



VIJNAN KARMEE

Journal of the
Association of Scientific Workers of India

VOL XIX

JANUARY 1967

NO. 1

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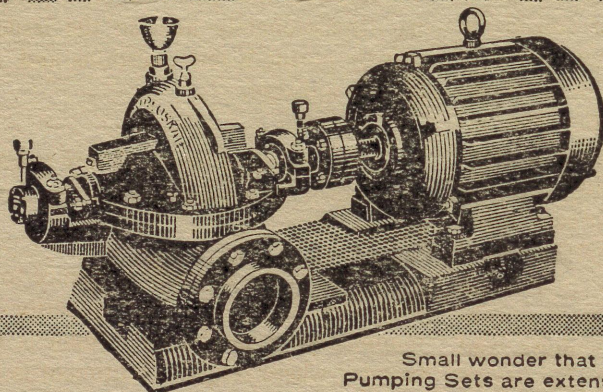
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Cow Agitation and Scientific Outlook

Happily Jagadguru Shankaracharya and Prabhudat Brahmachari have broken their fasts undertaken in support of Goraksha Samiti's demand for a total ban on slaughter of cow and its progeny. These fasts were preceded by a demonstration during the last session of the Parliament in which thousands of people including near-naked sadhus, men and women had participated. The demonstrations had turned violent and some anti-social elements indulged in arson and looting and damage to public property. The authorities responsible for law and order had to resort to firing resulting in deaths. Subsequently the Prime Minister considered it necessary to reshuffle her Cabinet. The cow agitation has become a factor in the forthcoming elections. Political parties and individual candidates have considered it expedient either to keep silent or side with the predominant trend by vying with each other to volunteer compromise formulas. Lest this political duststorm should blur clear thinking and scientific approach to the problem of animal husbandry, agriculture and cattle wealth, the position must be stated clearly and unequivocally.

The present agitation and demand is undoubtedly based on widespread religious sentiment about cow in the majority community and is indicative of the immensity of the task before the votaries of secularism, democracy and scientific outlook. In private conversation, discussions and even in the daily press dozens of articles have appeared repudiating the theory that

Hindus and Aryans were always cow-worshippers. Educated and enlightened members of the majority community totally reject the idea of spiritual holiness of the cow and the concept of the cow protection. It is to the credit of the Indian democratic set-up that such voices can be raised publicly. However, it is equally the weakness of the Indian secularism and democracy that no organisation or public leader has publicly characterised the present agitation for what it indisputably is—a communal revivalist attempt to foist medieval ideas of animal worship on the entire Indian people. Let us dispassionately analyse the issues involved by posing a few questions and attempting the answers:

1. *Is the cow endowed with any special virtue entitling it to a place of worship by human beings ?*

There is no scientific evidence to suggest that cow is in any way superior to most mammalian quadrupeds. India is the only country where religious sentiment is attached to the cow. In other countries such as U.S.A., U.K., Germany (West & East) Soviet Union, Japan, Thailand, UAR, Ghana, Nigeria, etc. and the rest of the world, cow is treated in proper perspective as a milch cattle and for protein food. Beef is taken by most communities including Buddhists the world over.

2. *Whatever the merits or otherwise of the agitation, will it not help Indian agriculture*

and dairy Industries and economy if total ban on slaughter of cow and its progeny is banned ?

It is the other way about. A total ban on slaughter of cow and its progeny is likely to harm Indian agriculture, dairy industry and economy. Although 70% of the population in India is engaged in agriculture and India has the largest proportion of available land under the plough, the country is still deficit in foodgrains and is dependent on imports to avoid widespread hunger and distress. Foodgrains is the single biggest item of foreign exchange expenditure for the country. Backwardness of Indian agriculture is partly attributable to its being animal based. Use of oxen and cattle for agricultural operations must give way to mechanised farming in the interest of economy and productivity. Cow-protection is likely to prove a negative factor in agricultural mechanisation.

So far as dairy industry is concerned, availability, and per capita consumption of milk and milk products in India is among the lowest in the world. The religious attitude to the cow has worked against introducing better breeds and elimination of poorer varieties and of putting the dairy industry on a scientific and commercial footing. The load due to non-destruction of non-productive and uneconomic cattle has strained the available fodder resources and proved detriment to the healthy growth of the dairy industry.

So far as economy is concerned, the ban

threatens to hit export earnings. The Chairman of the State Trading Corporation has warned that the loss of trade in raw and tanned hides and skins may run into crores of rupees in foreign exchange. It may hit the future of Shoe industry and trade, and raise the price of leather goods in the country and exports to other countries. Besides, unkempt, starving cattle wandering in bazaars and vegetable markets are a revolting sight and add to lowering the standards of sanitation and public health.

