large number of scientists in these countries and we applied for a Government grant to meet part of the expenses for this Conference. In October 1958 we were informed of the Government of India's inability to assist the Association in this regard. This was a matter of great disappointment to us and we hope that Government would reconsider the matter so that a Regional Conference could be called during 1959.

In my presidential address last year, I referred to the unsatisfactory status accorded to scientists. This did not refer merely to being accorded a "higher position" in the order of precedence on ceremonial occasions—as scientists are really not much worried about that. What is highly unsatisfactory, however, is the attitude which those in authority in administration and other places adopt towards the opinions and points of view put forward by scientific workers on important problems facing the country. Even on matters of purely scientific and technical nature, final decisions are taken by people having no direct scientific training or knowledge, and even if scientific opinions is called, the scientists are treated as "egg-heads" and "back room boys". The situation in this regard appears to be unsatisfactory in some of the large enterprises in the country—both in the public sector and the private sector and demands a close examination.

And now I come to the most outstanding and important event for science and scientists in the country, i.e., the enunciation by the Government of India of its Scientific Policy in a resolution placed before the Houses of Parliament by the Prime Minister on March 13, 1958. The resolution can well be regarded as a Charter for Scientific Workers in India and incorporates a large number of resolutions on the role and status of science and scientific workers adopted by the Association during the last several years. I shall conclude my speech by reading out to you the statement I issued in the Vijnan Karmee on the occasion :

"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 accorded 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 resolutions meets to a very large extent the demands put forward by the Association from time to time during 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 a 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 effort. As a first step, the Government of India should give greater authority to the Panel of Scientists and actively associate them 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 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 whole-heartedly to this end."

Next Steps in Planning*

By

P. C. Mahalanobis, F.R.S.

Introduction

India adopted planning for economic development with the initiation of the First Five Year Plan in 1951. At this stage, the plan was essentially a list of projects without any clear unity of purpose. A sense of strategy began to develop and certain broad aims were formulated in advance in 1954 for the preparation of a draft frame for the Second Five Year plan. It was agreed that attempts must be made to get India out of the fear of unemployment in ten years or as soon as possible ; to lay sound foundations for a continuing improvement in the level of living, that is, of the national income ; and also to bring about greater equality of opportunities.

1.2. In 1955 India accepted socialism as the goal of economic policy. The Second Five Year Plan took a long term view of economic development over a period of 10 or 15 years or more, and adopted a basic strategy for this purpose which involved a crucial change in the outlook. Three years have nearly passed after the initiation of the Second Plan in April 1956. There have been many gains and some set-backs ; and much

* Anniversary address delivered on 20.1.'59 under the auspices of National Institute of Sciences of India.

experience has been gathered. We must now prepare our mind for the Third Five Year Plan which will have to be started in about two years. It is, therefore, appropriate that we should now consider the next steps in planning.

Review of Industrial Developments

2.1. Before doing this it will be useful to consider previous developments in India in the context of the history of industrialization of the more advanced countries of the world. The industrial revolution started about two hundred years ago in the United Kingdom, the U.S.A. and countries of Western Europe where science and technology were highly developed. At first there was expansion of the manufacture of textiles and other consumer goods. The use of steel for industrial purposes started less than a hundred years ago. The world production of steel was less than one million metric ton in 1870, and reached 4.4m. tons in 1880 and 28m. tons in 1900. In 1870, U.K. and Germany were producing about 200,000 tons per year and U.S.A. and Russia had just started. By 1880 U.K. and U.S.A. reached 1.3m. tons and Germany reached this level in 1885, and France in 1895. These countries were already industrialized and had a high level of living indicated by per capita income of from 400 to 600 U.S. dollars per person per year (at current dollars for 1955 and 1956) at the time they reached the level of production of one million tons of steel per year. Health and education also were fairly well developed with the number of physicians ranging between 3.6 and 16.3 per ten thousand of population, and with a proportion of school children between 12 and 19 per cent of the population. Developments were fairly rapid from this time and U.S.A. reached 4.3m. tons in 1890, Germany 4m. tons in 1895, U.K. 5m. tons in 1900 and France 4.7m. tons in 1913. During this period there was some further expansion of health, education and research which was broadly in accordance with the previous trend. An output of 4 or 5 million tons of steel per year usually makes a turning point in industrial progress. At this level it becomes possible to establish comprehensive manufacturing complexes of steel, heavy machine building and heavy electrical industries, and chemical engineering.

2.2. Japan had started producing steel just before the First World War and reached one million ton in 1923 when Japan's per capita national income was still quite low and only 125 U.S. dollars. Health and education in Japan were, however, as highly developed as in the advanced countries of Europe and America. Japan reached 4.9m. tons in 1935, that is, in 12 years. It is important to note that modernization in Japan had started about 90 years ago with the Meiji Restoration with deliberate emphasis on health, education, scientific research and industrialization. Japan, for example, had made primary education free and compulsory before U.K.

2.3. Russia had reached the production of about one million tons of steel as early as 1895 but was quite backward in education and health with 1.6 physicians per ten thousand of population and with only 3 per cent of the population in primary schools. Owing to war, revolution and civil war, production in U.S.S.R. had decreased to 0.6m. tons in 1923, but recovered to 4.9m. tons in 1929, by which time education and health had also developed in a remarkable manner approaching conditions prevailing in the more advanced countries at corresponding epochs. China started very recently with 0.6m. tons of steel in 1950 and rapidly reached 5m. tons in 1956 and 10m. tons in 1958.

2.4. Until recently industrial developments in India were taking place rather slowly and in a somewhat imitative way of the earlier history of industrial growth in Europe and America in which we can distinguish four layers or phases. On the top or the surface comes consumer goods which can be established fairly quickly with the help of imported machinery. The second layer is the production of electricity, steel and other metals; this is highly capital intensive and requires large imports of machinery and also an appreciable amount of time. Next is the manufacture of heavy machines, heavy electrical apparatus and chemical engineering (for the production of industrial raw materials). This usually requires a much longer time but, once established, would enable a large part of the capital and producer goods being manufactured out of domestic resources. Even more basic is the expansion of health, education, science, and of scientific and technical manpower which takes practically a generation to mature.

2.5. Following the above pattern only upto the first phase of consumer goods, India had become the second biggest producer of textiles in the world and had also developed the manufacture of other consumer goods without however establishing the basic industries like metals, heavy machine building and heavy electricals. In fact, in India the production of steel had remained basically at a little above the level of one million ton after nearly half a century of the beginning of the industry, although the country has very large resources of iron ore of the best quality. The economy was developing only very slowly on the basis of immediate demands and supplies without any long range view. Also, there was comparatively little development of health, education, and science in relation to the size of the country and its population.

Gains in the Second Five Year Plan

3.1. There were important gains in the Second Five Year Plan which marked a radical break with the old way of thinking. It was realised that unemployment and poverty can be cured only through rapid industrialization. It was not enough to expand the production of textiles and consumer goods. It was necessary to increase the supply of energy and of machinery and tools of production to create more employment. It was realised that the only way to do this in a big country like India was to establish, as rapidly as possible, the basic steel, heavy machine building, and heavy electrical industries and chemical engineering. This would make it possible to produce capital and producer goods of all kinds and thus expand industrial investments increasingly out of domestic resources. This is the only way to secure increasing supplies of machinery and energy, with which we can create more employment and also can give workers more machinery so that the total production in the country can rise rapidly.

3.2. In India the highest priority must be given to the establishment and expansion of the basic industries. Large investments in the basic industries would, of course, give rise to an increasing demand for food, cloth and other consumer goods. In India it is possible and desirable to meet this demand by setting idle hands to work in the traditional way or in small scale industries to produce consumer goods and other necessities as much as possible. This would also create much employment all over the country.

3.3. It was appreciated that, in India, the production of an agricultural surplus is the key to industrialization. It is not only essential to grow enough food and fibres for our own requirements but it is also necessary to produce a surplus in the form of either industrial or food crops. In India agriculture and manufacturing industries are completely interlocked. Economic progress depends on the advance of both. Advance of one step in agriculture would supply food and raw materials for advance of one step in manufacturing industries which again, in its turn, would speed up irrigation and increase the supply of fertilizers and pesticides and help in the promoion of scientific research, which would lead to further advances in agriculture. The importance of the scattered or diffused phase of production, both in agriculture and in traditional and small scale industries, was broadly appreciated. It is also being increasingly realised that land reform and the organization of village co-operatives are urgent and essential needs for increasing agricultural production.

3.4. The Second Five Year Plan accepted the above strategy of economic developmeent in a general way. It was decided to expand steel production to about 5 million tons; to give high priority to atomic energy; to establish a heavy machine building industry and the manufacture of heavy electricals; and also to develop prospecting for oil exploration and to establish oil refineries of our own. India would be now able to start developing large manufacturing complexes.

3.5. There were, however, gaps and set-backs also. An acute shortage of foreign currency occurred in the very first year of the Second Plan, which in my opinion was not inescapable but was largely due to lack of adequate tools and instruments of planning and also partly to lack of proper appreciation of the strategy of the Second Plan. The shortage of foreign currency created great difficulties. I discussed this question in my Anniversary Address last year. The remedy is in our own hands because in India we can manufacture capital and producer goods increasingly out of our own domestic resources, once the basic industries are established and developed. Therefore the only radical cure of the shortage of foreign currency would be by building up the basic industries as rapidly as possible.

3.6. Foreign aid, especially in the form of long term loans for capital goods and technical personnel, would be of critical importance at the stage of what P.M.S. Blackett has called "assisted take off" in industrialization. Indefinite reliance on foreign loans is neither possible nor desirable. A continuing stream of short-term financial loans from abroad would not be of much help in the long run and may make the position worse. The chief source of capital formation must be domestic savings. Fortunately, the need of raising more resources is admitted and gradually action is being taken in this regard. One notable advance was the acceptance of the principle of an expenditure tax together with a tax on wealth.

3.7. In the highly developed countries of the West, taxes on commodities are usually looked upon as "regressive" as being a burden on the poor. Public enterprizes are also expected to be run on a no-loss-no-profit basis. Fortunately our outlook is changing and it is being realised that in an underdeveloped country like India excise and customs duties, purchase tax on commodities or a levy on services would be convenient and adaptable methods to raise resources. It is also agreed in principle that public enterprizes should earn and contribute increasing returns for purposes of national development.

3.8. It is encouraging that the question of scientific and technical manpower is receiving increasing attention. The subject is being studied at a technical level in the Division of Perspective Planning in the Planning Commission. A Standing Committee of the Cabinet has been set up for manpower; and administrative units have been established in the Central Government and in the States.

Weaknesses in Planning

4.1. The Second Plan, no doubt, has been a great step in advance. It has set productive forces in motion which cannot possibly be reversed without disaster. There are, however, serious gaps and weaknesses.

4.2. Review of industrialization has shown that there is a close connexion between economic development and progress in health and education. In West Europe and America there was simultaneous progress of industries and health, education and science. In Russia, before the first World War, the production of steel had reached 5 million tons but there was little progress in health and education; and there was revolution. In U.S.S.R., China and other socialized countries and also in Japan great emphasis was and is being given to progress in health, education and science *pari passu* with industrialization. India would soon reach the critical level of steel production of 5 million tons but is still backward in health, education and science.

4.3. Before considering these three points in some detail I shall refer to another disturbing aspect of the present situation, namely, the steady increase in unemployment.

Increase in unemployment

5.1. We do not yet have in India any regular reporting of unemployment. Some indications are, however, available from trends in the number of applicants in the Labour Exchange Registers in India. It is disturbing to note that the total number of persons registering in these Exchanges had more than doubled in five years between January 1953 and December 1957. It is also worth noting that the Labour Exchanges can find employment for only a very few; and the average number of applicants for each notified vacancy increased steadily from 23.3 in 1953, year by year, to 33 in 1957. Also, as all notified vacancies were not filled by applicants recommended by the Labour Exchanges, the number of applicants for each effective placement was nearly 40 in 1953 and had steadily increased to nearly 51 in 1957. That is, the Labour Exchanges can find employment for only two persons or less out of every *hundred* applicants, on an average. This is not a criticism of Labour Exchanges but simply an indication of the heavy back-log of unemployment.

5.2. This back-log differs in different occupational categories. The ratio of applicants to effective placements has increased in practically all categories except in "others." The greatest relative increase occurred among those seeking "educational," "clerical" and "unskilled" jobs. In 1957 there was only one effective placement for 36 applicants seeking educational posts; and one for 75 seeking clerical or unskilled jobs. It is clear that the size of the second plan was not big enough to absorb the fresh seekers of employment who joined the labour force through the growth of population. A much bigger plan is essential to get rid of the fear of unemployment.

5.3. In my Anniversary Address last year I gave some information on unemployment and underemployment obtained through the National Sample Survey. I explained the difficulties of measuring underemployment and stated that there was scarcely any doubt that 10 or 12 million persons in India were unemployed or severely underemployed and that this figure might rise to even 25 or 30 million if consideration is extended to those who were sitting idle for more than half of their normal working time. I had drawn attention to the fact that about 10 per cent of educated persons (matriculates and above) were probably unemployed, and that this number was likely to rise. The evidence from Labour Exchanges would seem broadly to corroboate this.

5.4. It is clear that the Second Five Year Plan has not succeeded in absorbing, in sufficiently large numbers, the new seekers of employment. It is also likely that unemployment is continuing to increase among educated persons especially in urban areas. This is a disturbing sign. The only conclusion to be drawn is that the Third Five Year Plan must be much bigger in size than the Second Five Year Plan. It would be remembered that in the Second Five Year Plan it was visualized that net investments should reach Rs. 9900 crores in the Third Plan. Let us round off the figure, and adopt Rs. 10,000 crores as the target for investment in the Third Five Year Plan.

Health

6.1. Health, education and research have indeed a dual role. These are no doubt significant constituents of the level of living and, in this sense, are fruits of national development. On the other hand, advance of health, education and research are of basic importance in bringing about industrial and social progress. I shall first consider health.

6.2. In India at present there are about 70,000 physicians of whom a little less than a half are trained at the University level and about 37,000 are licenciates with four-year training in junior medical schools. The number of doctors in India as a whole is about 176 per million of population or one physician for about 5700 persons on an average. The number however varies widely from one state to another, from over 600 per million (one doctor for 1700 persons) in West Bengal and Delhi to 40 per million (or one for 25,000) in Rajasthan and Manipur. What is, however, much more serious is that most of the doctors reside in urban areas; and the total number of doctors residing in rural areas (with a population of about 330 million) may be below 10,000 that is, only one doctor for 30,000 persons or more on an average. In some rural areas it is known that there is only one qualified doctor for 50,000 or 100,000 persons.

6.3. An important committee on health and medical care (popularly known as the Bhore Committee from the name of its Chairman) stated in the foreword to its report submitted in 1946 that "*no individual should fail to secure adequate medical care because of inability to pay for it.*" This Committee had prepared a long-term programme most of which still remains unimplemented.

6.4. There is no difference of opinion regarding the desirability of providing medical care to all who need it. In India, unfortunately, in some respects we are still at the stage of a somewhat superficial imitation of the most advanced countries of Europe and America. Junior medical schools were abolished after independence on the view that our countrymen cannot be allowed to have anything less than the best. And yet to provide a sufficient number of university trained doctors and adequate hospital and medical services upto the standard of the rich countries of the world is absolutely impossible at present.

6.5. Doctors and drugs are both extremely scarce in India. Doctor's fees and the price of drugs are also high which keep these beyond the reach of most people. The extreme inequality in the distribution of expenditure on medicine and medical services can be appreciated from the relative share of expenditure on these items, shown below for the bottom ten per cent, the lower half, and the top ten per cent of all households.

per cent of households	cumulative percentage of expenditure on: medical services		medicine	
	USA[1] 1950	India[3] 1955	India[2] 1952	India[3] 1955
(1)	(2)	(3)	(4)	(5)
	per cent share of expenditure *			
bottom 10 per cent	5	0.1	1	1
(lower half) 50 „	37	6	9	8
top 10 „	19	64	45	56

1 *USA* 1950: Studies on Consumer Expenditure, 1950, Vol. VIII (University of Pennsylvania).
2 *India* 1952: National Sample Survey: 4th Round; April-September 1952: All-India (Urban).
3 *India* 1955: National Sample Survey: 9th Round; May-November 1955: All-India (Rural).

6.6. The above Table gives some similar figures for urban areas in U.S.A. in 1950. Looking at the first line of the table it is seen that the bottom ten per cent of American households share five per cent of the total expenditure on medical services incurred by all households; the corresponding share of the bottom ten per cent of rural households in India is negligibly small and only about 0.1 per cent. From the second line it is noticed that the lower half of American households share 37 per cent of the total expenditure while the Indian households share only 6 per cent of the total. We may also look at the top. Ten per cent of the households at the top in America take a share of 19 per cent of the total while the corresponding Indian households at the top have 64 per cent or nearly two-thirds of the total expenditure on medical services. The position is almost as bad in the case of medicine. In India the lower half of rural households share only 8 per cent of the total expenditure on drugs, the corresponding figure for urban households being 9 per cent.

* *Note* : The classification is by size of income of households for the USA 1950 data; by size of expenditure of households for the India 1952 data; and by size of expenditure of persons for the India 1955 data. The American and Indian results are therefore not comparable in a completely rigorous way but the broad picture is clear. The expenditure on both medicine and medical services are far more concentrated in India showing that it is only the very few rich who can affod to pay for medicine and medical services. The two series for India 1955 have been, however, classified in the same way; and show that the distribution of expenditure on medical services is relatively more concentrated, that is, medical services are even more scarce than medicine in rural areas of India.

6.7. It may be pointed out, at this stage, that in countries with free and universal health services like U.K. and U.S.S.R. every person, in principle, receives essential medical services and medicine. In both countries, as private medical practice is permitted and drugs can be purchased in the market, some medical expenditure may be incurred by the rich on their own, but there is no discrimination between the rich and the poor so far as the national health services are concerned. In all other advanced countries medical care is available to the poor either free of charge or at a very small cost.

6.8. I should like to make a few suggestions for consideration for the Third Five Year Plan. Firstly. I think it would be wise to reintroduce training extending over, say, 3 years for a junior type of doctor or auxiliary health worker who would be prepared to serve in villages for a modest allowance of say something like Rs. 1,000 per year with permission for private practice within certain limits. The training cost would be possibly one-fourth or one-fifth of that of a fully qualified doctor. The pay or allowance would also be one-fifth or even less of the pay which would have to be given to a university level doctor. The cost of training and maintaining a junior doctor may be thus five times cheaper.