3. *What attitude should the scientists take ?*

The first requisite is that scientific workers should have the courage to think objectively, rising above the religious sentiments and emotions aroused by the agitation. They should have faith that objective truth and scientific principles are a greater social force than superstitions and religious dogma. They should appreciate the fact that milch cattle of the bovine species are a valuable national asset to be maintained and promoted through scientific practice of animal husbandry and improvement in breed. The main use of the bovine cattle is for milk and milk products, protein food and leather. This use should be satisfied in the most economic manner.

Cow worship has nothing in common with scientific attitude or rational thinking and it is the task of scientific workers to educate the masses on a correct approach to the problem.

INAUGURAL ADDRESS

by *Shrimati* INDIRA GANDHI, *Prime Minister of India*

at

The Fiftyfourth Indian Science Congress, Hyderabad (1967)

It is a special satisfaction for me to be with scientists.

India has now entered a most critical phase of her development—the scientific and technological phase. In our battle against poverty, we are really involved in making up some of the leeway in technological advance. At the moment we are concerned with creating an agricultural revolution to feed our growing numbers and to raise raw material resources for our industrial growth. The vital element in this effort is the introduction of new technology—the use of improved varieties of seed, the “chemicalisation” of agriculture with the use of fertilisers, pesticides and so on. Behind the progressive farmer stands the plant breeder, the chemist, the engineer, the meteorologist—all scientists.

Of all the changes being wrought by science, the most significant is the change in attitudes. The farmer is now ready to accept the new technology and the discipline which goes with it. Superstition and traditionalism are steadily yielding ground to science, to a scientific temper, a rational outlook. Yet we are by no means rid of the old type of thinking.

The scientist is the initiator of change. He holds the key to progress—and to destruction. In India he has necessarily to be one of the principal allies of Government and the people in the war on poverty. As

an educator and innovator he has to be in the forefront of the Indian revolution working in partnership with those who move the levers of the economy.

The many weaknesses in this partnership must be removed. The politician and the general administrator is each in his own way inclined towards tradition. All over the world, ideology—the sphere of the politician—has been increasingly influenced by technology which is the field of the scientist. This in turn demands specialisation, or at least specialised advice in management, administration and policy planning, some of which are the field of the administrator. In our country we have not yet achieved quite the right equation between all these elements.

However, the scientist cannot escape his share of responsibility for this state of affairs. He cannot remain in the seclusion of his laboratory nor retire from the battle of development. He must emerge and keep in constant touch with the people and their problems. He must popularise the answers which science has found.

Can we forget that the central fact of our lives today is poverty? Our politics is very largely the politics of poverty. Many of the particularist rivalries around us—of language, caste, community and region—are in great part no more than social and political manifestations of the scramble for

the limited jobs and opportunities available in a still poor and under-privileged society. Development itself is conditioned by lack of resources.

Despite the very considerable progress made since independence, the recent conflicts with China and Pakistan, the so-called "pause" in aid and two successive droughts have revealed our vulnerability. We have set ourselves the objective of becoming independent of food imports by 1971 and of being able to do without foreign assistance by 1975. This is *Swadeshi*—as much an attitude of mind and a process as a goal. In other words, *Swadeshi* has to be both the means and the end.

To go *Swadeshi* is a challenge and responsibility which our scientists should accept and share. Others also are deeply involved—the policy-maker, the administrator, the worker, the farmer and the consumer. But the scientist has a key rôle. It has been rightly said that India is not a poor country but a country of poor people. The country itself is rich since it is well endowed with an abundance and variety of natural resources and with a gifted people who possess many skills and are quick to acquire new ones. The location, mobilization, and harnessing of these natural resources offers an enormous field of endeavour to the scientist.

Scientists and specialists have also to carry knowledge from the laboratory or from the storehouse of world knowledge to the factory and the farm. They have to provide extension services and technical guidance, to translate and adapt the knowledge and experience of others into forms in which it can be applied usefully in Indian conditions. Even small improvements in a gadget here and a machine or method there can go far in cutting costs, improving quality and opening up new avenues of development.

We cannot afford to import know-how and foreign collaboration except where it is absolutely essential. It costs valuable foreign exchange. We want to give full scope for Indian research and the development of indigenous technology. Naturally, there may be exceptions to the rule. Time might be a vital factor and it may sometimes be in the national interest to invite foreign collaboration or to accept a proven foreign process, rather than wait even a year for an Indian equivalent. Or, it may be in our interest to accept such a process and concentrate our own scientific attention and resources on something new, something different. There can be no hard and fast rule in such matters. We have to meet the situations which arise.

The main opportunity and responsibility must be and is that of the Indian scientist. Our scientists will be far better placed to confront these challenges if they are more closely identified with industry and other users. This bridge exists but it is as yet somewhat fragile.

Mr. President, I was greatly interested in your reference to the origin and growth of the Indian Science Congress. You have urged the need for a reorientation of the functions of this Congress. I support your view that this Science Congress should provide effective liaison between scientists and the public, and should become a forum for scientists, industrial managers, engineers, farmers, administrators, economists and planners to discuss major developments in science and their application to national problems—what has to be done and how best it might be achieved.

We need to give more thought to the planning and management of research in India. Our research programmes should have specific objectives and time-schedule, and must fit into the structure of our development

plans. They should also be user-oriented and as far as possible the scientist and the user should be associated on each project.

Research priorities should be more clearly defined and foreign collaboration should be carefully fitted into a coherent scheme of national research programming. Once our research objectives are clear and specific, and linked to the broad time-table and priorities of development, budgeting for science and research would be more rational and generous and less amenable to *ad hoc* cuts or sudden changes. We certainly cannot afford to be niggardly in our investment in science. Nothing could be more short-sighted. But mere investment in science will also not make sense unless this investment is related to end uses. Science is such a vast field that it cannot be put under any one label. But there is something that has been termed "big science" which is very, very expensive and the technological application of which calls for huge capital expenditure. Not all science is "big science" nor should we be misled by bigness and false prestige. A good deal of modern research needs costly equipment. However, whatever the size and nature of a research programme, it ultimately has to be financed from its pay-off. This being so, over large areas of science, the old formula of R & D —Research and Development—will no longer suffice. The equation has to be extended to Design, Production and Marketing. If you look at this longer equation, R & D remains the problem of the scientist. Development, design and production concerns the technologist and engineer. Production and marketing lies within the province of the entrepreneur, manager and salesman. The administrator and the planner are interested in the entire formula.

The question of research planning is under the scientists' consideration. For its part, the Government would be glad to have

suggestions in this regard from scientists, universities and industry.

It is interesting that the Science Council of Japan elected by several thousands of member-scientists and technicians, has recently adopted a Five Year Science Plan presented by its Committee on long range research projects. You yourself, Mr. President, have referred to the British Association for the Advancement of Science. There are Academies of Science in the USSR, the United States and China. Apart from this Science Congress we have the National Institute of Sciences in India (NISI) in Delhi. Neither of these bodies nor any other provides the kind of broad forum which could organise and advance the concept of *Swadeshi* which I have described.

Some years ago we adopted a Scientific Policy Resolution. There is a Scientific Committee of the Cabinet. There are various bodies, councils, institutes and a growing number of research organisations directly financed by industry. But we have not yet organised a truly integrated structure of scientific effort and enquiry which is adequately related to the objects of national development and security. There are missing links and there are weak links. We are genuinely concerned about all these matters and seek your guidance and cooperation in finding appropriate answers.

I am certainly not opposed to pure science and fundamental research. I do recognize their importance. But I would be inclined to apportion the tasks of fundamental research and applied research broadly as between the universities on the one hand and the National Laboratories and similar institutions as well as industry on the other. Applied science and technology advance welfare; pure science enlarges the frontiers of knowledge. The two are indivisible each acting and reacting on the other. We must find a balance of priorities.

The problem of brain-drain is an international one. Western Europe also loses able scientists, technicians and specialists to the United States and Canada. This migration is caused not only by the greater opportunities for specialised work which the more advanced countries offer, but also in some respects by the lack of job opportunities in our country. Yet it is an absurd situation that a country like India, struggling with massive problems of development, should in fact be rendering technical assistance through the export of brain-power to the advanced nations of the West. This question is of vital interest to us and we must devise ways and means of preventing this type of intellectual waste. This has to be done not by restrictions, legislation or executive fiat, but by providing more and more creative opportunities for scientists and other specialists in India. Just as important is the creation of the right attitude

towards science and technology towards those who are working in these fields.

The practical application is our first concern since we can justify our respective callings only if through our work we can make a difference in the lives of our people. However, the importance of science is not limited to utility. Science has given man the opportunity to free himself from the tyranny of circumstance. It has proved also to be a unifier of mankind. The scientific method is the enemy both of privilege and prejudice. My father, who was delighted to be amongst scientists and identified himself with your organisation stressed the liberating role of science. He regarded it as his duty to bring about an alliance of modern science and ancient spiritual resources. Only in such an alliance can there be hope for the future of mankind. I trust that as those who usher in the future, scientists will work for this noble objective.