6.9. The organisation of medical teaching at a junior level would also be feasible on a much larger scale than at the university level. There are about 400 district hospitals, which, with some additional facilities, can serve as training centres for junior doctors; and which on an average, may be able to turn out 25 trained persons each per year which would supply 10,000 junior doctors per year after the scheme is in full operation. This would make it possible to have, say, one junior doctor for a group of ten villages in roughly half a million villages in eight or ten years. One fully qualified doctor may be placed in charge about five junior doctors; and should be able to give some attention to the more difficult cases.

6.10. The cost of providing hospital and other health services would also have to be brought down to a level which the country can afford. The cost of construction of buildings can and should be lowered very appreciably firstly by adopting standards and specifications which would be appropriate for a poor country like India; and, secondly, by improving the efficiency of public construction. It is also necessary to develop rapidly the manufacture of drugs and medical goods, and also to establish factories for the manufacture of machinery for this purpose. There is, of course, need of more systematic research for a fuller exploitation of our own natural resources for medical and health purposes.

6.11. Finally, it seems to me it would be very wise to initiate a truly national health service, even if this be in a skeletal form, during the Third plan period. The emphasis in the first instance should be on establishing a large number of small village units which would provide essential medical service to the villages and also serve as family planning centres. This is the only way in which there would be any real chance of promoting birth-control effectively. This is a matter of great importance and urgency.

Education

7.1. India is backward in education generally. In most advanced countries there is practically no illiteracy; and in China also the position is improving rapidly. India is still far off from universal and compulsory primary education.

In India the number of illiterates (including both males and females) was 83.5 per cent of the population according to the Census of 1951. The National Sample Survey indicated that there was only a slight reduction of illiteracy to 82.5 per cent of the population as a whole in 1955. The number of students in primary schools in India was about 60 per 1000 of population in 1956 against 87 in China in 1955, 144 in Japan in 1956, 125 in U.S.S.R., and 154 in U.S.A.

7.2. The position is quite different at the secondary level. India had 23 students per 1000 of population at the secondary level in 1956 which was three times higher than the corresponding figure 7.4 in China in 1955. Also, the Indian figure does not compare too badly with 38 in U.S.S.R. in 1957-58 or 48 in U.S.A. in 1955. The number of students in the university and equivalent levels in India is remarkably high with a rate of 1.8 per 1000 of population which can compare favourably wih 0.5 in China, 1.6 in U.K., or 2.5 in West Germany and 3.5 in France.

7.3. This structural difference in education comes out even more clearly if we adopt the number of primary students as the base for comparison. For every thousand students in the primary stage, India had about 384 at the secondary level in 1956 which was much higher than the corresponding proportion of 84 in China, and also higher than the proportions in France (264), U.S.S.R. (300), and U.S.A. (312). The number of students in the university and equivalent levels per thousand students in the primary levels is also very high in India and was about 30 against 5 or 6 in China, 15 in U.K., 26 in West Germany, 31 in France and 47 in Japan. Only U.S.A. and U.S.S.R. have higher proportions.

7.4. The above comparisons bring out several points. India is weakest at the primary level and is far behind China and all advanced countries of the world. India has a much stronger position at the secondary level on a population basis. If, however, the number of primary students is used as the base for comparison then India has proportionately larger numbers in the secondary schools than most advanced countries of the world including U.S.A. and U.S.S.R. At the university and equivalent levels, also, India has a higher proportion of students than U.K., and has a proportion of the same order as Germany or France on the basis broadly of both population and of the number of students at the primary level.

7.5. It is important to note that higher education in India has been expanding quite rapidly in recent years. The total enrolment at higher levels (from intermediate to post-graduate and equivalent courses) was about 400,000 in 1951 and increased to about 780,000 in 1956-57, that is, the number had almost doubled in six years. It can be further noted that the largest increase had taken place at the intermediate level. On the whole, there was relatively greater expansion in arts, commerce and law compared to science and technology including medicine and veterinaries.

7.6. The outturn of qualified persons in India, at intermediate and higher levels also showed a large increase and, more or less, kept pace with the increase in enrolment. There was, however, a good deal of wastage. On the whole, only about half the candidates who appeared at the examinations at the higher (university and equivalent) levels succeeded in passing these examinations. The proportion of successful candidates was the lowest at the intermediate stage (between 42 and 46 per cent). Large percentages of failure give rise to much frustration and to much waste of time, money and effort.

7.7. Some interesting information can be obtained by examining the number of of students in higher courses in proportion to the number of matriculates. For every 10,000 students who matriculated in 1952, about 6,750 had enrolled for courses at the intermediate level in 1952-53 out of whom about 4,400 succeeded in passing the appropriate examinations at this level in 1954. The enrolment at the degree level was 3,319 in 1954-55, and the number receiving degrees two years later in 1956 was 2,364. The enrolment in post-graduate courses in 1956-57 was 1,552. It may be noted that for every 10,000 candidates who had matriculated in 1952 only 2,920 or less than 30 per cent took up courses in science and technical subjects at the intermediate level ; and less than 12 per cent proceeded with courses in science, technology, agriculture, medicine and veterinary at the degree stage. Finally, only 156 or less than two per cent took post-graduate courses in science and technology. The educational base is poor for a rapid expansion of scientific and technical personnel at higher levels.

7.8. Higher education in India developed to a great extent in a somewhat imitative way on the British pattern. Social and economic conditions are however entirely different in India. Academic ideals which are realisable in the U.K. sometimes necessarily degenerate into superficial imitation and window dressing. Indian colleges often have very large numbers of students who are not adequately prepared for higher education. University and college teachers are poorly paid and are often obliged to do a good deal of part-time outside work. Classes are very big, and library and laboratory facilities are often poor. It is not surprising that conditions of work in the universities are not entirely satisfactory.

7.9. In the advanced countries of the world there are usually good opportunities for productive employment for the students who come out of universities and other higher institutions. In India the position is entirely different. Only a very small proportion receive vocational or professional training. A very large number receive what is called general education which does not make them fit to undertake any particular productive work. As I have already mentioned, unemployment among educated persons in India is increasing. This is creating a great deal of frustration and discontent. The greatest weakness in India is the lack of an organic relation between the system of education and national needs for economic development.

7.10. A radical reform of the educational system is a most urgent next step in planning. It is necessary, to turn out an increasing number of suitably trained personnel to meet the increasing demands of an expanding economy. The first thing in education must therefore be to give appropriate vocational and professional training which would make graduates of higher educational institutions qualified to undertake productive work of one kind or another. This is not in any way incompatible with what is called general culture. In fact, the two can very well go together. Dr. Zakir Hussain in his Patel Memorial Lectures has recently given a most illuminating exposition of this theme.

Planning for Socialism

8.1. At this stage it is desirable to recall that in India socialism has been declared to be the goal of economic policy. It is quite proper not to try to give any rigid definition. And yet it is essential to have some clear understanding in this matter as a guide to action. In U.S.S.R., China and other countries in which socialism of one form or another has been already established, planning is considered to be an essential requirement for economic and social progress; and the aims and objectives of planning are settled in accordance with the principles of socialism in the accepted form. In other words planning in the socialized countries is an instrument of socialism. In India the position is different. Socialism has been accepted as the aim but has not yet been established. It is, therefore, important to examine the relation between planning and socialism.

8.2. Many different ideas have been associated with the concept of socialism in different countries and at different times. I shall select three ideas which have special relevance to our problems. The first is rapid economic development through full utilization of the resources of the country. This was the object for which planning was established in India and should continue to receive full attention. The second idea I should like to mention is removing progressively large disparties in wealth, income, and power; and the third is fostering equality of opportunities of all kinds for all the people of India.

8.3. The distribution of wealth, income and privileges is extremely unequal in India. The number of persons who pay income-tax is of the order of five lakhs or half a million.[1] Multiplying by five, (which is the average number of persons per household) the total number of persons in families paying income-tax would be about 2.5 million out of a population of nearly 400 million or appreciably less than one per cent. The class which has some money and influence in India is thus extremely small and possibly forms not more than one or two per cent of the whole population. Facilities for education being both scarce and expensive, higher education is probably almost a monopoly of this privileged class at the top. Many poor people do not get even the opportunity to learn how to read and write. Many who complete the primary stage cannot join secondary schools; many who complete the secondary stage are unable to go to institutions of higher education on account of poverty. The same process of selection, on the basis of the income of the parents, continues at all levels of higher education Finally it is only the rich people who can send their children abroad for higher training and education.

8.4. Inequalities in medical care result in a larger number of deaths among the poor people. Inequalities in educational opportunities have a deeper and more pervasive effect. It is true that some extremely able students succeed in securing scholarships upto the highest level but their number is very small. By and large, it is the rich people who have the opportunity of giving their children the type of education required for posts of influence and responsibility in the country. By and large, those having such training are selected for posts of responsibility on the strength of their higher educational qualifications. In this way the power and privileges of a small group of people at the top tend to be not only preserved but strengthened. In both public services and organized private enterprizes practically all posts of influence and power are held by persons belonging to the same small privileged class. This has created an influential group of people who naturally desire to maintain their

1 The actual number depends on the level of income at which income-tax becomes chargeable; this level has fluctuated between Rs. 2500 and Rs. 4200 per year in recent years.

privileged position and power. During the British period many of the influential people were not enthusiastic about the political change because they were afraid of losing their own privileges. In the same way it is not surprizing that there are people in India today who are not enthusiastic about a rapid economic progress out of a similar fear of losing their privileges and power. It is necessary to remove barriers to educational opportunities to overcome such difficulties. This is the only way in which a sound foundation can be laid for democracy and socialism in India.

Educational Reform

9.1. The only real remedy is to make education entirely free and also to ensure that no deserving student would be deprived of educational opportunities on account of poverty. It is no doubt necessary and desirable to do this at all levels of education; but it may be too difficult a task to undertake immediately. As a first step, it is suggested, that this reform should be carried through at the university and equivalent levels during the period of the Third Five Year Plan. This would call for several types of action. Firstly, all fees at the university level would have to be abolished by increasing the direct contribution from Government by an equal amount. Secondly, enough financial assistance would have to be provided by Government to enable every deserving student being maintained during the whole period of his study in higher educational institutions. Thirdly, selection for admission to higher education would have to be made entirely on merit. Fourthly, it would be desirable to institute evening classes, correspondence courses, and external examination on a large scale to provide opportunities for higher education to those who are unable to attend the day-classes and also to maintain a policy of open door as a safeguard against rigidities and defects which may develop within a strictly controlled system of admissions. Finally, it would be desirable to initiate a scheme for constructive work for the nation which would be obligatory for one or two years for all students who are admitted to higher educational institutions or who gradaute from such institutions. This is not the occasion to give any detailed scheme but it may be useful briefly to consider some of the implication of the above proposals.

9.2. We have seen that total enrolment in higher education had nearly doubled in six years and was about 780,000 in 1956-57. The direct expenditure on higher education was about Rs. 293 million (Rs. 29.3 crores), out of which about 42 per cent or Rs. 120 million (Rs. 12 crores) came from students' fees[1]. The number of students during the Third Plan period would no doubt be higher. If expansion continued at about the same rate, the number in the middle of the Third Plan period may reach a million and a half. It may not be however necessary or desirable to allow such an increase in future, and we may provisionally accept a target of one million students in higher education in the Third Plan but also keep in mind a million and a half. For one million students, the Government grant in lieu of fees would come to about Rs. 16 crores, and for a million and a half to about Rs. 24 crores per year at current rates and prices.

1 Compared to a fee income of 42 per cent of the total expenditure in India the income from fees at the university level is less than 11 per cent in U.K. and is about 8 per cent in the land-grant institutions many of which are the great State universities of U.S.A.

9.3. As regards financial assistance for maintenance, at the rate of Rs. 300 or Rs. 400 per year per student on an average, the cost would come to Rs. 30 or Rs. 40 crores per year for one million students. I have used average figures because it would be quite reasonable to adopt something like a "means test" so that the amount of the stipend would depend on what assistance the parent would need to maintain the student without any strain. Secondly, stipends of a larger amount may be offered as incentives to attract students to science and technology or other suitable subjects and also to post-graduate courses. The total cost may be of the order of Rs. 50 or Rs. 60 crores per year. If the Third Plan succeeds in raising the national income by five per cent per year (and this is about the lowest safe limit) then the additional income generated would be at least of the order of Rs. 600 crores per year or more out of which there should not be any difficulty in providing the above expenditure[2].

9.4. Selection for admissions on merit is indeed a formidable task, but I venture to think it is not beyond our capacity if we call science to our aid. The objects of the admission test must be clearly defined, and attempts must be made to maintain uniform standards throughout the country. I shall make a few suggestions to serve as a basis for further discussions. It may be desirable to try to assess such aspects of the candidate's qualifications, for example, as (a) his content of knowledge in appropriate subjects, (b) his ability to search and compile relevant information from books and written materials, (c) his capacity to organize his knowledge and convey his ideas in a clear way in a written form, or (d) his skill in manual or technical work or ability to make scientific observations or experiments. These are all amenable to assessment on a more or less objective basis. For example, modern objective tests, in which a candidate has only to indicate his choice between different answers, can be used in testing knowledge in a standardised manner throughout the country. The ability to compile and collect information from given books and materials can also be standardised at different levels of difficulty. The ability to convey in a coherent form his knowledge and ideas can be tested by asking the candidate to prepare written notes on the basis of material given to him or to be collected by him from given books and papers. His power of expression can be tested by the usual type of free essay for which several hours can be allotted. Some kind of practical work or experiments can also be made a part of the examination.

9.5. I should like to mention that, in my opinion, modern statistical methods can be used very effectively to select a required number of questions for any particular paper out of a given "universe of questions" in a random manner and at the same time to maintain assigned levels of difficulty and subject coverage within prescribed limits with objective certainty. This would have two advantanges. It would enable uniform stan-

2 It is appropriate at this stage to point out that the proposals to abolish all fees in higher education and to award maintenance stipends out of government funds would merely involve a redistribution of the national income ; and should not, in principle, cause any additional strain on the economy as a whole. It would be necessary, of course, for Government to raise the required amount through additional taxation or in other ways. But, in principle, the amount which was being spent by the parents of the students would be set free and would be available for either savings or consumption. In other words, there would be no additional call on physical resources.

dards being maintained throughout the country and from year to year. It would also permit almost infinite variations in the content of individual question papers so that copying from an answer book can be made practically impossible. Furthermore, with the help of modern electronic computers it would be possible to mark the objective type of papers very quickly and accurately.

9.6. I may also explain that the test for admission need not be one single examination but may very well be different examinations for different groups of subjects. For each examination it would be, however, necessary to maintain as uniform standards as possible over the whole country. To maintain parity or equivalence of standards between different examinations would be technically a more difficult task. However in principle, it is not absolutely necessary that the quality of the candidates should be the same in all subjects. If there is greater competition in certain subjects it is likely that such subjects would attract candidates of a higher quality on an average. This need not be prevented.

9.7. One great advantage of the proposed system would be that it would be possible to regulate admission to particular subjects in accordance with social needs and opportunities of employment which are likely to be available to the students after graduation. In this way admission to higher education would be geared to future requirements of trained manpower.

9.8. It would be of advantage in many ways to institute evening classes, correspondence courses and external examinations to offer fuller opportunities for higher education. Correspondence courses are being used very extensively in U.S.S.R. apparently with great success; and it would be possible to take advantage of Soviet experience. Arrangements may have to be made for laboratory or other institutional work for prescribed periods or during vaccations. All this would, of course, call for much organizational effort and experimentation which would offer scope for much employment of persons with higher education. A standard system of external examinations (including practical work or tests as necessary) would keep the door open for every one and would be a safeguard against abuses developing within a closed system.

National Service

10.1. If the State undertakes to make education available at its own expense to all deserving then it would be entirely proper to ask the students to undertake productive and constructive work for the country for one or two years. The maintenance stipend would be continued or can be increased in suitable cases during this period. In many countries of the world a period of service in the armed forces is compulsory. In India, instead of conscripted service in the defence forces, we may think of a period of obligatory service in peace camps or in a peace force for constructive work.

10.2. It would be probably convenient to ask the students to put in their prescribed period of service immediately after their graduation. This would supply every year a large number of highly trained persons who would be able to undertake productive work of various kinds. This would be of direct gain to the nation. For example, it would be possible to use a large number of such students to do teaching work at different levels all over the country. The medical graduates can help in bringing medical care to the villages. For the trainee himself it would be a valuable period of apprenticeship training, something like the "internee" work in hospitals by medical graduates, and would be of help in their finding employment suited to their training and aptitudes. The most valuable aspect of the peace camps or peace forces, if I may use this phrase, would be the bringing together of young persons from widely differing types of families in a comradeship of active work for the country This would be an effective way of promoting the spirit of democracy.

10.3. Although I have spoken of students joining the peace camps or the peace force after graduation from higher institution of education it is also possible to have "work schools", as Dr. Zakir Hussain has called them, for students before they come to the University. In U.S.S.R. a new policy has been adopted of asking all students to work for at least two years from the age of 15 before they are admitted to institutions of higher education. Various possibilities are thus open. The really important point is to accept the principle that a prescribed period of service in a peace force for say two years at some stage or other would be an obligatory requirement for all educated persons.

Science and Research

11.1. The importance of science and technology for national development has been recognised in India, in principle, since independence. It cannot be said, however, that progress has been entirely adequate or satisfactory. There is urgent need of improving the teaching of science at all levels. Much improvement is also needed in the organization of research. There is no time to make a comprehensive review, and I shall make some brief observation on some selected aspects of the problem.