SCIENCE AND NATIONAL WELFARE

Presidential Address

by Prof. T.R. SESHADRI

at

Fiftyfourth Indian Science Congress, Hyderabad (1967)

Function of the Indian Science Congress: a reorientation

THE Annual Session of the Indian Science Congress has been an important event for Indian Scientists. This Congress was founded more than 50 years ago by a group of scientists which included several British savants working in India. The object was to provide an occasion for research workers to meet and discuss scientific problems and exchange views. It was originally a small body consisting mainly of University teachers and scholars. Later government organisations have played an important part and a considerable number of members of the public have also become interested in science. Thus from small meetings it has grown steadily in importance and size to its present large dimensions. There have been criticisms of its functioning; many of them are the result of misunderstanding. Still there are a number of points for the Congress to consider. At the time it was founded it was almost the only scientific society of all India character and it also had to provide opportunities for all branches of science to be discussed. Later specialist societies have sprung up in large numbers, not only for each major branch of science but also for sub-divisions. Further, there are a number of Academies which have charge of science at advanced levels. All these Academies and Scientific societies hold con-

ventions and seminars in specialised branches. There is need, therefore, for a reorientation of function for this large Science Congress. Such a change has taken place with similar science organisations in other countries, also; for example, the British Association for the Advancement of Science, on whose model the Indian Science Congress was founded, is now the major organisation for contact between British scientists and the British public. The annual meetings of the Association are arranged under the joint auspices of a University and a City-Council and the responsibilities are about equally divided between the Mayor and the Vice-Chancellor. It is an occasion for many special functions both in the University and in the city. I feel that we should also take effective steps to make this Science Congress more and more effective as liaison between scientists and the public. In an age of science this becomes an essential activity for a national body. Our annual meetings should be used for discussing more fully major developments in science and their application to national welfare; all activities which would be duplication of the work of specialist societies could be minimised. More emphasis should be placed on the science education of the youth—school and college students. Special programmes should be arranged for them e.g., special lectures, educational films and exhibitions. There is the question of language

for science teaching at different levels. Can we not have for this purpose a common language for our country if not for the whole world ? Equally important is the question of script. An excellent article on an ideal alphabet was published in Science and Culture last year by Prof. S. K. Chatterjee. It is worthy of wide study and adoption. The Indian Standards Institution could also help in this matter because alphabet is of industrial and technological importance. Again there is need to discuss the Science Policy of Government and how it has affected science, scientists and the nation; the Science Congress can provide the most suitable forum for this discussion. I am glad to state that at the initiative of our immediate past General Secretary, Dr. Atma Ram, this reorientation has already been initiated. I express a strong wish that it will be complete in the very near future.

I wish, specially, to thank the Prime Minister for her kindness in being present with us this afternoon and inaugurating this important session. I may here recall that her illustrious father ever since he took charge of the Government of this country as the First Prime Minister, rarely ever missed the Sessions of the Science Congress. This was one of the many ways by which he showed the great value he attached to Science and its applications. It was fortunate that he learnt science in Cambridge. All through his life he maintained a scientific outlook and worked for the progress of Science, understanding fully that it is an important tool for the welfare of the nation. We would request his worthy daughter also to follow the tradition set by him. Science can prove to be an efficient tool for the solution of many of our national problems. We all realise that we are passing through very critical times and we are faced with the problem of defence of our country and protection of our freedom. This is most important.

Equally pressing are the problems of Food and Health, Education and Population Control. In ancient days people used to go to wise men and sages in times of trouble. Now they seem to look up to scientists for the necessary help. Not only technology and industry based on science are essential but more important is the scientific approach to problems.

Science and spirituality

Though the present is an age of science, we are not sure if all understand correctly what it implies. Different people seem to understand it differently. The villager has probably not heard about it or thinks that it is something beyond his comprehension. To many a young student, it may just mean a career. To most of the public it may mean big machines and technology, to social workers modern amenities and comforts, to industrialists a source of fortune for themselves and for the nation and to administrators an item for taxation. To some thinkers its destructive aspect, such as high explosives and Atom Bombs, is repulsive and hence it is an object of condemnation. But careful analysis shows that all these are only some products of science, many good and many equally bad depending on individual standpoints, and they do not represent the spirit of science. Many observers have been disturbed by the feeling that science is antagonistic to religion more science may mean less of religion, less of ethics and less of true culture and all those that we associate with the finer and higher traits of human nature. This is a very important subject and the relation of science and religion has been engaging the attention of modern thinkers of our country from the time of Swami Vivekananda. A recent discussion is by Swami Ranganathananda who is well known as a religious teacher and Head of the Ramakrishna Mission Institute of Culture at Calcutta. The paper

entitled Swami Vivekananda's synthesis of Science and Religion was contributed to the Session of the Parliament of Religions held in January 1964 and published in book form. Owing to limitation of time I cannot go into the detail of his excellent arguments and the volume of data he has analysed. However, I may state here a few salient points and conclusions.