11.2. Science is developing so fast that it is becoming increasingly difficult for teaching to keep pace with the advancement of knowledge. J. D. Bernal has recently pointed out that :

"With a rapidly growing civilization, the young will year by year have more to know and also, will be required, by the new demands made on them, to know more......Something must be done to simplify and reduce the amount of learning at every stage.... In the past with some reason, teaching was considered to be the passing on of known and established truths from one generation to the next.... But clearly, in a civilization where the whole basis of knowledge is expected to change several times in a generation, the passing on of established knowledge becomes palpably inadequate and, also, from its ever increasing bulk, impossible. It is lucky if most of what is taught is true, or supposed to be true, at the time it is taught. It is certain that it will no longer be considered true by the time those who are taught are half-way through their lives. What is needed, therefore is a different and lightened content of education. The emphasis will be on discovery rather than knowledge. It will be, not so much the passing on the established truths, as showing the way to criticize and discover new truths; in other words, the active part of the scientific Method."[1]

11.3. Some serious thinking has been going on for some time in the Indian Statistical Institute on organizing an integrated course of science teaching in which emphasis would be given to develop the student's skill in observation, counting,

1 J. D. Bernal : World Without War, 1958, pp. 197-198.

measurement, logical analysis and interpretation of the facts, and the design of new experiments to test the working hypothesis. One single set of observations and experiments may cover different branches of science, which, it is hoped may give an integrated outlook on scientific method. It is no longer possible to have encyclopaedic coverage of knowledge. The only possibility is to try to make an intensive and integrated study which would touch particular aspects of different branches of science. I have no time to elaborate these thoughts but it seems to me that it will be well worth making some experiments in this direction.

11.4. It is essential to spread the teaching of science extensively at the school level without which it will be never possible to secure a sound foundation for advancement of science in India. Sir Alexander Fleck, in his presidential address to the British Association for the Advancement of Science in 1958 mentioned that in U.S.S.R. children from 11 to 17 years devote 46 per cent of their school time to science subjects. I am aware that it is not possible to approach this level immediately in India but we should keep some target in view. Teaching of science, both in schools and universities, deserves serious attention by senior scientists.

11.5. As regards the organization of science in its wider sense, I have on other occasions pointed out that our own National Institute of Sciences is not very active. Our Institute is supposed to have the responsibility of advising Government on scientific matters. In practice there is very little activity of this kind. This I think is partly due to lack of clear ideas regarding what should be the proper function of scientific societies in the changing conditions of the present time; and also, I am sorry to say, partly due to lack of a sense of responsibility on our own part.

11.6. I am a strong advocate of the public sector but this, in my view, does not mean concentrating all activities in government departments. On the contrary, in the scentific field, I think it is essential to build up and maintain truly independent scientific organizations which would be in a position to offer advice and constructive criticisms and suggestions to Government. I have already mentioned that we ourselves have not been sufficiently serious regarding our own responsibilities. But I also think that the time has come for Government to give serious attention to the future structure of scientfic organization and research in India not only within government but for the country as a whole.

11.7. If I may put it in this way, the solution does not lie in officialising all scientific activities but gradually to make the scientific organizations truly functional by transferring to them real responsibilities and entrusting them with fruitful activities. The advancement of science requires proper recognition of scientists in the structure of society as a whole. In this connexion I may remind you that Sir Alexander Fleck has given a quotation from an administrator which went on record that "the place of the expert is not in the saddle but as the assistant and the adviser. The scientist must be on tap, not on top." I can only say that the future of India depends on reversing the dictum of the administrator and recognising that the scientist must be on top and not merely on tap. I have a deep conviction that scientists must supply the leadership in national development. It is necessary that they should take the initiative.

Letters to Editor

Cost of Living in the Soviet Union.

Sir,

I have only just seen Shri Priyada Ranjan Ray's article on Scientific Policy Resolution in your June-July issue of last year. I find that the comparative statement, given by him on page 12 comparing the salaries and commodity prices in the Soviet Union and India, conveys a wrong impression of the position. Neither salaries nor prices of commodities can be compared directly between a socialist country like Soviet Union and a capitalist country like India. This for simple reason that in the Soviet Union a considerable part of the salary is paid in kind. Besides this important factor Dr. Ray has made the position still more difficult by quoting prices of commodities in the Soviet Union seem to be about four times the prevailing prices at present. He does not state where he got his figures from. Leaving this matter aside for the present I want to stress that some of the necessities of life which are essential for cultural advancement of the people are provided in kind, entirely free of charge, and the quality of these services is of the same high order to all people regardless of their income group level. Take for instance education; no matter where born and to whom, every boy and girl receives from the kindergarten to the high university and technical institution, receives education entirely free of cost. Not only no fees are charged but as many as 85 per cent of the students in universities and higher technical institutions receive handsome scholarships which vary from 250 to 850 roubles a month to maintain them at these institutions. The value of the scholarship depends on how well a student does at his studies. Then there is a job waiting for every one at the end of his studies. Since all entrants to institutions of higher learning have to sit for competitive examinations, it may happen, and it does happen, that the son of a highly paid wage earner may fail to get admission while his cook's son may be admitted.

Then again medical aid at its best is provided entirely free of charge and the quality of this service does not depend on the patient's wage. Similarly every worker, manual or intellectual, has to pay no more than 5 per cent of his salary for his housing accommodation, heat, gas water and electricity; and as your readers must have seen that the Soviet Union investing tremendous sums to build houses for the people and they will build 15 million flats during the present Seven-Year Plan. They are planning to provide each worker a separate flat of his own. Equally important, the worker is given about one month's paid holiday with travelling expenses provided. Then again every worker is free to retire himself at the age of 65 and is entitled to a reasonably good pension which in the lower wage scales may be as much as 4|5th of his wage. Taking all these factors into account, it becomes clear that the money wage that an individual gets in the Soviet Union is meant entirely for the provision of food, clothing, personal effects and entertainment.

Dr. Ray's comparative statement to convey a correct picture should have included the relative prices of the commodities and services in both countries. It is just not enough to take into account only the level of prices of the consumer goods. Cost of services must also be considered which may even be more heavy than the cost of consumer goods and it is obviously so from what I have said. I must stress again the free services of education, and education at its best, and medical aid. Those members who have children to bring up will appreciate what I am trying to say.

It should also be remembered that in the Soviet Union wives are also wage earners and in the low income groups wives earn as much or even more than husbands. In the group of utterly unskilled workers, drawing 350 roubles a month, which are very few, the family's income would be certainly somewhere near 700 roubles a month or more.

I am not pleading for large differential in the pay of various types of workers. I am merely trying to say that we should always be objective, and must try to inform ourselves as correctly as possible.

S. S. SOKHEY
Maj.—Gen.

News Roundup

University Grants Commission report 1957-58

The University Grants Commission, in its Second Report, has come to the conclusion that the problem of raising university standards could not be solved by concentrating efforts at the point of post-graduate study and research alone but it was also necessary to assist in the improvement of standards in the affiliated colleges. Therefore, as required by the U.G.C. Act, regulations have now been framed enabling the commission to include affiliated colleges within its purview and a list of colleges under the various universities has been drawn up for this purpose.

The Report makes particular mention of the rapidly increasing demand for technically trained personnel and says that the Commission is assisting Engineering colleges and Departments to increase the number of seats available in them. In most cases the number is being doubled.

The Report says that the Commisson has given considerable thought to the problem of improving the conditions of service of the teachers of the affiliated colleges. It has prepared a scheme by which large funds would be made available by the Commission itself for the revision of scales of pay of teachers in such colleges on the basis of the State Government|University|College concerned sharing 50 per cent of the increased expenditure in the case of men's colleges and 25 per cent in the case of woman's colleges. A number of Universities and State Governments have agreed to work out this scheme.

On the question of salaries of University teachers, the Commission's report discloses that so far 19 universities have implemented the scheme for improving the salaries with financial assistance from the Commission. The Universities of Baroda and Shri Venkateswara have not been able to agree to accept responsibility for 50 per cent of the increase cost involved in this scheme. Six Universities, namely, Agra, Allahabad, Bombay, Jammu and Kashmir, Lucknow and Banaras have already better scales of pay for their teachers.

Three-Year Degree Course

Referring to the three-year degree course, the Commission says that it considers this as part of a total plan to improve school and university education. So far the Universities of Baroda, Karnatak, Kerala, Madras, Osmania and Saugar have started the course. The Universities of Aligarh, Andhra, Annamalai, Mysore, Nagpur, Sardar Vallabhai Vidyapeeth and Shri Venkateswara are expected to implement the scheme in 1958-59 and the Universities of Poona, Rajasthan, SNDT Women's, Utkal and Bikram in 1959-60. The matter is under consideration of other universitities. The scheme, says the report, presupposes the reorganisation of high school education also.

Regulating Number of Students

The report says that the present system of evaluating the work of university students in India is not entirely satisfactory and calls for reform. A Committee of persons with special knowledge and interest in this field has been appointed to make a thorough study of the problems involved and propose remedial action.

The Commission has accepted the the report of the Committee appointed by it to examine the problems connected with question of the medium of instruction. The Committee has suggested that the change from English to an Indian language at the university stage should not be hastened and that it should be preceded by adequate preparatory measures Even after the change, English should continue to be studied by all university students. "It is in our educational interest that English should be retained as a properly studied second language in our universities......," it says.

Difficulties :

The Commission has pointed out some of the difficulties which it had to face in its work. It had given priority to the construction of new buildings in the various Universities but the tempo of construction was slow owing to shortage of steel and cement, and consequently Universities found it difficult to implement their projects with the speed with which they were expected to do. Again, there has been a great deal of difficulty in the matter of scientific equipment and books. Although a considerable amount of scientific apparatus is now manufactured in India, equipment has still to be imported from abroad for higher work, particularly for research. For this purpose, the Universities require import licenses and foreign exchange permits which are not readily available to them. The commission is still negotiating this matter with the Government. While it appreciates the need to conserve the country's foreign exchange resources, it feels that unless the Universities' need for scientific equipment is properly recognised and adequate means found to enable them to obtain equipment quickly, the development of higher scientific education in in the country will be greatly retarded.

In regard to the allocation of funds, the Commission says that it is aware of the fact that the funds likely to be placed at its disposal at any time will be limited by wider national considerations and in accordance with the economic position of the country. However it desires to have the freedom to operate within flexible limits of quinquennial allocation of funds rather than in the rigid limits of an annual budgetary provision. The Commission has also requested the Government to extend encouragement in financial terms so that it could go all out to meet multifarious needs of Universities. This could be done by placing at the Commission's disposal any additional funds that may become available from savings elsewhere.

Measures for Rapid Expansion of Women's Education in India

The National Committee on Women's Education appointed in May, 1958, has recently submitted its Report to the Government of India. It has made far-reaching recommendations to make up the lee-way in the girls' education.

Among the recommendations which need top priority and immediate consideration by the Government, the Committee has suggested the followings :—

(1) The education of women should be regarded as a major special problem in Education for a good many years to come and a bold and determined effort should be made to face its difficulties and magnitudes and to close the existing gap between the education of men and women in as short a time as possible.

(2) The highest priority should be given to scheme prepared from this point of view and the funds required for the purpose should be considered to be the first charge on the sums set aside for the development of education.

(3) Adequate steps should be taken, without any delay, to create a special machinery to deal with the problem of the education of girls and women and to assign adequate special fund for the purpose.

(4) Steps should be taken to constitute as early as possible, a National Council for the Education of Girls and women.

(5) The problems of the education of women is so vital and of such great national significance that it is absolutely necessary for the Centre to assume responsibility for its rapid development. This responsibility will be shown in three ways :

(a) It would be a responsibility of the Centre to see that a parity between the education of boys and girls is reached as early as possible and also to see that the education of women is developed equally in all parts of the country; (b) the Centre will prescribe targets to be attained and also guide the States in preparing comprehensive development plans for the education of girls and women in their areas; and (c) The Centre will assist the States financially in implementing the approved plans.

An amount of not less than 10 crores in addition to provisions that already exist should be yearmarked for the education of women during the remaining period of the Second Plan.

During the Third Five Year Plan, there should be a special programme for the development of the education of women which is not covered by any of the general programmes and that a sum of not less than Rs. 100 crores should be allocated for it.

The Planning Commission should set up a permanent machinery to estimate, as accurately as possible, the women-power requirements of the Plans from time to time and make the results of its studies available to the Government and the public.

Reorganisation of Technical Education

The All India Council for Technical Education had framed courses in Civil, Mechanical, Electrical, Mining and, Chemical Engineering; Metallurgy; Textile Technology; Architecture; Commerce; Applied Art; Management Studies, and Printing Technology. The courses had been framed primarily as a model for the organisation and improvement of technical education in the country. They were serving that purpose in a very useful manner in respect of courses conducted both at polytechnics and at University institutions.

All State Government had recognised the National Diploma in Engineering awarded by the All India Council for Technical Education as equivalent to a university degree for purposes of appointment to superior posts and services. The National Certificate was recognised for subordinate posts and services.

Promotion of Technical Education in India—Assistance from the U.S.S.R.

An agreement to further develop economic co-operation between India and the U.S.S.R. was signed recently in Moscow.

The agreement provides for the supply of equipment, free of charge as a gift to India from the Soviet Union, amounting to a sum of Rs. 36 lakhs for the laboratories of physics, electrical engineering, radio engineering and television, electronic devices, geodesy and central scientific and technological research at the Indian Institute of Technology, Bombay. The Institute, the second in the chain of the four higher technological institutions being established by the Central Government, has already been receiving considerable assistance in the shape of equipment and professors through UNESCO from out of the Soviet contributions to the U.N.O. Fund.

The agreement also provides for the training of 50 Indian engineers in the U.S.S.R. for a period of two to three years with the object of strengthening the teaching staff in the various technical institutions in the country. The entire cost of training which will commence in 1959 will be borne by the Soviet Government. A large number of the trainees will be drawn from among young bright graduates of Indian Universities, who on completion of their training in the U.S.S.R. will work as teachers in the the technological institutions. A number of Soviet professors and teachers will also be deputed to India to work on the teaching staff of the Indian institutions. It is expected that this measure will greatly help in releiving the shortage of highly qualified technical teachers in the country.

The agreement further contemplates publication in India of selected Russian text books in engineering. The Government of the U.S.S.R. has undertaken to make available to India translation into English of such text books as may be selected for the purpose.

Cheap solar device may solve need for more fresh water

In many areas of the world the need for fresh water is acute and so the search for cheap production of fresh water from salt or brackish sources has continued.

The U. S. Department of the Interior (USDI) is close, it is believed, to a solution. It is completing at Daytona Beach, Florida, a solar-distillation unit designed to operate as inexpensively as possible.

The Daytona Beach plant consists essentially of a smooth, shallow depression that receives sea water at one end, takes fresh water from parallel canals and drains water with increased salinety from the other end. The earth floor is covered with a black asphalt lining a quarter-inch thick, considerably like the linings already in use on small feeder irrigation canals used in the projects for watering the drier areas of the U.S. West.

The experimental unit is designed to

take off as fresh water about half the sea water stream that moves through the plant. The remainder, carrying twice as much salt and other waste materials when it was pumped in, returns to the sea.

Dr. George O.G.Lof, consultant to USDI's saline water division in planning the new plant, believes that the materials needed for the installation will not cost more that $ 1 a square foot and should produce about a pound of water per square foot daily.

Latest vanguard satellite to aid weather mapping of globe

The primary objective of the latest Vanguard experimental satellite launched from Cape Canaveral, Florida, is to measure the distribution and movement of clouds over the daylight portion of the earth. The experiment represents step to obtain continuous weather mapping of global scope.

The satellite's 24--hour sweep should reveal cloud cover data over about 25 percent of the earth's sunlit surface in 600-mile wide strips.

The Vanguard satellite, 20 inches in diameter and weighing 21.5 pounds, contains two photocells mounted behind circular, gridded windows on opposite sides of the sphere. As the photocells sweep the sunlit side of the earth, they measure sunlight intensities.

The satellite's photocells scan the sunlit side of the earth during 50 minutes of its orbital period and transmit the data to a Minitrack station in 60-second bursts. The data telemetered to the ground are then erased from the tape, and the system is reset to begin recording again.

U.K. Expenditure on scientific research to be doubled

Expenditure on research by the United Kingdom Government will be nearly doubled in the next five years, it is announced in London. Under its second five-year plan, for the period 1959-64, approximately £ 61,000,000 will be made available to the Department of Scientific and Industrial Research (DSIR), compared with £ 36,000,000 for the first five-year period, which ends on March 31, 1959.

Expansion will continue steadily throughout the period, and for the year 1963-64 expenditure is planned to reach about £ 14,000,000.

The largest expansion is planned in the field of scientific grants to the universities. Post graduate awards to students will be increased by about 10 per cent. each year, until in 1963-64 it is hoped some 3,800 students will be receiving DSIR grants for research training. In the same year it is expected that DSIR support for special research in the research departments of universities will be operating on a scale of about £ 1,750,000.

Grants to the research associations will also be increased to over £ 2,000,000 per annum by the end of the period. At present there are 49 organizations in the DSIR scheme. The Council for Scientific and Industrial Research will continue its policy of encouraging industry to bear an increasing proportion of the total cost.

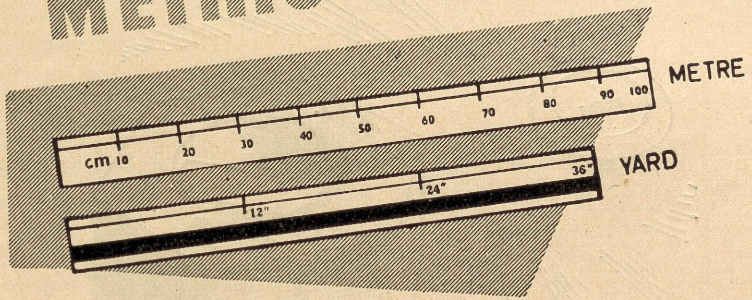
INSTITUTION OF CHEMISTS (INDIA)

Associateship examination, 1959

The Ninth Associateship Examination of the Institution of Chemists (India) will be held in November, 1959. The last date for Registration is 31st March, 1959. The Examination in Group A (Analytical Chemistry) is divided into the following ten Sections and each candidate will be examined in two of them according to his choice as approved by the Council, in addition to the General Chemistry including Organic, Inorganic, Physical and Applied Analytical Chemistry—(1) Analysis of Minerals, Silicates, Ores and Alloys; (2) Analysis of Drugs and Pharmaceuticals; (3) Analysis of Foods; (4) Analysis of Water and Sewage; (5) Biochemical Analysis; (6) Analysis of Oils, Fats and Soaps; (7) Fuel and Gas Analysis; (8) Analysis of Soils and Fertilisers; (9) Analysis connected with Forensic Chemistry; and (10) Analysis connected with Leather Chemistry. The Examination is recognised by the Government of India as equivalent to M.Sc. for purposes of chemists.

Further enquiries may be made to the Honorary Secretaries, Institution of Chemists (India), Chemical Department, Medical College, Calcutta-12.