Indian thought upholds both religion and science as valid disciplines in the pursuit of truth. India's thinkers never found any contradiction between the two. The method of investigation in the field of religion is largely the same as in the positive sciences. A thorough scientific study of the facts of the inner life was undertaken by the great thinkers of ancient India; the insights which they gained were re-tested and amplified by a galaxy of subsequent thinkers. It is because of this that Indian spirituality has stood the test of time and is also fully hospitable to modern science.

He then concludes that there is no conflict between science and religion. Both have the identical aim of helping man to grow in spirituality, and of ushering in a better social order. Each by itself is insufficient and helpless. The combination today of the spiritual energies of these two complementary disciplines in the life of man will produce fully integrated human beings and thus help to evolve a complete human civilization. This synthesis is the most outstanding contribution of Swami Vivekananda to human thought of the present time.

It has been the conclusion of many thinkers that great movements in India have always had a basis in spirituality and her part in the harmony of nations is to play the spiritual note. The recent example of Gandhiji confirms that we have not lost the great tradition. His whole life was a grand effort to spiritualise politics. Will it not be far more easy to bring science and spirituality together?

Intellectual and Cultural Values of Science

From very ancient days Science has continued to have high intellectual and cultural values. Though culture is popularly associated with certain shows it is not easy to define, as numerous components are involved, the most important being the scientific and rational attitude of mind. Imagine what would have been the level of our ancient culture and civilization if the primary attitudes of enquiry and critical assessment and search for truth at all levels, physical, mental and spiritual, were not there. In the modern context this is forgotten and most of our cultural activities have very little of science component in them. There is another aspect of science and that is its importance for mental and intellectual health. All of us know how costly cricket is and all other sports including wrestling, boxing hunting, mountaineering and space travel. Sports are generally intended to foster bodily health and fitness, though this is frequently forgotten and the business part and other considerations become dominant. Mind is far more important, powerful and valuable and should be kept in proper health and condition. For this purpose nothing can be better than Science, and many great people obviously took to Science for this primary attraction. Very early in the history of civilization, Mathematics and Astronomy received attention. They continue to be attractive even now, though many other aspects of science have developed similar values in recent years for example, Particle Physics and Structural Chemistry and Molecular Biology.

The Macrocosm : Astronomy

The study of Astronomy is also capable of providing great spiritual inspiration. It is a unique means to have a glimpse of the Infinity by revealing the unimaginably vast extent of the universe we live in. There

is ample space if we could use it. Our earth and solar system form part of a large spiral galaxy of innumerable stars that is about one hundred thousand Light Years in diameter and our Sun is placed towards the edge of this system. This is an inconceivably large dimension but by no means as large as the universe made visible by long exposure photography coupled with large telescopes. In it the most distant galaxy is about five thousand million Light Years away. It is a distance difficult to conceive when we realise that light travels about 300 thousand kilometres a second. We understand how bright the Sun is, particularly in tropical countries. But the more recently studied quasars are ten to hundred times more luminous than the most luminous galaxy but they have only one tenth the size. This is again an inconceivably high luminosity. It is lucky we are so far away from them. We are thereby able to live safely and study them.

If astronomy refers to the infinite macrocosm and is an ancient science the opposite is provided by the more recent study of structural chemistry dealing with the tiny microcosm. In this field during the past 100 years great advances have been made in what may be described as "seeing the unseen". Things that cannot be seen even by the most powerful microscope, have been seen and pictured by the intricate study of molecular structure, a discipline that has been systematically developed by a large number of extraordinary intellects.

THE MICROCOSM

Structural Chemistry

All of us use the terms atoms and molecules. They represent objects that are very tiny indeed. They are normally unseen and the ordinary man sees only the gross appearance of objects that are aggregates of enormous number of molecules. The knowledge

of the gross is not unreal; it is only incomplete and partial and we see more and more fully when we understand the subtle details by deeper mental perception based on the effects we observe. We are steadily advancing towards fuller and fuller knowledge.