WHAT IS THE METRIC SYSTEM ?



The Metric System derives its name from the Metre, which is the primary unit for measuring length. In this system, as in all decimal systems, the basis of calculation is 10. We multiply or divide any unit of length, weight or volume by the same number i.e. 10.

In the Metric System, the multiples of a unit have the prefix *Deca* (10 times), *Hecto* ($10 \times 10 = 100$ times) and *Kilo* ($10 \times 10 \times 10 = 1{,}000$ times). The sub-units have the prefix *Deci* (1/10) *Centi* (1/100) and *Milli* (1/1,000).

THE CHANGE-OVER TO THE METRIC SYSTEM OF WEIGHTS AND MEASURES BEGINS FROM OCTOBER, 1958

KNOW THE METRIC LENGTHS

The primary unit of length is

THE METRE

=40 inches approx.
1 kilometre = 5 furlongs

SUB-UNITS

10 millimetres = 1 centimetre
10 centimetres = 1 decimetre
10 decimetres = 1 metre

MULTIPLES

10 metres = 1 decametre
10 decametres = 1 hectometre
10 hectometres = 1 kilometre

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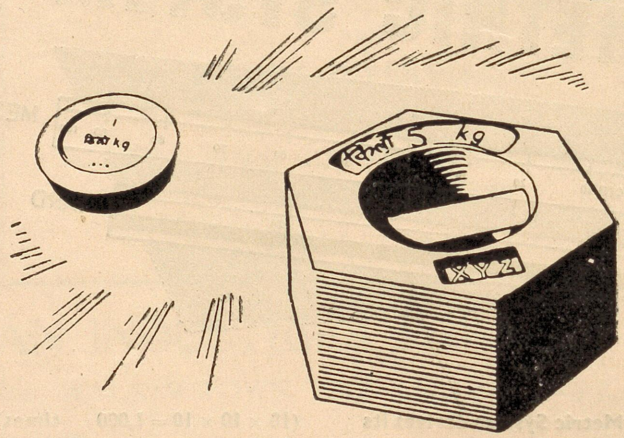
ISSUED BY THE GOVERNMENT OF INDIA

First Phase



The first phase of the change-over to the Metric System of Weights and Measures began on October 1, 1958. The use of Metric weights has become legal in selected areas of the States.

The Metric System has been introduced also in Government departments and industries like cotton textile, iron and steel, engineering, heavy chemicals, paper, cement and jute.

The reform will be gradually extended till the whole country is covered.

METRIC SYSTEM

for simplicity and uniformity

KNOW THE METRIC EQUIVALENTS OF THE PRESENT WEIGHTS

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journal of the association of scientific workers of India

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FEBRUARY & MARCH '59

No. 2 & 3

VIJNAN KARMEE

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(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

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.

The Scientific Policy and the Scientist

Pursuit of science has conferred immense benefit on mankind and has endowed man with enormous power to do himself good or evil as he pleases. The impact of science on man's life has been most tremendous during the last half a century or so, and as a consequence science as a means to an end, is evincing interest in more and more people. It is no longer the special reserve for the secluded savant; the economist and the politician, the industrialist and the agriculturist, nay, even the votaries of so-called fine arts are looking forward to science for furthering their respective ends.

It is, therefore, natural that the Indian Government in their efforts towards building up a prosperous India should employ science as best as they could; the adoption of the Scientific Policy Resolution by the Indian Parliament is a recognition of that fact. How far the Govt. would succeed in the implementation of this Policy is a matter of secondary importance, once the principle has been given a public and legal recognition. Because sooner or later, the Policy will have to be executed in practice, inspite of the bureaucratic set-up in the administration and the Government.

The question then arises as to what is the status of science in India at present. Can it deliver the goods? Can it live upto the hopes of the legislators who have passed the Scientific Policy Resolution? Whoever has got a first hand knowledge of the scientific institutions in India is impressed most by their size, equipment and meagre contribution to the field of science and technology! The shortage of scientific and technical man-power is a well-known fact and many of the first plan targets could not be attained admittedly due to this shortage. Had this been a simple quantitative shortage, it could have been easily filled up by expanding the existing educational institutions, or by establishing new institutions. But our experience leads us to believe that the shortage is also a qualitative one. One of our leading scientists, after his return from a tour of the USSR and other European countries, in a recent article in the Vijnan Karmee, has pointed out that the top scientists in the USSR are paid as much by way of remuneration as the top Indian Scientists. Yet, we see what their top scientists are giving to the nation, nay, to the world in the field of science and technology and in comparison, what our scientists are contributing in the field of science. What could be the reason for this dismal state of affairs? Is it due to mal-administration? Or due to lack of coordination, lack of funds or lack of talents? May be there are several reasons working together, but to us the most potent reason seems to be more a psychological one than anything else. Workers in our country whether scientific, technical or otherwise, work more by compulsion than by any inner urge for work. They do not feel enthusiastic about work, at least not as a rule. They work only when they have a direct personal benefit accruing from the work and even then they would give their minimum. The same spirit is more or less working among the scientific and technical workers, no matter what they get by way of remuneration. A man can work willingly or with pleasure only when he works for the good of community, a collective good of which he is also a partaker. But our people are imbued with an individualistic outlook, a "devil-may-take-the-hindmost" mentality which has resulted in an indecent scramble for personal gains, a feverish haste on the part of some to put up a front,—a show; on the part of others, despondency and loss of interest. Those who can put up the best show derives the most benefit, whether there is any substance or not behind the show. The spirit of salesmanship has pervaded the world. It is not merit, but salesmanship, that decides the value, social or otherwise of any commodity or quality. Formerly, commodity could have a good market if proved good in use by a discerning public. Now it is difficult for an average busy man to pause and think about an issue; the advertisement decides the issue for him. This spirit of salesmanship has also entered the domain of science. In olden days, there certainly were groups and cliques in the world of science. Yet the scientists, did not throw overboard the basic principles of science. The old-day scientists had their bias but they had also retained their faculty of scientific reasoning. But nowhere else in the world today or yesterday, has the spirit of showmanship or salesmanship done so much damage to the cause of science as in India.

This salesmanship is killing the scientific spirit in India. It is killing the initiative of talented young workers, discrediting Indian scientists in the eyes of the world. It is needless to speculate on what the foreign scientists think about our scientific achievements. An unbiased self-analysis would clearly reveal our short-comings. So, inspite of good intentions on the part of the legislators and administrators, can Indian science under present conditions fruitfully contribute towards economic, social and cultural upliftment of the country? Can India prosper in this world of heart-breaking competition, if science does not give out its best? The answer to these questions would undoubtedly be in the negative, unless science in India is taught and practiced in a progressive manner. Regarding teaching of science, the Govt. is doing quite a bit, in setting up new institutions, expanding the old ones and changing, enlarging and remodelling the curricula. Of course, individual scientists are contributing towards these labours but yet the present trend in Indian Science is a retrograde one due to the lack of a sense of collective responsibility among the scientific and technical workers, who are supposed to build up the edifice of country's prosperity.

What then is the remedy so that Indian science can be harnessed to further India's progress at a faster rate, enlarge the field of scientific knowledge for the common good of mankind, and generally enhance India's prestige in Scientific World. Apart from what is already being done by the Govt. at their level, as remedies, we may suggest certain self-imposed ones, which are not achievable through rules, regulations or legislations. These remedies should have to be part of a scientific discipline to which all scientific workers from top to bottom have to be re-initiated. The aim of this discipline should be to inculcate among the scientific workers from the very beginning the sense of social responsibility—the collective responsibility of science to mankind, and the true spirit of science—the capacity to see things without bias.

This self-imposed discipline should consist in—

(i) dissociating all selfish motives from matters scientific; (science is universal, scientific truth is universal truth, inspite of personal gains and losses);

(ii) eliminating the hierachical outlook in science; (scientific inspiration is not confined to the older or elder scientists alone, rather it is more frequently seen where administrative burden does not weigh too heavily);

(iii) giving due credit to all workers, especially the young and in-experienced ones who need encouragement; (scientific workers are not mere beasts of burden and nobody has any right to treat them so);

(iv) judging worth of scientific workers on merit of their work, unbiased by advertisement, recommendations or personalities; (scientific merit can neither be created nor can be destroyed by propaganda, recommendations, or personal likes and dislikes);

(v) doing research work for the common good, and not for individual or restricted benefit; (neither mere publication of papers nor more doctorates alone can give India economic prosperity or raise India's prestige in the scientific world); and

(vi) encouraging self-criticism within the ranks and files of scientific workers. (Periodic introspection is good to check hierachical tendencies, groupism and other malpractices. Criticism without fear or fortune in periodic open forums in institutions can go a long way in developing healthy tradition in science).

In the end, we may be permitted to reproduce and commend to all the "Scientists' Oath" proposed by Dr. Gene Weltfish of Deptt. of Anthropology, Columbia University similar to the Hippocratic Oath of the Medical Graduates as far back as in Sept. 1945, which is self-explanatory :—

"I pledge that I will use my knowledge for the good of humanity and against destructive forces of the world and the ruthless intent of men; and that I will work together with my fellow scientists of whatever nation, creed or colour for these our common ends".

This oath was proposed no doubt, with the Second World War as the immediate background, but the spirit of dedication that it conveys is what is required in scientists then, now and always, and never before in such a high degree in our country's history as it is now.

Glowing Electron

By

D. Kelendjeridze

A Nobel Prize was awarded not so long ago to three Soviet scientists—Professor Pavel Cherenkov, Academician Igor Tamm and Professor Ilya Frank, Corresponding Member of the USSR Academy of Sciences,—for the theoretical substantiation and interpretation of a phenomenon known as Cherenkov Radiation. Here is an article on this important discovery.

Light! How usual a thing it is in our everyday life. During the day the Sun pours light generously on our planet. Diffused by the Earth's atmosphere, the light makes our skies blue. At night we turn on electricity, and the light from man-made sources—glow-lamps or daylight lamps—floods our rooms and the streets of our cities. Light can be multicoloured, visible or invisible. But for all the commonness and variety of light phenomena, the physical nature of light is extremely complicated. The mystery of white light was unravelled by scientists but a few centuries ago. The white light of the sun-ray turned out to be heterogeneous and capable of being broken up by a simple glass prism into its components—attractive coloured bands like those of a rainbow.

The science of light has recently passed through a stage of rapid development. The world's best laboratories of to-day are equipped with instruments which are by far superior in sensitivity to so perfect an organ as the human eye.

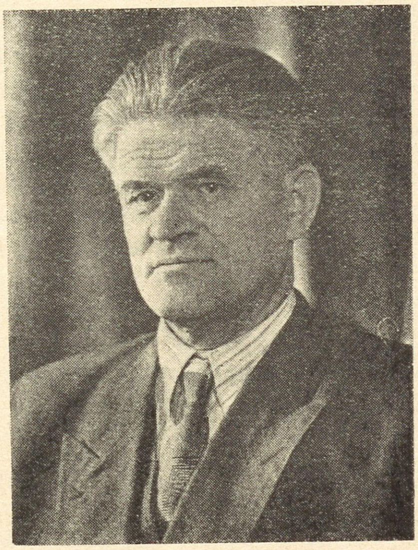
Things were different, however, comparatively recently......

In 1932, a group of research scientists studied the light phenomenon known as luminescence under the direction of the late S. I. Vavilov, the then President of the USSR Academy of Sciences, at the Physics Institute in Leningrad. Pavel Cherenkov, then a postgraduate student, was one of the younger members of that group.

Luminescence has since firmly entered our life. It is present on our television screens, in our daylight lamps, advertisement lights etc. And yet, there was a time when scientists had to make countless experiments in blacked-out laboratories to find out what laws governed this phenomenon. For want of instruments which are available to-day, they had to spend hours on end to adapt their eyes to complete darkness in order to be able to see the most feeble flashes of light during experiments.

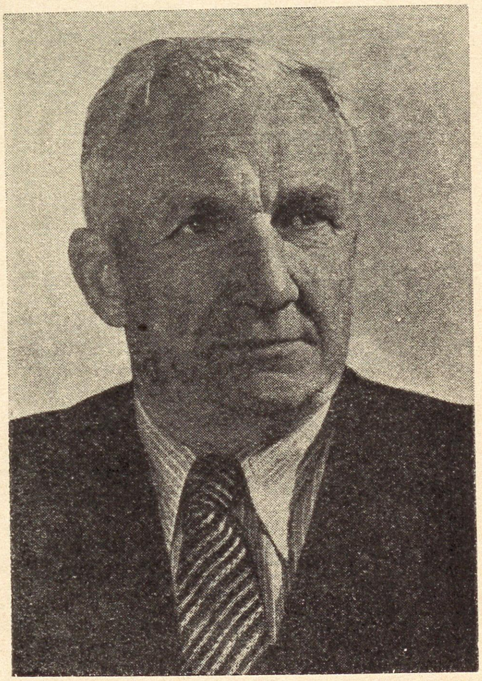
Pavel Cherenkov was investigating the luminescence of uranyl salts dissolved in other liquids. This luminescence was caused by invisible gamma-rays emanating from radium. He had to establish the dependence of the brightness of luminescence on the concentration of salts.

Cherenkov faced the problem that plagues any experimenter: how was the result of the experiment affected by the medium in which it was conducted? Perhaps, it was the glass that glowed, or the water was not quite pure? So, Cherenkov first diluted the salt concentration and then replaced it by pure water. The effect was quite unexpected: water,



Professor Pavel Cherenkov

Prof. Ilya Frank



Prof. Igor Tamm

pure water, continued to glow just as the dilute salt solution did. What was the matter? All kinds of bold thoughts raced through the researcher's mind. But the final conclusion had to be made quietly, wisely and prudently. For that was but a feeble glow seen by a tired eye.

When the ordinary water was replaced by a distilled liquid, the effect remained unchanged. That meant that admixtures had nothing to do with it. (That was an essential thing for pure liquids are known to glow sometimes due to dilute admixtures under the influence of invisible ultra-violet rays or X-rays).

May be it was the glass that had dissolved in the water, if very little? To solve that problem, Cherenkov took a platinum crucible instead of the glass vessel. Pure liquids: water, alcohol, toluene, sulphuric acid all continued to glow. But that was not the end of it. But that was not the end of it. It had to be proved that the glowing had nothing to do with luminescence. With a brilliant vision of an experimenter, Cherenkov added potassium iodide, silver nitrate and other quenching agents to the liquid. Yet, the luminescence remained unchanged.

Incessant experimentation for two years proved very fruitful. It transpired that the luminescence was caused not by gamma-rays themselves, but by the electrons they formed in the liquid. Further experiments were conducted directly with the sources of electrons. It was established that radiation did not spread symmetrically in every direction from the source of radiation as we were accustomed to see happening in our everyday life. Light spreads at a sharp angle to the directon of the motion of electrons just the way the beam of car lights does at night.

S. I. Vavilov hazarded a suggestion that electrons are slowed down colliding with atoms, that they lose some of their energy of motion. But the energy does not vanish but passes into the energy of light radiation which has been observed in experiments. Yet, more elaborate experiments have disproved that hypothesis of bremsstrahlung radiation. This led to the discovery recorded in the Transactions of the USSR Academy of Sciences in 1934 as follows:

"We are arriving at the fundamental conclusion that the glow which has been observed to occur in pure liquids during the passage of fast electrons cannot, in view of its unusual properties, belong to any of the earlier known kinds of luminescence."

The phenomenon discovered by Cherenkov looked extremely mysterious for many years. There was something enigmatic about the problem as it stood. Was the new phenomenon to be explained in terms of the old notions and old theoretical postulates or by evolving new theoretical aspects and introducing new hypotheses in the form of mathematical equations.

It was in 1937 that the mysterious glow of a liquid under the influence of the electrons moving through it, which came to be known as Cherenkov Radiation, was explained by the combined efforts of three Soviet scientists: P. Cherenkov, I. Tamm and I. Frank.

Every detail of this phenomenon was explained in terms of classic electrodynamics. Under the theory of relativity there can be velocity greater than the velocity of light in empty space which is equal to 300 km|sec. The speed of light in matter is a different thing. In water, for instance, light travels at a speed of a "mere" 220 km|sec. and in glass—still more slowly—200km|sec.

Now, the velocity of the motion of an electron in a medium exceeds the velocity of light in that medium and, in consequence, the electron itself begins to emit light from each point of its travel and always at a definite sharp angle to the direction of its motion.

The glow of liquids during the passage of other elementary particles through them—mesons and protons—has been observed by scientists to be in full accord with the theory explaining Cherenkov Radiation.

Cherenkov's discovery has made it possible to devise sensitive instruments to register the motion of elementary particles. Such instruments are being used for extremely accurate measurements of the energies of such particles which is of great importance for the study of nuclear reactions. Such counters are used for cosmic ray recording from Soviet artificial Earth satellites.

The theoretical substantiation of Cherenkov Radiation proved of great importance not only for those branches of physics which study light phenomena. It is common knowledge that light visible to the eye is a combination of electromagnetic waves of definite oscillation frequency. The laboratory research on Cherenkov Radiation has provided an opportunity for using this principle to generate millimetre radiowaves which are of great importance in television, radiolocation and in the allied fields.

The greatest prospect in this sense is provided by the theory of the late Academician Mandelstam. This theory boils down to the following : electromagnetic waves are well propagated through special metal tubes called wave guides. By placing walls with holes in them inside the wave guides, the speed of propagation of electromagnetic waves can be drastically reduced which is entirely in accord with the conditions of the passage of light through any substance. Imagine that a beam of very fast electrons is passed through such a wave guide. Since there will thus be a complete analogy with the motion of electrons through a medium, conditions will be presented for Cherenkov Radiation in the form of millimetre radiowaves. And the generation of millimetre radiowaves is of extremely great importance for the development of television, interplanetary radio contacts and radiolocation. This possibility of generating radio-waves has been proved by the investigations of Soviet as well as foreign scientists. It is safe to hope that this new trend in the development of the Cherenkov Radiation theory will be placed at man's service as soon as certain technical difficulties have been overcome.

Central Executive Committee (1959) Meets

The new Executive Committee met on 25 January in Room No. 16, Law Faculty, University, Delhi with Professor P. C. Mahalanobis, President, in the chair to discuss the steps to be taken on the resolutions adopted at the Annual Meeting and to prepare the programme of action for the current year.

2. The following were present :

Prof. P. C. Mahalanobis, Dr. S. H. Zaheer, Dr. B. Mukherji, Maj. Gen. S. S. Sokhey, Dr. B. C. Guha, Mr. A. Rahman, Mr. Baldev Singh, Mr. D. V. Varma, Mr. J. N. Misra, Dr. D. K. Roy, Dr. V. C. Vohra, Dr. Rais Ahmed and others.

3. The President initiating the discussion characterised the social situation in India as one of extreme formalism which even the scientists and scientific institutions have not been able to escape. There were many organizations and many committees which continually passed resolutions or called upon Government to take this action or that. There was no attempt to make a patient study of the facts of the situation or to work out programmes of action at a concrete level. The association of scientific workers could either fall in line with the general pattern of formalism or adopt a realistic approach to the solution of basic problems. If the Association decides to take its stand on reality then it must change its mode of action. It must give up passing resolutions advising what other organizations or Government should do. It must give serious thought to what the Association can itself do, formulate its own pogramme of work, make detailed studies of concrete problems in a scientific spirit, and where necessary sumbit specific proposals to other organizations or Government.

4. After a full discussion the CEC accepted this analysis and method of action. It was decided that the resolutions passed at the General Meeting should be carefully examined in accordance with this policy and broadly divided into two categories :

(A) Items in which specific action could be taken by the CEC in accordance with the general directives of the Annual Meeting with suitable modifications in the form or language of the resolution ; and

(B) Items which required further study and which would be referred back to appropriate bodies for such study.

5. The different resolutions were then discussed in detail and the following revised programme of work was drawn up ; and it was decided that this programme of work would be circulated among all members of the Association for their general approval and further comments and suggestions.

Resolution No. 1 : It was agreed that members of the ASWI be invited to prepare working papers for consideration at group meetings or by the Planning Commission or Government.

The President suggested the following procedure. Any member of the Association (or any scientific worker) having thought of any subject or proposal for the consideration of the Planning Commission would get in touch with, at least, two other members and through group discussions or correspondence among three or more members get ready a draft paper giving it a concrete form a scheme or proposals for further discussion. Once such a working paper was ready, it could be circulated among a wider group interested in the subject for comments and suggestions. Also, the President was confident, it would be possible, if necessary, to arrange a small meeting at a convenient place of 5 or 6 or more members or other scientific workers to consider the matter thoroughly and prepare a revised working paper which would then receive serious consideration by appropriate organizations or Government agencies including the Planning Commission. He mentioned that the Council of the National Institute of Science had approved, in principle of this procedure; and he thought the NISI might be willing in suitable cases to convene the group meeting. The President thought other ways could also be found to arrange such meetings once really serious and competent working papers were available. He would help in this matter in every way and would be glad if working papers were sent to him.

Resolution Nos. 2, 5, 7, 8, 19, 20, 21 : The ASWI stresses the importance of devising appropriate methods of implementation of the Government of India Resolution on Scientific Policy announced in March 1958 and the urgent need of formulating appropriate schemes for scientific grades and services in Government agencies, universities and other scientific institutions including methods of recruitment, appraisal of personnel and departmental promotions, migration from one agency to another, age of retirement, and consolidated funds for leave, pension, provident fund and other benefits and also arrangements for efficient administration of scientific and technical personnel. It was agreed that these subjects call for serious and sustained consideration by the members of the Association with a view to evolving agreed schemes and proposals. The Standing Committee which was set up at the Annual Meeting consisting of Shri Baldev Singh (Convenor), Major General S. S. Sokhey, Shri A. Rahman, Dr. M. S. Iyenger and Dr. Rais Ahmed should be requested to take suitable action.

Resolution No. 3 : The ASWI is of the view that experience and technical knowledge gained in industrial projects in the public sector should be made available for the country as a whole, and agreements with foreign firms should be made keeping the above principle in view. Specific cases in which there was any departure from the above policy should be examined and, where necessary, suitable action should be taken by a standing committee consisting of Major General S. S. Sokhey (Convenor), Dr. S. Husain Zaheer, Dr. D. S. Kothari, Dr. B. Mukherji, Dr. V. C. Vohra and the President, with powers to coopt other members.

Resolution No. 4 : The ASWI is of the view that fullest advantage should be taken of technical knowledge and experience available within the country and experts should be brought from abroad only when their services were really essential. Specific cases of deviation from the above policy should be examined and, if necessary, suitable action should be taken by the CEC.

Resolution No. 6 : The ASWI, recognising the universal character of science, stresses the need of removing restrictions on the free communication of results of scientific research and of promoting international collaboration in the field of science and technology,. Cases of restrictive practices should be examined and, where necessary, suitable action should be taken by the CEC.

Resolution No. 12 : The ASWI is of the view that no scientific worker should be dismissed by any employer without assigning reasons for such action, and that Service Rules should be changed where necessary for this purpose.

6. It was agreed that the following resolutions should be forwarded to appropriate authorities :—

Resolution No. 9 : to the Pay Commission requesting that the report should be submitted as early as possible and that particular attention should be given to the needs of the scientific workers keeping the Scientific Policy of Government in view.

Resolution No. 10 : to the Ministry of Labour requesting that single-fare for double-journey railway concession rates should be made available for bona-fide trade union workers attending their annual meetings.

Resolution No. 11 : to the Council of Scientific and Industrial Research requesting that an Advisory Committee should be appointed consisting of independent scientists to advise the Vice-President in cases of dismissal where victimisation is alleged by the scientific worker concerned.

Resolution No. 13 : to the Government of India requesting that Government servants should be permitted to avail themselves of the leave travel concessions during regular leave to any place their interest in India.

Resolution No. 14 : to the Council of Scientific and Industrial Research requesting that suitable residential accommodation be provided for the staff working at the Central Leather Research Institute.

Resoution No. 17 : to the Ministry of Defence drawing attention to the hardship caused by a break due to ETE service and requesting condonation of the break.

Resolution No. 18 : to the Government of India pointing out the need of giving protection under article 311 of the constitution of India to civilians paid from Defence Estimates.

Resolution No. 19 : to the Government of India requesting that the definition of "family" should be modified so as to reserve the present anomalies in the elegibility to family benefits.

7. The following resolutions were referred back for further study :—

Resolution No. 15 : regarding departmental promotions in the Central Leather Research Institute, Madras.

Resolution No. 16 : regarding the forwarding of application for posts outside the office of the Surveyor-General of India.

8. *CEC Meetings* : The following tentative dates and places were decided.

March—April (Calcutta) ; August (Hyderabad) ; November (Delhi) ; January (Bombay).

9. *Vijnan Karmee* : The President was requested to write an editorial explaining the new approach and Messrs. Baldev Singh and A. Rahman to contribute an explanatory article in the Vijnan Karmee.

The Editor would meet the President to discuss arrangements for printing and related matters.

10. *Government Grant* : The two secretaries would prepare the case in consultation with the President and approach the Government of India for increased help.

11. *Membership Drive* : The new approach would be widely circulated and should serve to increase the membership.

The two Secretaries would draw up plans for tours to cover the Institutions not yet visited.

12. *CSIR Workers Convention* : Hyderabad branch to continue the efforts to call the convention.

13. *Typewriter* : A new typewriter to be purchased from funds of the Regional Centre.

14. *Regional Centre* : The new committee would be constituted as follows :

Professor P. C. Mahalanobis, Shri M. R. Raman, Dr. D. K. Roy, Shri Baldev Singh and Dr. S. Husain Zaheer, as the representative of the World Federation and Director of the Centre.

It would draw up the budget and proposals. Effort to organize an Asian Scientific Workers Conference is to be continued.

Annual Report of the General Secretaries, 1958

Membership

During this year renewed efforts were made to increase the membership of the Association. Two new branches have been established, one at the Central Food Technological Research Institute, Mysore with 100 and at the Central Fuel Research Institute, Jealgora with 52 members. A new unit at the Central Leather Research Institute, Madras has also been established. The membership at CSIR Headquarters Unit at Delhi has increased considerably. Two more full fledged association viz., the Surveyors Association at Dehra Dun and the Southern Railway Chemists and Metallurgists Association, Madras have been affiliated to the ASWI. Negotiations for establishing branches|units at the Central Tobacco Research Institute, Rajamundri, Central Road Research Institute, Delhi and Hydraulic Research Station, Bhadrabad, U.P. and for affiliating the Indian Railway Scientific Staff Association, Jamalpur and the Scientific Staff Association of the National Physical Laboratory, Delhi are progressing. Scientific Workers at PWD Research Institute, Lucknow are being accorded organizational assistance. The total membership of the Association is now about 2000 out of which about 500 are newly enrolled during the year under review.

Grants to the Association

During 1958, the Association received a grant of Rs. 5000.00 from the Government of India in two equal instalments and Rs. 500.00 from the National Institute of Sciences of India. Application for grant to the Government of India for 1959 has been submitted.

Publication of Vijnan Karmee

Dr. S. K. Bose, Editor V.K. and General Secretary (Publications) has left for France; on his request Shri A. K. Biswas, a member of the Editorial Board, V.K. placed his report before the Council of the Association. The Council of the Association has elected Dr. D. K. Roy D.Sc., Research Officer, of the Indian Institute for Biochemistry and

Experimental Medicine, Calcutta to be the Editor and Secretary (Pulications) for the current year. We very much regret the irregularity in publication of V.K. Two General Secretaries (Publications) successively left India on official business. The necessary authorisation procedure for the new Editor took time. However, it is expected to bring up the issues up-to-date.

The get-up of the journal has improved and the number printed each month has increased from 700 to 1100. Besides the members, 25 copies are sent to distinguished foreign scientists, 50 to noted Indian personalities, 11 to Advisory Board members, 18 to foreign organisations, 6 to Information Service Centres, and 43 to libraries of National Laboratories and other academic institutions. Advertisement position has improved from 8 to 12 through the personal efforts of our President Dr. Zaheer and members of our Hyderabad Branch.

Presently, we are facing certain problems in procuring sufficient articles for publication in the journal. The various Branches and Units are again requested to be more active in regularly procuring and contributing articles and send information of their activities for publication. It is needless to remind our members that this journal is the mouthpiece of the thoughts, aspirations, achievements, problems and activities of the Scientific Workers of India.

Financial status of the publications is not yet beyond worries. We are still dependent on periodic grants. Increased efforts have to be made by the members of different Branches and Units to endeavour for procuring some more advertisement materials to make the journal self-supporting.

Relation with World Federation

Our affiliation with this International Organisation has continued. The Indian Regional Centre of the World Federation was formally constituted in July, 1958 with Dr. S. H. Zaheer as its Head with a committee of five members. Considerable preliminary work has been done to organise the scientific workers of the Asian countries and very useful contacts have been established.

Resolutions

Action was taken on all the resolutions that were passed by the General Body at Madras in January, 1958. Majority of these resolutions are receiving attention of the authorities to whom they have been referred. Our resolutions pertaining to the confirmation and promotion of technical assistants at Government Test House, Calcutta have met with some success in that the Ministry of Works, Housing and Supply has agreed to convert 80% of the temporary posts into permanent cadre and has also agreed to reserve posts to be filled purely by promotions. As regards the ASWI memorandum to the Pay Commission, we have been assured that the recommendations made in our memorandum would be given due consideration by the Pay Commission.

The Association is, no doubt, gaining popularity amongst the scientific workers of India ; this will be evident from the increase in membership. The problem before us is now not only to increase the membership but also to some extent, to sustain its existing membership.

Sd.| D. V. Varma
General Secretary (Organisaton)

Treasurer's Report, 1958

Balance sheet as at 31st March '58

Liabilities			*Assets*		
General Fund Account					
Balance sheet as per last balance sheet.	1612.90		Metal box as per last account.	10.00	
Less deficit for the year as per following statement of income & expenditure.	815.35	797.55	Less depreciation.	1.00	9.00
Loan from Dr. S. K. Mukherji.	507.41		Duplex machine as per last account.	524.62	
Loan from Dr. S. Ganguli.	114.57	621.98	Less depreciation.	52.50	472.12
			Typewriter as per last account.	91.50	
			Less depreciation.	9.00	82.50
			Sundry debtors.	90.00	90.00
			Cash		
			In hand	83.27	
			With Palai Bank New Delhi.	93.51	
			With Punjab National Bank, Kanpur.	589.13	765.91
Total		1419.53	Total		1419.53

Income and Expenditure Account for the period 1-1-57 to 31-3-58

Expenditure		*Income*		
		Subscriptions		
Salaries allowances and expenses of officers.	1567.22	From individuals	121.00	
		From Branches	2155.75	2276.75
Salaries, allowances & expenses of Estt.	872.27			
		Income from Misc. sources		
Cost of publishing Vijnan Karmee.	8598.11	Grant from Govt. and NISI	6500.00	
Rent, Rate & Taxes.	460.46	Advertisement revenue.	2387.00	
		Misc. income.	131.25	9018.25
Stationary, Printing and Postage.	649.79			
Depreciation in assets.	62.50	Excess of expenditure over income for the period said above.		815.35
Total	12110.35	Total		12110.35

Auditor's report

Examined, and found correct according to books of account produced, information supplied and explanations given.

Sd|- Chartered Accountants Sd|- General Secy. Sd|- Treasurer Sd|- President

Income and Expenditure Statement for the period from 1-4-58 to 31-12-58

Expenditure

		Rs. nP
Allowances and expenses to officers		105.62
Establishment expenses		225.00
Audit fee		50.00
Bank charges		26.47
Rent etc.		480.00
Stationary, Printing & Postage		147.21
Miscellaneous expenses		34.50
Vijnan Karmee Publication		4106.21
Repayment of loan to Dr. S. K. Mukherji		507.41
Outstanding payments		
Bills of V. K.	Rs. 3464.00	
Money held in	Rs. 2662.04	
Trust for Indian Regional Centre		6126.04
Total :		11808.46

Income

			Rs. nP
Opening Balance			
Cash	Rs. 83.27		
Bank	Rs. 682.64		765.91
Membership Fee			
Direct		29.50	
From Branches/Units		1190.09	1219.59
Grant from Govt.			2500.00
Grant from N.I.S.I.			500.00
Advertisement revenue			870.49
Sale of V. K.			40.00
From W.F.S.W. for Ind. Reg. Centre			2662.04
Deficit (outstanding Payments)		6126.04	
Less Clossing Balance			
Bank		1579.88	
Cash Treasurer		100.94	
Cash Gen. Secy. (Pubn.)		1112.69	
Cash Dr. Ganguly		66.53	
		2860.04	
Deficit (Carried over)			3266.00
Total :			11808.46

Estimates of Income and Expenditure for the period 1-1-59 to 31-3-59

Expenditure	Rs. nP	*Income*	Rs. nP
Deficit (brought over)	3266.00	*Substriptions*	
Allowances and expenses to officers	200.00	Direct	50.00
Establishment expenses	120.00	from Branches	600.00
Bank charges	15.00	Income from advertisements	400 00
Rents etc.	100.00	Sale of Journal	20.00
Stationary, Printing & Postage	300.00	Grants from Govt.|NISI	5,000.00
Miscellaneous expenses	65.00		
Vijnan Karmee Cost of publishing 3 Issues	1800.00		
Excess of income over expenditure	204.00		
Total :	6070.00	Total :	6070.00

Budget Proposals for the period 1-4-59 to 31-3-60

Income	Rs. nP.	*Expenditure*	Rs. nP.
Opening Balance	200.00	Allowances & expenses to officers	1,000.00
Subscriptions Direct	100.00	Estt. expenses	1500.00
From Branches|Units	2,000.00	Audit fee & Accountancy	100.00
Income from advertisements	2,000.00	Affiliation fee	100.00
Grants & Donation	10,000.00	Stationary, Printing & Postage	1000.00
Sale of publications	100.00	Miscellaneous expenses	200.00
		Publication expenses Vijnan Karmee	9000.00
		Purchase of Type-Writer etc.	1000.00
		Closing Balance	500.00
Total :	14,400.00	Total :	14,400.00

World Federation Corner

Executive Council, W.F.S.W.

(1957—1959)

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Mrs. W. Burhop	(see above—Burhop)

London, March, 1959.

W.F.S.W. General Assembly, 1959

The Preparatory Committee for the General Assembly and the Symposium met recently in Moscow in accordance with the decisions, of the 11th meeting of the Bureau held at Zurich in December, 1958.

The following decisions were taken—During the second half of September, at a date to be fixed later in Warsaw there will be held one following the other :

(1) The Symposium (duration—3 days).

(2) The General Assembly (duration—2 days).

The draft programme of the Symposium is given below :

"Science in the development of the economy and welfare of mankind."

(A) *Plenary Session*

During the Plenary Session the following general papers will be presented.

I (a) General report on the subject of the Symposium :
Speaker—J. D. Bernal, Britain (probable).

(b) Second general report on the subject of the Symposium :
Speaker—O. Lange, Poland (probable).

II (a) The recent development of science in China and its contribution to world science :
Speaker.......... (China).

(b) The recent development of science in India and its contribution to world science :
Speaker.......... (India).

III The tasks and possibilities of modern science for overcoming the economic backwardness of certain peoples and for the general improvement of welfare.

Two speakers chosen from two of the following countries :
U.S.A., France, Great Britain, Japan, U.S.S.R.

(B) Working Commissions :

Commission 1—The tasks and possibilities of the physical, chemical and geological sciences.

Two contributions are planned :
One written contribution from Li Sze Kwang (China).
One contribution from...... (U.S.A., U.S.S.R. or France).

Commission 2—The tasks and possibilities of the biological, medical and agricultural sciences.

Two contributions are planned :
Agriculture........ (China, France, G.D.R., or Bulgaria)
Medicine........ (Poland).

Commission 3—The tasks and possibilities of the social and economic sciences.

Two contributions are planned :
Economic sciences...... (Greece or France).

Social sciences ...... (Uzbekistan, U.S.S.R.).

Commission 4—The present situation and future tasks for the training of scientific and technical personnel :

One contribution—Academician I. Malek (Czechoslovakia).