I can give one illustration. There is a valuable red substance called carotene which is present in carrot as its colouring matter and also in the leaves of plants. It is the source of vitamin A and hence is called pro-vitamin-A. An ordinary person without serious scientific education will describe it as a red crystalline substance. He can get a magnified picture of the crystals. He could also use it for colouring foods, particularly oil and ghee; besides colour it also adds to the food value. But for a chemist it means much more. Its molecules though extremely tiny are still complex; each molecule is represented by the formula $C_{40}H_{56}$ containing 96 atoms and these atoms are arranged in a definite manner having two rings and between them a long bridge. More recent studies have given further details. Not only do the electrons in it move under the influence of light and thus produce colour but the atoms of carbon and hydrogen oscillate making a breathing in and out movement. These are too subtle to be seen by the eye, but our minds can see them based on the effects noticed in what are called spectra. We can take the spectrum not only with visible light but also with ultra-violet and infra-red light. Raman spectrum provides another important method of study. Quite recently we have been using a further different method of observation; we call it 'Nuclear Magnetic Resonance spectrum'. This is an exceptionally powerful method and is based on the existence of spin of the nuclei of atoms. On account of this spin certain atomic nuclei e.g., protons behave like tiny magnets and make precessions in the earth's magnetic field somewhat similar to the precession of a

spinning top under the influence of gravity, and this property can be used for various studies. One of the discoverers of this phenomenon, Purcell in his Nobel Prize lecture narrates as follows:

"I have not yet lost a feeling of wonder and of delight, that this delicate motion (precession of nuclei) should reside in all the ordinary things around us revealing itself only to him who looks for it. I remember, in the winter of our first experiments, just seven years ago, looking on snow with new eyes. There the snow lay around my door-step, great heaps of protons quietly precessing in the earth's magnetic field".

Now in carotene we could picture not only the arrangement of atoms, the movement of electrons and the vibration of the atoms, but also the precession of the protons. This may not be the end of our vision, and we may in future see more fully.

Sub-atomic Particles

Subtler than the atoms are the sub-atomic particles and great advances have been made in their study in recent years. This is an outcome of our age-old interest in the nature of the fundamental constituents of matter. Our ancestors thought there existed five elements; their ideas were disproved. As chemistry developed, a large number of chemical elements were discovered. In nature there were about 92, but more were prepared artificially and all these could be classified, and arranged in the periodic table. Earlier in this century sub-atomic particles, electrons, protons and neutrons were discovered. Thirty years ago we developed the picture of neutrons and protons as the constituents of atomic nuclei and we had the feeling that we had reached the end of the search for fundamental particles. In the final analysis, it appeared that we could reduce the world to nucleons, electrons and quanta of radiation and their interactions. But this position

changed, especially after the last war; the study of cosmic radiation revealed a whole range of new particles, the mesons, baryons and antibaryons which had escaped earlier discovery because they were extremely short-lived. During the past ten years new accelerators and bubble chambers and sophisticated computing methods have increased the pace of discovery and a new world of phenomena has been revealed. The number of known particles, most of them exceedingly ephemeral, now exceeds one hundred, almost equal to that of the chemical elements. Quite recently a remarkable degree of order has been found among the particles and they can be arranged in well-defined groups. The validity of the groupings has been established by the predication of missing members and their properties and its verification. This is somewhat similar to what happened earlier with the atoms of the chemical elements and their classification.

If atomic and molecular universe gave us a picture of rotations, vibrations and precession, the sub-atomic level is a universe of rapid change and impermanence. Particles of all types are created and they are annihilated into other forms of matter and energy and they are capable of rapidly resuming their identity. Among the family of particles nucleons, electrons, and the quanta of radiation, are more familiar to us because they are the most stable at our temperatures. The idea that matter is made up of indestructible elementary particles called atoms has become untenable, and the universe that we know is subject to incessant and more or less rapid changes. This should provide an urge for the discovery and understanding of the underlying primary cause which is permanent, unchanging and indestructible on which depend all the changing phenomena.

These scientific developments have no doubt affected our civilization and science has become an indispensable and growing

part of our culture. The achievements of pure science have been claimed to have the same value as music and drama, literature, sculpture, architecture and painting and should be cherished as we do our epic poems, temples and monuments and cave paintings. They are the results of the creative spirit of man and its expression. At the same time some branches of pure science can be economically very important in their applications, as for example structural chemistry in relation to dyes, drugs and insecticides.