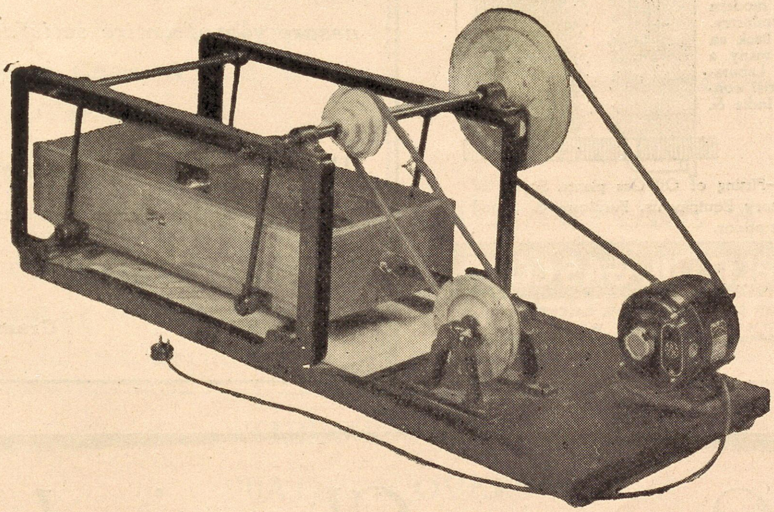
Commission 5—The importance of international scientific relations Recommendations :

One contribution .... (G.D.R., Great Britain or France).

The Federation attaches great importance to the success of the Symposium.

Members of our organization who are interested to contribute papers may send their contributions to the following address :

Dr. S. H. Zaheer, Director, Regional Research Laboratories, Hyderabad-Dn. 9.



Statement about ownership and other particulars about newspaper

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(FORM IV)

(*See Rule 8*)

1.	Place of Publication	...	92, Upper Circular Road., Calcutta-9.
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	Nationality	...	Indian
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5.	Editor's Name	...	Dr. D. K. Mitra
	Nationality	...	Indian
	Address	...	92, Upper Circular Road.
6.	Name and address of individuals who own the newspapers and partners or shareholders holding more than one per cent of the total capital.		Association of Scientific Workers of India.

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

Dated 9th June 1959.

D. K. Mitra
Signature of Publisher

Know the Association of Scientific Workers of India

Year of formation : The Association of Scientific Workers of India was formed in 1947 under the Presidentship 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 inculcate 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 M. R. Raman as the General Secretary (Organization). The address is 8/60, Arya Nagar, Post Box No : 388, Kanpur. Any enquiries may be sent to any of the above two places.

Regd. C 3982

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VIJNAN KARMEE

journal of the association of scientific workers of india

APRIL '59

Vol. XI

No. 4

VIJNAN KARMEE

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(Founder-President : Shri Jawaharlal Nehru)

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For Nonmembers

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CONTENTS

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

What is wrong with scientific researchers of our country today? This is an oft-repeated and pertinent question asked by many people from various walks of our society. Of course, from the number of papers published in journals and presented before such learned bodies like the Indian Science Congress, National Institute of Sciences, Academy of Science etc. and the progressively increasing budget towards research expenditure in national laboratories, institutes and universities, one gets a glorified picture about the status of researchers and facilities for doing research in this country. Is it really a true picture? If we compare the overall data, in this aspect, with those of other countries like U.S.A., U.S.S.R., England, post-war Germany and two of our Asiatic neighbours namely Japan and China, one can easily find out where we stand. We have gained independence over a decade; scientific and technological research and development have been the key-note of our Government from the very beginning. So, where are our defects? What are the reasons of our still standing at the lowest rung of the ladder and vainly looking at the sky? Normal logic and reasons prompt us to be self-critical. None of the glorified annual reports from the Institutes will lead us anywhere near our cherished objective; let us look back and diagnose the ailment, recognise it and prescribe the right medicines or even radical surgery to bring back healthy state. Wisdom and strong will are needed at this hour to do it.

Are we lacking in talents? Is there any shortage of young and qualified research worker? One of our old teachers—a brilliant scientist in younger days, now a politician *cum* science professor—lays the blame on younger scientists that they lack in devotion to scientific research. When young workers (M.Sc.s or M.B.B.S.s in a scale of Rs. 160-330) grumble for higher salary these top-notch scientific administrators always advise them 'plain living and high thinking' to keep mum and prove their worth by contributing to Country's name, fame and scientific and technological development. Of course, these *patriotic* 'tin gods' are at a comfortable level of a couple of thousand rupees per month with other special facilities. We do not grudge them but their such advices only expose hypocrisy and bad taste. Besides, there is the sword of *Section 5A* hanging dangerously over every head to watch who dares stick out his neck and shout for justice and fair play. Our Government have been spending a large amount of money for annual meetings of a number of Scientific Committees and Advisory Boards. It is deplorable to note that majority of the members seldom go through the reports critically and scratch their brains; rather they take the opportunity as 'holidaying' in big cities; the Administrators and Directors get their reports approved, applauded and signed, irrespective of merits and demerits. These members know fully well that they may lose membership if they question or criticise the reports. None of them endeavour to find out how far the planned target of research was achieved or what more could have been or ought to have been done and the reasons for not doing that amount of work. It is regrettable to say that most of these members forget, forsake and forego their entrusted duty and feel happy by nice and big parties and dinners and *special entertainments*. The earnest and hard-working researcher at lower level pine for want of recognition and assessment of his work and worth. Instances are not far to seek of a number of bright young scientists who made good name in foreign laboratories, whose publications have been recorded and referred to by a number of standard books published abroad, when asked about his present activity in a national laboratory replied with a sigh 'I am now living the life of a retired scientist receiving regularly salary cheques on the first day of every month'. It is no wonder that many such workers try to get out of this rut and many foreign universities have kept doors open for them. When these workers try to apply for jobs through official channels, woes befall upon them; they have to endure bitter reprisals and untold hardships from the administrators and the applications are seldom forwarded. Where Section 5A cannot be applied *other methods* are adopted to exasperate the worker out of the Institute. Illiad described the brutality of Achilles who dragged his dead enemy tied behind his chariot; these modern Achilleses surpass the medieval brutality on tied *living men* to prove their might and vengeance; wailings of these unfortunate victims cannot reach the ears of higher authorities for the sake of maintaining rigid discipline. Yes, *Casabianca stood on the burning deck!*

Very frequently our authorities advise us to do good work, make sacrifice and wait with patience with the maxim 'man cannot live on bread alone'; but where are the 'blessed bread' and security? The chronic illness lies in some members of the older generation of scientists and fossilized administrators who have not changed with the change of this Country's history. They have managed to form *coteries* and are viciously neglecting the basic principles of justice. After the Country's emancipation from foreign rule a group of ambitious, high-handed, unscrupulous ex-scientists, unfortunately, managed to control certain sections of scientific research and teaching institutes and thereafter have been thwarting and destroying the zeal, ambition and talent of our scientific personnel. They can do it with impunity because of unconditional mutual support of the fellow members of their *coteries;* many of them have liaison with some top people or they have cleverly and cunningly obliged certain big bosses at Delhi. Thus, unchallenged exercise of power has, in some cases, reached the border of corruption, both physical and spiritual. Utter disregard to the attainments and aspirations of younger scientists, negligence to build up a proper scientific atmosphere are being frequently reported from a number of research institutions. These administrators have essentially formed a 'scientific junta' with its traditional monopoly of power politics and mutual admiration of fellow members. Amongst them a few selfish, intriguing and unscrupulous ex-scientist-politicians are spreading widespread uncertainty among junior scientists and they are bold enough to shower threats and favours openly; some of them utterly disregard the principles of profession and indulge in private and personal bussiness, medical and technical practice and consultations, bringing additional income to their pockets. This atmosphere breeds favouritism and suppression of talents; workers are induced to try *other methods* to become boss's favourites. Cases are nor rare where an ordinary arts graduate could be promoted to S.S.A. in a Scientific research institute whereas a number of M.Sc.s and M.B.B.S.s, with longer years of service, with some important publications to their credit, could not get out of the rank of J.S.A. Instances are available when these young scientists in their despair make attempts for outside jobs, vengeance comes down in the form of stopping or changing their research projects knowing full well that those workers had made considerable progress towards completion of doctoral thesis; many such victims resign and try their luck somewhere else including assistantships and fellowships in foreign countries. One national laboratory has set up such a record of 7 out of 21. How long this wastage of money and human material will be tolerated? Some of these administrators forget the fundamental point that there is no 'open sesame' way in scientific research nor is this a 'slave-driving' job nor the job of building railroads by prisoners of war. Intense, whole-hearted, honest and patient undertaking by a team of workers is needed to develop the right spirit and conducive atmosphere for scientific research; it can only then attract and enthuse bright young people to this fold; then only scientific research can become a career, a profession and life's occupation. Can anybody imagine the plight of M.Sc.s and medical graduates of 30 to 40 years age working in national laboratories, with publications in Indian and foreign journals, in the posts of J.S.A., who are not even called for interview for higher posts in the same Institute? One may pertinently ask what is the function of Advisory Bodies and Special Committees if injustice is continuously perpetrated?

It is very pleasing indeed to have a glimpse of big buildings, named Research Institutes. Will anybody look beyond colossal structures and the array of ultra-medern equipments and enquire about the disappointments and disillusions of scientific workers? Most of the top men are tied down to their *coteries to* achieve personal and parochial ends and the rest are complacent. If anybody raises his voice and asks justice and fair play, he is hunted down on the bogey of indiscipline or 'red herring'. This is one of the reasons why a number of able scientific workers are seeking to go abroad. Will the saner section of our scientific administrators and policy makers just pause to think over this situation? Will they not, on national interest, come out of the *coteries* and cry halt to such wastage? No human individual is above our national interest. Will they do some heart-searching and realise that *ommissions* and *commissions,* repeatedly condoned, are jeopardising the Nation's scientific and technological research and development. This is urgently necessary in view of the third five-year plan in the offing.

These dark clouds have some silver linings. We are fortunate that the development of scientific and technological research has a special place in the heart of our Prime Minister, Mr. Nehru. Our young scientists always have personal blessings and encouragement from him. It is a matter of gratification that our Minister of Scientific Research is striving to accord all opportunities to younger scientists; assurance of security to scientific workers by the present Director General of CSIR is laudable and inspiring. Over and above, we had and have amongst us some scientists like Acharya Ray, Acharya Bose and Prof. Raman who by dint of their lifelong devotion to scientific research have built up schools of thought and have become guiding stars to all researchers. Their lives will be fountainhead of inspiration to the younger scientists who had been frustrated. A concerted effort by all concerned can resurrect the dead and dying research potentialities. There is no dearth of qualified and talented young scientists. The authorities should be determined to clean out those unworthy administrators. Judicious and fair administration and encouragement and goodwill to workers will surely create inspired atmosphere where one can work and think freely with security assured. The world is changing fast; better days, better opportunities to dedicate one's life to scientific research and utilise science for the happiness of mankind are not far off.

Report on the position in the Association of Scientific Workers of India

ACADEMICIAN I. MALEK

During my visit to India lasting from 10th January to 8th February 1959, I attended the following meetings held by the Association of Scientific Workers of India.

1. Meeting of the General Assembly, which took place in New Delhi on the occasion of the Indian Science Congress, under the chairmanship of Husain Zaheer and participation of Indian Prime Minister Shri Jawaharlal Nehru.

At this meeting I delivered a message of greetings on behalf of the World Federation of Scientific Workers and informed the Assembly about present problems, particularly about the results of the fight against nuclear weapons, publication matters and the forthcoming General Assembly of the World Federation of Scientific Workers connected most probably with a symposium. The General Assembly discussed 21 resolutions, tabled by various branches and units of the Indian Association, a part of which was concerned with the social status of scientific workers, the other part dealing with general questions of the development of India's science and economy. Some of these resolutions were sharply criticised by Mr. Nehru because of their critical attitude, who besides, stressed the importance of upkeeping the quality of scientists at their present rapid growth and also emphasised the important role of women in the reconstruction of Indian society and of women scientists, consequently.

2. Meeting of the newly elected Executive Committee presided over by the new President Prof. Mahalanobis.

This meeting discussed the implementation of the resolutions adopted by the General Assembly, mainly because of the criticism levelled against the resolutions by Mr. Nehru.

It was agreed that the work of the Association cannot limit itself on critical resolutions, but it must elaborate concrete proposals which would be discussed within the whole breadth of ahe organisations and thus would strengthen both its activity and authority.

3. I participated in discussion at meetings of some units, e.g. at the Aligarh University|Dr. Rais Ahmed|, the Hyderabad Unit| Dr. Husain Zaheer, Mr. Baldev Singh et. al.|the Bangalore Unit|Prof. Dhawan and R. A. Vasudeva Murthy|.

Moreover, I met with some of the office bearers e.g. Dr. Rahman, Roorkee, Dr. Roy of Calcutta, both members of the Editorial Board of Vijnan Karmee and particularly, with the President of the Association Prof. Mahalanobis, F.R.S., Director of the Indian Statistical Institute in Calcutta. On the basis of these meetings and discussions I gained the following conclusion about the Association of the Scientific Workers of India.

The Association underwent a crisis some two years ago, during which its membership sank to 800. The Association had not a single programme and did not work consistently. After the election of Dr. Husain Zaheer, the President of the Association and under the participation of a number of active young scientific workers they succeeded in developing the activities of the Association in all its eight branches, which later resulted in the increase of membership to over 2,000 and further, in an active interest in public matters, which became manifest in the resolutions adopted. It seems, however, that the activity of the various branches is not the same, and depends upto considerable measure on the possibility of finding a team of active officers. With regard to this respect, I had a particularly good impression from the Hyderabad organisation.

The Indian Association, however, has all possibilities for further development, since there are in Indian scientific institutes many young active workers who are forming the main core of the Association. On the contrary, senior scientists in official positions are considerably reserved towards the Association, partly due to the fact that the Association bears a trade-union character. It is most probable, that interest could be enhanced by individual membership.

The Indian Association has also considerable financial difficulties. Its total budget for 1958 was 11,808,46 rupees and in the end of the year ended with 3,000 rupees deficit. Considerable part of the budget forms a grant from the Indian Government amounting to 5,000 rupees and from the National Institute of Science, India, 500 rupees. It is expected that similar income will be also in the future. It is reckoned with larger income from the sale of their journal Vijnan Karmee. The budget for the first three months of this year envisages 6,070 rupees and in the twelve months starting from 1st April 1959, 14,400 rupees. This depends of course on the question, if they succeed in getting a higher grant from the Government and other institutions.

For their future work, they are agreed that there exist all conditions for making the work more active and to command interest of other circles of scientists, be it by participation in the solution of the basic problems of the status of science in India or the questions of the social welfare of Indian scientific workers.

The following question were then discussed :

1. The question of the WFSW General Assembly in Warsaw and the symposium on science in the service of under-developed countries. There was general agreement with holding the General Assembly together with the symposium. It will be necessary to solve financial problems connected with their participation.

Further I am giving the opinion of Prof. Mahalanobis to the symposium. He greets the fundamental idea of the symposium, but invites the attention to the fact that the last meeting at Kitzbuehel adopted a resolution that the 4th Pugwash meeting will be devoted just to this question and asks us to consider whether it would not be better to hold the symposium, well prepared and with a concrete appreciation not only from the point of view of the general situation but an economic appreciation, after the 4th Pugwash meeting. After thorough discussion he agreed to the original proposal and thinks it will be purposeful to arrange the symposium preceding Pugwash Four, so that it would bring material. He believes that in no case this symposium should be a final one, since a deep and principal solution will require long time. He thinks that it will be useful to return to this idea once again afterwards.

2. Regional Centre of WFSW in India :

Preparations to the activities of the WFSW Regional Centre in India were started in the way that two very active officers|Shri Rahman and Shri Baldev Singh were proposed to be delegated on tour to countries in the Middle East and South Asia. But due to paucity of funds, this proposal was dropped subsequently. Considerable amount of material was collected about scientists with whom it would be possible to maintain contacts in the future. The material collected was through the courtesy of the Embassies of the countries from Asian and West Asian Region in India and of the Indian Ambassadors and consuls in these countries.

Other activities were not developed, because one did not succeed in obtaining funds for the meeting of the Regional Centre in India.

3. When discussing editorial work, it appeared that Scientific World is distributed in India only in small number for the time being and therefore little known. We came to an agreement with the present Editor of Vijnan Karmee, Dr. Roy|Ind. Inst. of Biochemistry and Experimental Medicine, P. 27, Prinsep Street, Calcutta 13|, that more active cooperation will be necessary to reprint articles from the Scientific World in Vijnan Karmee and vice versa.

It was agreed that Vijnan Karmee should become far more a discussion forum, making it possible to exchange views on important questions of Indian science.

The following articles will be printed in the Scientific World.

1. Dr. Rahman's article from Nr 10, Vijnan Karmee suitably edited,

2. An article by Dr. Zaheer or his team about the work of the Regional Research Institute in Hyderabad, as an example of connection between science and practice,

3. An article from Prof. Dhawan or his co-workers about the Indian Science Institute at Bangalore.

Adjudication of Scientific Work

Dr. D. S. Bhatia

The subject that I have chosen is rather controversial and permits of treatment from many view points. My intention in choosing the subject, however, is to focus attention of scientific workers on the possibility of creating better conditions under which achievements of the scientific workers could be adjudicated adequately. I shall not make any attempt to define the term "scientific worker" but my remarks are generally applicable to all workers engaged in Institutions like ours. A doubt often occurs and clarification is often sought on the demarcation of scientific work and other related work. Let us not unduly stress the importance of some work and unjustifiably minimise the work. Let us not decry the work of our colleague out of sheer jealousy or with the hope of gaining personal petty favours.

Any person engaged actively in work desires and deserves encouragement with the passage of time. The encouragement may take the shape of increased emoluments, better status, better working conditions, increased powers and increased responsibilities, special mention in despatches, award of certificates of merits, cash prizes or medals etc. This brings us to the question of adjudication of merits of individuals.

Quite often it is pointed out that people in ministerial services are assured of their future at a certain predetermined pace barring any unforeseen and exceptional circumstances. Such an assurance does not exist or perhaps it is not desirable in scientific cadre. A person in the Secretariat usually becomes more and more experienced with passage of time and is more competent to interpret rules and regulations, find out ways to adapt the rules when necessary and come to quick and rational decisions in difficult cases. But a person engaged in scientific work may or may not improve with the passage of time. The mere fact that he holds a certain position today should not entitle him automatically to better position tomorrow. He may do so if he plays his part and discharges his obligations.