Not long ago, pure science cost us little. In the last century a distinguished scientist could have accommodated all his laboratory equipment in a tray and even more recently the laboratory in which the Raman Effect was discovered, had only an annual budget of a few thousand rupees; but now pure science in many of its branches has become highly expensive and in some cases like particle physics, space research and genetic code, it is so expensive that only a few rich nations with enormous resources can afford them. The danger is that even poorer ones have a tendency to emulate them with adverse effect on their national economy.

Science and Society

From the immensity of the macrocosmic universe and the subtle intricacies of the microcosmic universe we have to come down to think of the complexities of the ordinary world of every-day life. Here arise problems of food and clothing, housing, health and sanitation, education, communication and defence. They are all of immediate importance and require all our resources and earnest attention. Their solution depends on applied sciences and when successful can produce health and wealth on which depend the nation's capacity to sustain pure scientific research and promote culture. This point has been frequently voiced more particularly in the course of our recent discussions with leading

scientists in U.K. by our past General Secretary, Dr. Atma Ram, whose recent appointment to the responsible post of the Director-General of the C.S.I.R., has been widely welcomed. If we wish to maintain progress of pure science, there must be enough financial resources in the nation and they can be had only by the application of science for production and by the development of industries. Are we fully aware of this and do we devote enough time and energy for this essential purpose? It is the rapid progress of applied science and technology that has revolutionised all aspects of civilized life and created the familiar activities of the modern age, an age of jet and space travel, radio and television, vitamins and antibiotics, insecticides and fungicides, novel metals, plastics and polymers and glass, and of computers. These in their turn open out new areas of work in pure science. The phenomenal development of the dyestuff and drug industries in pre-war Germany is stated to have given direct stimulus to the marked growth of structural chemistry in that country.

It is with a view to promote the application of science to technology that the large number of National Laboratories and other laboratories have been set up in quick succession in our country during the past 20 years. They have been conceived in a big way, built with great speed and well provided with staff and equipment. But the fear has been expressed that several of them have not concentrated their capacity on applied scientific research with the result the resources have not been brought to bear effectively in producing results of economic value. Most of the staff seem to have come with only an academic background with little experience of industry and have not been successfully oriented towards project work of technical importance. Consequently there has been an attempt to make the National Laboratories

duplication of universities with the end result that both types of institutions tend to suffer.

Our national need for applied research is so great that in the present context even universities will have to focus their attention on research of this nature. Long ago the main function of a University was teaching. Research was done by enthusiasts, not always in universities but also outside in academies and in many cases by rich people in their own homes. It soon became a normal function of universities. In a democratic and scientific age, a third function is becoming more and more prominent, that is national service. In an ideal university, these functions can be complementary and need not be competitive and each can be done better because of the presence of the others. Normal research programmes are intended primarily for the training of students and for the advancement of science including techniques and concepts. Other programmes can be undertaken as service to the State or to industry and should now be considered as a service function of the University. Since this service research in Universities requires considerable finance which no university can afford adequate financial help from Government and Science Research Councils is necessary to enable this function to be effectively performed.

A mistaken impression seems to persist that discoveries in pure science are valued more than their application to technology. There is no justification for this. In earlier years, most scientific work was of applied nature and what is called pure science is a later development. Achievements in either line have received appreciation; as a matter of fact practical application provides more tangible rewards. However, fashions exist as elsewhere in scientific research also. Devotees of pure science seem to be more prone to this influence. The more abstract the subjects are the purer they can be; there are

surely many interesting intellectual exercises, and there are many others that are mere repetitions and are not so interesting, but in the context of our national needs most of them may merely lead to exertion and not to worthwhile results. They can have validity and fulfilment only when they are capable of application.

Science Policy

The spirit of India is embodied in the concept of secular state that it has adopted for its Constitution. As frequently explained by our leaders it was not intended to be an irreligious state but a state which does not impose any particular religion. Another aspect is the scientific policy which the Parliament has adopted in an important resolution which gives a place of honour to science and to scientists and seeks to involve them in all aspects of planning and development. By this India has become wedded to science and technology, not only for the purpose of the physical goods and power that they can give, but also for the scientific spirit and way of life which will solve many problems of life and society objectively without fear or favour but with good feeling and wisdom. The responsibilities of a modern welfare state are increasingly large. They are no longer merely protective, concerned only to see that wrong things are not done, and that law and order are maintained, but also developmental, increasingly concerned with the promotion of useful and constructive projects utilising all available resources. In this new and more positive role the pursuit and promotion of science will be very much for the advantage of the nation. This places great responsibility on scientists and they have not only to work for the advancement and proper utilization of science but also to see that scientific work and achievements are not misapplied.