Now a few words about the obligations of the scientific worker. He should keep himself uptodate with the literature in his field. He should devote considerable amount of time in reading what others have written on subject directly or closely related to his field of study. He should not be content with doing what is assigned to him but should show initiative and drive to build on his work. Ideas are not the monopoly of people belonging to any particular status. Each worker deserves respect and appreciation of his ideas, only he must make bold to express them. We should not be afraid of expressing our views in a constructive way provided we maintain a certain *decorum* in what we do and what we say. Having ensured that the scientific worker has discharged his obligations, it is now left to those in authority to assess the value of the work of the individual and reward him suitably. Now we come to a very delicate and difficult situation but it is so only as long as we keep away from it and do not face it squarely.

The assessment of work of any individual in a research institution like ours is little more difficult than under the condition which obtain in Universities. In a University, a student is rewarded for his good work by award of a degree. If the work is of an exceptionally high order, the University may shower extra honours on the person. He may get fellowship and other facilities to pursue work in which he is most interested. One great satisfaction that a research worker enjoys in the university atmosphere is freedom to pursue his own line of work according to his plans. Such facilities may or may not exist in laboratories like ours. Perhaps it is not possible to give absolute freedom to individual worker in an institution wherein we are called upon to orientate our work keeping in view the immediate needs of the country. Regional interest also exerts an appreciable influence on the activities of a Research Institute. In other words laboratories like ours are called upon to devote a major portion of their time to regimented work. This state of affairs makes it incumbent on us to evolve a system whereby efforts of individuals are suitably acknowledged.

Collaborative Work :

In applied work today, there is an ever-increasing tendency, and a very desirable one, to undertake work on collaborative basis. Persons having different attributes and qualifications form a team and this team is assigned the task of executing the project.

Let me now trace the development of a project. We naturally start with an idea. The idea may come from any source within or without the Institute. Those in authority assign the task of experimenting with the idea to a team of workers, the size of which may vary but it is desirable to limit its size in the early stages of the investigation.

If the results of the laboratory investigations are encouraging and warrant further work, more workers trained in various branches of Food Engineering and related disciplines may be added to the team and the investigation then goes through the bench pilot plant, pilot plant stage and if necessary factory trials. At this stage, the task of the laboratory staff is almost completed and the service of workers trained in industrial liaison and|or extension work are requisitioned.

It is thus seen that the success of any project is due to the collaborative efforts of a large number of workers. It often happens that some workers have done more work than others and the work of some required a higher degree of efficiency and scientific knowledge. These points must be kept in mind while adjudicating the reward of work. Unfortunately, in recent years, I have noticed a tendency to appropriate credit when it was either not due or was due in a smaller measure. It is a sacred responsibility of the project leader and his superior officers to distribute the credit equitably. There is always a risk of forgetting some of the laboratory workers who have worked very hard with 'quiet efficiency' but who may not have had opportunities to come in contact with those in power and speak to them about their work.

If a project or a piece of investigation becomes a practical success and wins public acclamation and recognition by reputed scientists, all those who have been responsible for the success of the project must be benefitted. It will be unreasonable on my part to ask for equal share for everyone. That is neither possible nor desirable, but we should avoid situations where one or two individuals benefit and the rest are left out.

One of the recognised methods of acknowledging good work is to promote a person to a higher post with better status and higher emoluments. There are two ways in which promotion can be effected (1) by open competition and by (ii) departmental recommendation. In the last two or three years, I have observed that a major share of promotions has gone to departmental candidates and that is a healthy sign and we welcome it, but it has involved inter-departmental transfers with the result that certain projects have suffered. No·body is indispensable, but a certain amount of time must lapse before the newly appointed person gets going in his new assignent. The inter-departmental transfers consequent on promotion have another serious defect in that it prevents individuals from specialising in specific lines of work. Though the inter-departmental changes do not involve any loss of trained personnel to the Institute, yet in the long run the quality of work may suffer.

I have said lot of things but I have not come to any definite conclusions. It will be presumptuous on my part if I were to suggest changes in the present system of promotion. It will be highly improper if I were to question the method of interviewing the candidates as a criterion of promotion but I have a lurking feeling in my mind that the yardstick used by different selection committees seems to vary in its dimensions. Perhaps one of the methods of ensuring uniform assessment of merits of candidates will be to have only one standing committee who should select candidates for all posts in one particular Institute.

The interview should be exhaustive and sufficient time should be allowed to candidates to enable them to explain their work. The system of interviewing about 60-80 candidates in one day is not free from inherent defects.

Creation of new posts :

Creation of new posts Division-wise has some inherent defects in that it provides scope for promotion to only limited number of people. There may be cases where certain individuals have done good work and have richly deserved promotion to a better status and higher emoluments but they are against a dead end of the alley as no higher post exists in the Division. To overcome this defect and to ensure uniform opportunities to all deserving candidates, my humble submission is that posts should be created in cadres only, with no allocation to the Divisions. The deserving candidates should be promoted and shown against the newly created posts but should not be disturbed from their respective assignments. Of course, now and then, there may arise a necessity for creating *ad hoc* posts of short duration wherein we may require special aptitudes and qualifications and that would naturally limit the opportunities to only a few individuals. I am not offering any concrete suggestions, though I am prepared to do so if and when asked but to share my thoughts with you and to stimulate further interest in my colleagues, I am putting forth a few ideas. I am wondering whether it would not be conducive to better morale among scientific workers if we introduce the following changes :

1. The present designations starting from J.S.A. upwards should be changed into only two cadres of (i) Research Assistants (ii) Research

Officers. The present designation of Laboratory Assistants may stay as a single cadre and not as junior and senior.

2. The starting salaries of newly selected persons may be fixed with due regard to their age, qualifications, experience, etc. The present staff could be easily fixed in the two cadres at reasonable salaries determined by a uniform policy of mathematical accuracy.

3. The Departmental Heads may be given suitable designations and given a special pay of reasonable magnitude as a compensation for additional administrative and technical responsibilities. The Departmental Heads would however be in the cadre of Research Officers.

4. The two superior officers over the Departmental Heads will be the Deputy Director and the Director.

5. The Class IV staff working in the Laboratories should be designated as technicians and should be given higher emoluments than they receive now. One must not forget that some of the laboratory attendants play a very important role in the execution of certain pilot plant projects.

To summarize, the cadres will be as follows :

1. Director
2. Deputy Director
3. Research Officers
4. Research Assistants
5. Laboratory Assistants
6. Technicians.

You might raise a question as to how one is to differentiate between satisfactory, fair, good and excellent work when a uniform scale is provided. My answer to that is that in the first place if we adopt the above measures, the present disparities in the quality and quantity of work turned out by individuals will tend to decrease and perhaps ultimately disappear. The only satisfactory means to acknowledge exceptionally good work will be to award advance increments to selected persons periodically. This system wil work satisfactorily only when the people in authority ensure uniform opportunities to all concerned.

You may have observed that I have not made any reference to the ministerial staff who also play a very vital role in the work of scientific institutions like ours. I have deliberately refrained from making any comments in that direction as I do not feel I am competent to do so. But I may say this that in as much as we are all jointly engaged in a common cause, improvement in working conditions should benefit uniformly all the staff members of an Institute.

Happiness, Research Work and Success

By

SHANKAR KUMAR MUKHERJI

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Men always wish to be happy, but the means they instinctively employ for achieving happiness are such as to lead them into a state of unhappiness. It is this fact that led philosophers like Schopenhauer to inculcate their profoundly pessimistic views on life. The happiness, which depends upon the fulfillment of a desire or the satisfaction of a momentary impulse, is bound to be of a more or less illusory nature. Every bit of happiness gained through the appeasement of the ego will be invariably followed by an equal reaction in the form of unhappiness due to the attachment of the being to the object of desire and the consequent strain imposed upon it. According to the Vedanta, any act involving an increase of attachment, can never lead to happiness.

This however, does not rule out the possibility of happiness. As long as happiness is considered as the fulfillment of our personal desires, it always recedes like a mirage, but when it is viewed as the indirect fruit of self absorbing work it is intensely real. Happiness is something, which must be, in Russell's word "conquered". To be happy one must actively snatch happiness every moment out of one's existence. The means employed should be such as to keep the mind and the body free and alert so that they remain highly sensitive to the beauties of the world.

Research work, when viewed as a means of gaining happiness, appears to possess certain advantages peculiar to it alone. "The kernel of the scientific outlook", to quote Russell, "is the refusal to regard our own desires, tastes, and interests as affording a key to the understanding of the world". The aim of scientific research is not the immediate gain of something, but it practically involves the focusing of our attention every moment on the present and keeping the mind detached from its excessive pre-occupation with the past and the future. The ego, having no part to play here, remains temporarily dissolved. There is no eagerness to reach any preconceived end since there is no end to the unveiling of truths. Working with intensity but without attachment and without any craving for reward, is the correct attitude towards work, as recommended by the Bhagavat Gita and as confirmed by the accumulating knowledge of modern psychology. Research work is admirably well suited for that. Hence, it is not surprising to find that all the great scientists were seldom unhappy. In fact most of them were supremely happy as long as they were allowed to work unhampered within the four walls of their laboratories. It is curious to note that philosophers were generally less fortunate regarding happiness compared to the scientists. We have the history of many sick and even mad philosophers but of no mad scientists. Some scientists were undoubtedly eccentric but eccentricity of character is not so serious a fault as madness. An obvious inference is that philosophic ratiocination does not allow us as much freedom from the tyranny of the ego as scientific investigation. A few philosophers, Socrates, for example, might have been as happy as Faraday or Newton but Schopenhauer and Nietzsche were certainly not.

If research work is a source of so much happiness, then, we are logically forced to ask one simple question : why is there such a dearth of truly devoted workers in our magnificently set up new laboratories? Why, we may ask, do our very reputed teachers often dissociate themselves irreversibly from their laboratories as soon as they gain a minimum of scientific approbation (a D.Sc. for example, preferably from a foreign University), so that a doctor's degree, becomes, in effect, a decree of divorce between them and their laboratories? One obvious, though somewhat sophisticated answer, is that, for many, research work is not so exhilaratingly delightful as we have supposed. Research work, when carried out in the wrong spirit (or without spirit) is, no *more* interesting and no less boring than any other type of work. If the possession of a doctorate is the sole aim of a research worker, then his attention is constantly diverted from his present work and in his eagerness to gain the end, he often loses that patience of mind and impartiality of observation which are so essential for first rate work. Happiness, again, depends to a great extent upon our beliefs. To one, who believes that research work should be regarded as an unpleasant duty—a sort of extension of our competitive and wasteful academic activity and performed mainly to improve our qualifications and the chance of getting a good job, the charms of research work is, and ought to be, non-existent. His obssession with the idea of future success keeps him insensible to the delights of the day to day work. Slavery to the idea of future happiness is our greatest obstacle to happiness.

"Success" as Henry James termed it, is a "bitch goddess". In human mind, there is always a desire for recognition and appreciation by others. Success, involving superiority in wealth, knowledge or power, is irresistibly attractive, since it affords all those things for which the human being hungers so much. But one important fact must be remembered about success. Whenever success involves appreciation on the part of intellectually and morally underdeveloped people, it invariably proves debasing and degrading to the "successful" person. In psychological terms, confirmation of the Persona is always highly delightful but the quality and the form of the Persona are inexorably conditioned by the nature of those who confirm it. What is painful, is, the sight of so many of our research workers and teachers, taking the line of least resistance and running after success of the lowest sort. To rest upon one's past laurels is the most condemnable habit widely noticable among the contemporary Indian scientists. If a scientist feels satisfied with the praises of the laymen, who have the most romantically vague idea about research, and complacently forgets about the existence of his own laboratory then we must agree with Huxley, that nothing "fails" like success. Average people around us judge our scientists on the basis of the salary they draw, the power they can wield and the popularity of their popular lectures. However, if any inquisitive person possessing certain amount of critical faculty tries to find out how the international scientific circles regard our "great ones", he will generally come to some painful conclusions. He will often find that most of our "great ones" are mere local heroes, are unduly vociferous village Hampdens. Meanwhile, politics is proving attractive to many of them. A scientist, a real and famous scientist, is one possessing a D.Sc. and a seat in our democratic parliament. Devoted research workers are neglected and forgotten while demagogue-scientists flourish visibly.

It is however, wrong to say that only our scientists succumb to the charms of the "bitch goddess", easy success. Sinclair Lewis' "Martin Arrowsmith" is a book that should be read by every aspiring research worker. Holabird, in that book, appears to be a typical counter-part of our contemporary scientists—the only difference between America and India on this point being the existence of an appreciable number of Max Gottliebs in America while we have here only Holabirds and less than Holabirds. One great research worker, one great teacher (Berzelius, Liebig, Baeyer....) has the power of creating, through his noble example, more of devoted research workers than fifty of our glibly talking scientist-cum-philosopher-cum-politicians. The tendency to imitate is a potent factor in determining the thought patterns of human beings. The unsuccessful scientist, who is a worldly success, would be necessarily idolized by generations of young learners, while the devoted research worker, carrying on his work in the obscurity of his laboratory, would be unconsciously overlooked and forgotten by them. Hence, the process would continue like a chain reaction, the number of potential research workers being spoilt through the ignoble example of their teacher, increasing in geometrical progression.

Summing up, we find that research work, being essentially a disinterested search for truth, is logically one of the best methods of deriving happiness. To ensure the winning of the maximum amount of happiness out of it, it is necessary to shake off our herd instincts and to free our mind of the illusion that research work is simply a means of improving our academic qualifications. Excessive obsession with the idea of material success is always harmful to the research worker and never allows him to rise to his maximum height. It is imperative that a research worker should be aware of the fact that from the primitive days men have tried all methods of becoming supremely happy, and most of them led only to unhappiness and disillusionment. It is not worthwhile, therefore, to neglect the sure and immediate happiness of the present moment for what is uncertain and illusory.

However, since the craving for success is a fundamental fact of human nature, we must see that research workers are properly appreciated and criticised. The appreciation must come only from the intelligent and the competent and not from the unintelligent, money and power worshipping common rabbles. A group may be formed, for example, out of our fanatically devoted research workers, for actively reviewing the work of the existing workers and publishing, every month, an account of the exceptionally good work among them. (May we not use the Vijnan Karmee as the nucleus?) Criticisms, specially against teachers going astray, should be impartial, scathing and unsparing. At the same time, full publicity must be given, wherever possible, to those who show exceptional devotion to research work and undergo sacrifice by refusing to succumb to easy success. This may partially prevent the wastage of the talents of so many of our potentially good workers. Only such active efforts can drag us out of the bog of inefficiency and self-complacency in which we are wallowing at present.

Scientists' Pool*

SCIENTISTS in India are neither on tap nor on top (should they ever be, completly?) but the country has woken up to the need for them. When measuring the Government's interest in anything an unfailing index is the money spent and in the last five years the Government of India's allotment for Scientific Departments has increased from Rs. 7.6 crores in 1954-55 to Rs. 23.27 crores in the 1959-60 Budget; grants for the Council of Scientific and Industrial Research stand at Rs. 32 crores during the second Plan. Whether the money is always being used as best it could be is a pertinent question but there is no mistaking the spurt in interest. Of the scientists and engineers who hold jobs in India over three-fourths work in the public sector and so the Government, quite rightly, has been trying to shape a policy for science and scientists. The Scientific Policy Resolution, the National Register of Scientific and Technical Personnel and now the Scientists' Pool are some of the results.

It was long suspected and then proved true that scientists and (less frequently) engineers, often after valuable training abroad, waited around for employment while all the time there was great need for them. Quite a few, after knocking at doors fruitlessly for a while, took jobs abroad. So a Pool of Scientists (75% of them with foreign training and 25% from those recently out of Indian institutions), who would be paid between Rs. 400—Rs. 600 a month (and more in special cases with the all-important approval of the Finance Ministry) while suitable permanent work was found for them, is an excellent idea. The initial number selected for the Pool is 100, which is rather small. Double that would have been much better and 500 might have taken care of all qualified engineers and scientists looking for a job (90% of the 40,000 in the National Register are already employed). The small number has made the selection approximate to the filling of yet another group of posts and Government servants have had the usual hesitations about applying through "proper channels". Widening of the pool is, however, very likely and the principal snag is not the number but that basic policy and action are evolving with hesitating slowness. First notified in October last year it has taken close on

* Editorial of the Statesman dt. 21.5.1959; published with the kind permission from the Editor.

eight months to get the Pool near starting. Another major problem is the type of placement. Since the Government will pay until the scientist is satisfactorily fixed up, some establishments at least will be tempted to postpone absorbing Pool scientists for as long as possible. If the Pool contained more engineers and less "pure" scientists then its turn-over may look impressive but the engineers would have soon been employed anyway. Hence it would be prudent to have more scientists in it than engineers, a principle likely to be approved.

Obviously the Scientists' Pool and the idea of husbanding India's scarce scientific manpower could work only if the organization that is now engaged in registering associated itself more actively with placing. Requisitions, in about equal number from the private and public sectors, are arriving but the National Register organization, though assisting indirectly, is not positively engaged in placement. It should be.

Letter to the Editor

'A Reply'

Sir,

My attention has been drawn to letter published in the January (1959) issue of your esteemed journal in which Major General S. S. Sokhey has questioned the correctness of the prices of commodities in the Soviet Union, quoted by me in my article on "Scientific Policy Resolution" in the June & July (1958) issue of the journal. He also wants to know the sources of my information. In order to satisfy his curiosity I might state here that my figures were all quoted from the famous book "Inside Russia Today" of John Gunther, a publicist of international reputation (vide, Inside Russia Today, on "Shops, Prices and Wages", p. 66, 1957-58). If, however, Gunther's figures be considered wrong by the learned critic, I shall have at least the satisfaction of being in good company.

Major General Sokhey has laid particular stress on the fact that in the Soviet Union all classes of people, irrespective of their income level, enjoy many amenities of life at a nominal cost under State provision besides education, medical care, old age pension, etc. provided freely by the State. I may as well stress here that in India all these basic and welfare services are denied more or less equally to all classes of people except in certain respects to a microscopic minority in some government services and industrial establishments. Dearness and similar allowances are however provided practically for all the workers including the scientific workers. The wages of the scientists in India relative to those of the people of low income group in the country are quite comparable to those of the respective groups in Soviet Union, when viewed against the back-ground of commodity prices in the two countries. I, would, therefore, like to point out that the scientists in India have no logical or moral basis to claim any *special privileges* from the State, particularly when we remember that our contribution to the advancement of science and industries in India is negligibly small in comparison with those of the Soviet scientists in their country. It, of course, goes without saying that everybody will feel happy if wages of all people in the country are equitably raised and better amenities of life are provided for irrespective of scientific and other workers. Constitution of a privileged class enjoying a disproportionately large salary does not fit in with the objective of a socialistic pattern of democracy.

I do still feel that I have not failed to present a correct picture of the case under discussion.

Priyada Ranjan Rây

News Round-up

All India Council for Technical Education—Main Recommendations.

The All India Council for Technical Education at its meeting held recently in Delhi has approved the setting up of a Commission to evaluate the progress of post-graduate courses at different centres; Schemes for the establishment of 12 new polytechnics and the appointment of an expert committee to prepare a detailed scheme for the establishment of a Foundry and Forging Institution in the country.

The proposed Commission on evaluation of the progress of post-graduate courses has been asked to suggest measures for improvement and further development and to make recommendations regarding the starting of new post-graduate courses at suitable centres.

To encourage teachers' training programme and to attract the right type of persons to take up post-graduate studies in engineering and technology, the Council has recommended that the value of post-graduate studentships be raised from Rs. 150 P.M. to Rs. 250 P.M. and that of the research fellowships to Rs. 400 P.M. For persons who have taken diploma in engineering, the Council has recommended that full-time or part-time courses for degree in engineering should be organised at suitable institutions. Whenever Universities are unable to make provision for such courses advanced diploma courses should be organised by the State Boards of Technical Education. Facilities should also be provided at degree institutions for preparing candates for the examinations held by the Institute of Engineers, India.

It also accepted the scheme of research development in engineering and technology formulated by the Post-Graduate Development Committee.

The other recommendations of the Council relate to the holding of common admission examinations to technical and technological institutions, instituting courses in Foremanship and Supervision, proposals regarding incorporation of engineering schools as departments of universities, starting of degree courses in metallurgical engineering at the Bihar Institute of Technology, Sindri, and further development of nine existing institutions in the country.

Regarding the common examinations for admission to the technical institutions, the Council has recommended that examinations should be organised for all higher technological institutions, other Central institutions and such of those State Governments, university and non-government institutions which agree to join the scheme.

In regard to the proposal for incorporation of engineering schools as department of universities, the Council expressed the view that in the present set-up, it was neither practicable nor necessary to incorporated these colleges as departments of universities. The Council, however, recommended that, as far as possible, intimate contacts should be developed between engineering colleges and universities to which they are affiliated, both in respect of academic progress and in respect of organisation and development of the institutions as a whole. To achieve this objective, it suggested firstly, that engineering colleges should have on their Governing Bodies representatives of universities to which they are affiliated and, secondly, as far as possible, new engineering colleges should be located at such centres which also have institutions functioning for other disciplines, viz., Humanities and Sciences, etc. Every effort should be made to promote a corporate life between the students of engineering colleges and students of other institutions. Efforts should also be made to promote the growth of institutions having other institutions in or around the existing engineering colleges as far as feasible.

The Council has also recommended that financial assistance may be given to all degree institutions for switching over to the five year integrated degree course in engineering and technology.

3rd PLAN—There was also a general discussion on the draft outlines of the Third Five-Year Plan in the field of Technical Education at the meeting in which several prominent members of the Council participated. The general view was that side by side with the expansion of technical education, measures should also be taken to consolidate the present development. The starting of part-time and correspondence courses in engineering and technology were also considered. It was emphasised that high priority should be given to the teachers' training programme.

Some of the other suggestions made were : reduction in expenditure on buildings, more active participation by the industry in the expansion of technical education, rationalisation in the distribution of post-graduate courses, evaluation of the employment of technical graduates and diploma holders, translation of technical books into regional languages, use of common technical terminology in all regional languages, qualifications for entry into engineering colleges, training of technical personnel in subsidiary ranks, etc. etc.

The Chairman of the Council, Shri Humayun Kabir, in his concluding remarks expressed the hope that the working group set up recently to prepare blueprint for the third Five Year Plan of Technical Education would take all these suggestions into consideration while preparing their draft plan.

Carrying Results of Scientific Research to Rural Areas

Ways and means of carrying results of scientific research from various laboratories to the common man in the rural areas of the country in collaboration with the Ministry of Country Development and Co-operation were discussed at a meeting of the Extension Advisory Committee of the Council of Scientific and Industrial Research held in Delhi recently.

A comprehensive report prepared by a sub-committee under the chairmanship of Shri A. S. Naik, Joint Secretary, Ministry of Community Development and Co-operation, was discussed at the meeting. The report lays down various details regarding the methods for extension of the selected processes and recommends the formation of committees at the state level including the Development Commissioner and the concerned Heads of departments. It also recommends that sponsoring authorities at the district and block levels should be appointed who would have contact with the laboratories concerned, so that community developmennt workers could get adequate experience in implementing the results of research in collaboration with the extension wings of the laboratories concerned.

It is expected that this much needed step for associating scientific research with the rural areas will contribute directly towards the country's development programme and will also associate the scientist more closely with the immediate development needs in the different areas.

Liaision between Scientific Research and Industry

The following main steps have been taken by the Central Govt. to bring about a liaision co-ordination between scientific research and industry (a statement was recently made in Lok Sabha by the Union Deputy Minister of Scientific Research and Cultural Affairs).

(i) Special staff consisting of Industrial Liaision Officers and Regional Liaision Officers have been appointed to maintain an active and living contact between the industry and research laboratories. They carry out case studies of specific industries, ascertains their problems and refers these problems to laboratories for solution. They also bring to the notice of the industry the results of researches completed by laboratories that are useful for adoption|exploitation by industry.

(ii) National Research Development Corporation, an autonomous organisation consisting of prominent industrialists, has been set up to help industry to develop and commercially exploit research those are fit for industrial utilisation.

(iii) Extension services have been started with a view to demonstrate to the industry all over the country the processes developed in the laboratories. These have been found particularly useful for cottage and small scale industries.

(iv) A Joint Standing Committee for scientific research and industry has been established consisting of representatives of industry, C.S.I.R. and the Ministry of Commerce and Industry, presided over by Minister of Industry which meets occasionally to discuss and formulate proposals for bringing in close contact between industry and research.

Petroleum Council

The governing body of the C.S.I.R. has recently decided to constitute a Petroleum Council on the analogy of the Coal Council for the rapid development of petroleum industry in the country. It is intended that the Council would examine the following matters as soon as it was established.

(i) Training of personnel, research and investigations, documentation and information, and marketing and economics in the whole field of petroleum and natural gas,

(ii) facilities in the existing and proposed institutions and the potential for expansion of such facilities,

(iii) what additional facilities including any new institution should be created,

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Association News

Annual Council Meeting, 1958

The twelfth annual Council meeting of the Association of Scientific Workers of India was held on 20th January, 1959 in Delhi during the Indian Science Congress session. Dr. S. Husain Zaheer, President, was in the chair. The Secretaries' Report and the Treasurer's report (*published in the earlier issue of Vijnan Karmee*) were presented and adopted after discussions.

The Council noted that 21 resolutions have been received for consideration. These were scrutinised earlier by a Steering Committee consisting of Dr. Rais Ahmed, Sri Baldev Singh and Sri M. R. Raman. It was decided to recommend these resolutions (listed below) for adoption by the General Body meeting.

List of Resolutions adopted at the General Body Meeting

1. Role of scientists in planning.
2. Science policy resolution of Govt. of India.
3. Hindustan Antibiotics.
4. Technical experts.
5. Creation of an All India Scientific Service.
6. Interplanetary research and international character of science.
7. Administration of Scientific and Technical Departments.
8. Grades of University teachers.
9. Pay Commission.
10. Railway concessions for trade union workers.
11. Appeals Committee.
12. Dismissal without assigning reasons.
13. Leave travel concessions.
14. Residential accommodation for scientific workers in CLRI, Madras.
15. Departmental promotions in CLRI, Madras.
16. Forwarding of applications for posts outside the department.
17. Condonation of ETE service rendered between two TE services.
18. Protection under article 311 of the Constitutions of India for 'Civilians paid from Defence Estimates'.
19. Definition of 'Family' as per service rules.
20. Increase in percentage of departmental promotions to the Class II service of the Survey of India.

21. Promotions and retirement age of technical personnel in the C.S.I.R.

C.E.C. for the year 1959

The Central Executive Committee for the year 1959 was constituted as under :

President

1. Prof. P. C. Mahalanobis (Calcutta)

Vice-Presidents

2. Dr. S. Husain Zaheer (Hyderabad)
3. Dr. D. S. Kothari (Delhi)
4. Dr. B. Mukherji (Lucknow)
5. Sri D. V. Varma (Kanpur)

General Secretary (Org.)

6. Sri M. R. Raman (Kanpur)

General Secretary (Pub.)

7. Dr. D. K. Roy (Calcutta)

Jt. Secretary (Org.)

8. Sri Y. H. Rao (Kanpur)

Jt. Secretary (Pub.)

9. Dr. S. K. Chatterji (Calcutta)

Treasurer

10. Sri J. N. Misra (Kanpur)

Members

11. Major Gen. S. S. Sokhey (Delhi)
12. Dr. H. A. B. Parpia (Mysore)
13. Mr. A. Rahman (Roorkee)
14. Dr. M. A. Bashir Khan (Aligarh)
15. Sri Baldev Singh (Hyderabad)
16. Dr. E. R. Saxena (Hyderabad)
17. Miss M. Nagaratnam (Mysore)
18. Dr. M. S. Iyengar (Jealgora)

Ex-officio

19. Secretary, Calcutta Branch
20. ,, Roorkee ,,
21. Secretary, Jealgora Branch
22. ,, Lucknow ,,
23. ,, Mysore ,,
24. ,, Aligarh ,,
25. ,, Bangalore ,,
26. ,, Izatnagar ,,
27. ,, C.S.I.R., Delhi Unit
28. ,, C.L.R.I., Madras ,,
29. ,, S.W.A., Kanpur
30. ,, A.S.W., Kirkee
31. ,, A.S.W. Khamaria
32. ,, Surveyor's Association, Dehra Dun
33. ,, Southern Railway Chemists' and Mettalurgists' Association, Madras.

The Advisory Board and Editorial Board for Vijnan Karmee for the year 1959 was constituted as given below :

Advisory Board

1. Dr. D. S. Kothari (Delhi)
2. Dr. M. S. Randhawa (Delhi)
3. Dr. D. M. Bose (Calcutta)
4. Dr. D. N. Wadia (Bombay)
5. Dr. S. Bhagvantam (Bangalore)
6. Dr. S. H. Zaheer (Hyderabad)
7. Dr. A. C. Ukil (Calcutta)
8. Dr. B. C. Guha (Calcutta)
9. Maj. Gen. S. S. Sokhey (Delhi)
10. Dr. B. Mukherji (Lucknow)

Editorial Board

1. Prof. P. C. Mahalanobis (Calcutta)
2. Mr. A. Rahman (Roorkee)
3. Dr. S. K. Chatterji (Calcutta)
4. Mr. A. K. Biswas (Calcutta)
5. Dr. S. Ganguly (Calcutta)
6. Mr. M. R. Raman (Kanpur)
7. Dr. S. K. Roy (Calcutta)
8. Mr. Baldev Singh (Hyderabad)
9. Dr. Rais Ahmed (Aligarh)
10. Dr. E. R. Saxena (Hyderabad)

Editor—Dr. D. K. Roy* (Calcutta)

New Unit at Central Tobacco Research Institute, Rajahmundhry

The first general body meeting which was also the meeting called for to form and give shape to the Unit was held on 22nd April, 1959 with Dr. G. S. Moorthy, Director, in the chair. The President in his address stressed the need for scientific workers taking an active interest in an organisation like ASWI which not only looked to improvement in the service conditions of scientific workers but was also working for the society. He appealed to the scientific workers to become members of the organisation and to extend their support and co-operation in giving a proper shape and form to the Unit which had just been established.

The following were then elected as office bearers of the Unit for 1959.

President
Dr. G. S. Murthy

Secretary
Sri K. V. Venkataraman

Working Committee
Sri G. C. Patel
Sri E. V. G. Krishnamurthy
Sri M. Bangarayya

* Due to unavoidable circumstances, CEC has elected Dr. D. K. Mitra of Calcutta as Editor of Vijnan Karmee, in place of Dr. D. K. Roy.

World Federation Corner

Letter to Head of States for discontinuance of tests of Nuclear Weapons.

In accordance with the decision taken at the 11th Meeting of the Bureau at Zurich last December, a letter was addressed to Monsieur Debre, President Eisenhower, Mr. Khruschev and Mr. Macmillan requesting them each to receive a deputation from the World Federation of Scientific Workers to hear the views of the Federation on the question of discontinuance of tests of nuclear weapons. (Text reproduced below).

"You will be aware of the great concern with which scientists throughout the world have regarded the continued testing and development of nuclear weapons. This concern has found expression in many statements issued from time to time by meetings of scientists of the highest eminence and authority.

The World Federation of Scientific Workers shares this almost universal concern and over the years it has again and again directed attention to the dangers that face mankind as a result of these developments. It can no longer be denied that the continued testing of nuclear weapons brings with it dangers to the health of the present generation and grave risk to the health and well-being of future generations. It is true that the extent of these dangers cannot be accurately assessed but the best informed opinion regards it as probable that many hundreds of thousands of people in our own generation may perish prematurely if tests are continued at the present rate. Even since the recent evaluation by the United Nations Radiation Committee of the hazards of radiation, new and disquieting information has served to emphasize the dangers of continued testing.

A threat of mankind of vastly greater proportion would arise if present international tensions were to lead to the tragedy of a new world war. Indeed, many informed people are doubtful whether mankind itself could survive such a catastrophe.

The conference of technical experts that met in Geneva during the summer of last year clearly demonstrated that the effective control of tests of nuclear weapons was entirely practicable.

Negotiations are at present taking place at Geneva on the question of agreements to end nuclear weapon tests and to eliminate the danger of surprise attack. Unfortunately however these negotiations are making slow progress and we are seriously alarmed at the position which would arise if they should fail.

In this critical situation the World Federation of Scientific Workers considers that a new sense of urgency ought to be imparted into the conduct of negotiations so that the arms race, that saps the economic strength of countries and makes a mockery of the beneficent potentialities of science, could be ended.

A number of our members have had personal experience of the problems of radioactive fall-out and the contamination of food and living beings and are in a position to evaluate the significance of the most recent information. This Federation would greatly appreciate the privilege of sending a small international deputation of scientists to express to you our point of view on these most urgent problems of our time.

Yours very sincerely,
C. F. POWELL."
Dt. 10th Jan. 1959.

Mr. Khruschev agreed to receive an international delegation of scientists from the W.F.S.W. A delegation headed by Prof. C. F. Powell, President, W.F.S.W. will shortly meet him in Moscow. (*Reports have just been published in newspapers of the interview—detailed report will be printed later*).

General Assembly, 1959—Proposed Time table

Further information about the meetings being organised by the Federation during September in Warshaw has been obtained.

Dates : The symposium on 'Science in the development of economy and welfare of mankind' will be held on 24th, 25th and 26th September, 1959.

The General Assembly will be held in 27th and 28th September, 1959 ; the opening session being in the evening of 26th September.

Proposed Timetables :

23rd September, 1959—Meetings of General & Executive Council

24th, 25th & 26th September '59—
Symposium

26th September, 1959—Evening :—
Opening of General Assembly
Presidential address
Election of Presidium
Organisation of Commissions

27th September, 1959—Meeting of the Presidium
(agenda to include consideration of nominations)
Meetings of Commissions

28th September, 1959—Morning :—
Plenary Session
General Discussion
Report of Dr. Wooster on the Reports of Affiliated Organizations

Afternoon :—Closing Session
Reports of Commissions
Resolutions.

NOTICE

Applications (six copies) in the prescribed form obtained from the undersigned on payment of Re. 1|- per set by postal order, are invited not later than 5th August 1959 for the post of Lecturer in the Department of Organic Chemistry at the Institute in the grade Rs. 350-30|2-410-30-590-E.B.-30-770-40-850 plus dearness allowance admissible. The post is permanent and tenable upto the age of 60 years. The candidates in the service of Governments, Quasi Government or Government aided Institutions, Universities or similar Institutions should send their applications through their employers. Candidates with exceptionally high qualifications and experience may be sanctioned a higher starting salary by the Council.

It will be open to the ad hoc committee to select a candidate for the post of Senior Research Assistant in the grade Rs. 250-10-300-15-450-25|2-500 taking into consideration the qualifications and experience of the applicants.

QUALIFICATIONS : *Essential* : ( ) Fellowship of the Indian Institute of Science or a Doctorate in Organic Chemistry; (2) Post-doctorate research experience for at least three years; (3) Capability to conduct independent research work; (4) Knowledge of modern techniques, e.g. U.V. and I.R. Spectrometry, gas phase chromatography, etc., and modern concepts of organic chemistry. *Desirable* : Experience in synthetic organic chemistry.

Further particulars can be had on request.

A. G. PAI
REGISTRAR, INDIAN INSTITUTE OF SCIENCE
BANGALORE 12

HUNGER AND FOOD

SCIENCE AND MANKIND No. 1 (1959)

In this modern world of miracles, people still go hungry or do not get enough of the right kinds of food. Biologists, who could help solve these problems, are not in so great a demand as the physicists and engineers needed for the new developments in weapons and space travel. People accept the failures in food production and distribution because they do not know what is possible. In the belief that an informed public opinion can help to correct this situation, the World Federation of Scientific Workers presents an issue of SCIENCE AND MANKIND *devoted to the theme*

HUNGER AND FOOD

EDITED by Josué de Castro, former Chairman of the Executive Council of the Food and Agriculture Organization of the United Nations, this symposium has a contribution from Lord Boyd Orr, and includes articles dealing with the historical development of agriculture as well as the background to the recent phenomenal increases in agricultural production in China. Other contributions expose the shocking malnutrition in one of the biggest food-producing countries, Argentina, and the diseases due to excessive eating in some countries; and yet others deal with the fundamental of soil and photosynthesis—the basis of food production potentialities.

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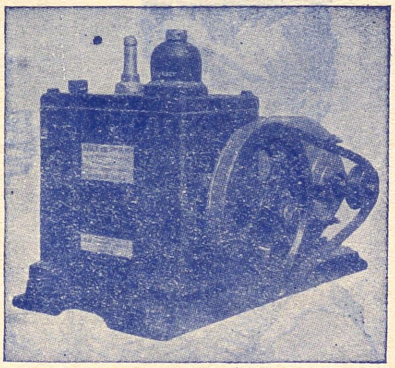

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