Recently there have been frequent dis-

cussions on the budget allotted by Government for scientific research. Two obviously important sides to the question have been emphasised. One view is that the money allotted is not enough and compares very unfavourably with that spent by other advanced countries, and that if India wishes to have a sound base of science and technology the expenditure on research and development should be not less than one per cent of the gross national product. The other view is that we have increased our commitments to science fairly fast to the tune of over 100 crores of Central and States budget excluding expenditure on research in universities, and raises the issue whether scientific potential in the country has advanced in the same rapid proportion and whether the results are commensurate with the expenditure. Since ours is a poor country with a number of rival demands like food, health and education, there is need to assess carefully at every stage whether any fresh expenditure is justified and will be fruitful. These are no doubt useful considerations to be kept in mind. The problem of budget is a difficult one to solve and needs a great deal of objective thinking. Since there is no abundance, questions of urgency and national priorities arise. Unfortunately the cost of everything is on the increase and the cost of science teaching and scientific research cannot be otherwise. Besides adequate increase in budget there is another way of meeting the situation. Utmost economy by all possible means and prevention of waste in all possible forms should seriously exercise our minds, since according to the old proverb money saved is money gained.

There is still another point which we should not overlook. Money and materials alone do not secure good research; they are only adjuncts and it is the human element behind them that does. Leadership in this context

is of utmost importance. Not only in war, not only in big business and industry, but also in research there is what is known as "strategy". We have all appreciated great generals who, with small armies and limited weapons, have over-powered larger and better equipped adversaries. Similarly with small resources great men have built up large industries. We can ignore leadership in the field of scientific research only at the cost of the nation's security and prosperity.

In this connection the mental climate of scientific workers becomes a matter of primary importance and we do not seem to have given sufficient attention to it in our educational system. Creative science has been claimed to be one of the greatest activities of the human mind and spirit. There is great need therefore for adequate preparation of the mind for this supreme effort. The essential steps in the training are described in *Raja Yoga*, the path of Mental Control. According to Patanjali the first step is *Yama* which includes the practice of non-killing, truthfulness, non-stealing, continence and non-receiving of gifts. Next is *Niyama* which includes cleanliness, contentment, austerity, study and self surrender to God. These are mental and moral disciplines to be strictly practised; they purify the mind and give it special powers of discrimination and dispassion. There is no doubt that a pure and strong mind sees truth clearly and the practice of science then becomes fruitful; not only this, the proper utilisation of science is also assured. In our traditional thinking without these essential steps further progress is not only unfruitful but dangerous. This is true even today. If there is danger in science it can arise from the lack of this mental and moral base. Even a little of this good training can yield great results.

In the organisation of scientific research emphasis has been rightly laid on bringing

together groups of scientists having complementary skills and talents and making them work in an atmosphere of mutual understanding and goodwill. It is however doubtful if due importance is given to the dedicated scientist who has also faith in his work and is capable of leadership. Talents differ widely among scientists. Some are narrow specialists and some others are good in human relations. But at the present time where team work is essential we need a good combination of the two capacities in leader and it is rare indeed.

Again there is the distinction between devotees of Pure Science and Applied Science subjects. It has been felt that the distinction and delimitation are difficult and many scientists have been good in both. In general however the two aspects seem to depend on different attitudes and capabilities. If one needs men of thought who are contemplative, the other needs men of action who are alert and enterprising; both types are necessary because they are complementary to each other. Not long ago the discovery

and its utilisation were matters left to individual enterprise and were slow. Now they have become urgent and important because most scientists are maintained by public funds in the expectation of quick and useful results.

In a welfare state we are very much concerned about incentives. Monetary rewards have obvious limits. In the alternative our minds should be hitched to higher ideals which have no such limitations. According to the scriptures the twin ideals of every human being should be (1) liberation or uplift of the Individual and (2) the good of the World. Science is in reality an excellent means for developing the mind and spirit to achieve higher goals. If this faith could grow among scientists, their status will rise remarkably and the ancient Vedic prayer which is equally the prayer of modern science will be fully answered:

From the unreal lead me to the real
From darkness lead me to light
From death lead me to immortality.

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ASWI ACTIVITIES

Mysore Branch

The Annual General Body Meeting of the Branch was held on 29th January 1967. Apart from discussing the annual report presented by the Secretary and the Treasurer, various organisational questions like amendment to the ASWI constitution, formation of an ASWI-CSIR and other measures to strengthen the Association were discussed. Two resolutions pertaining to (a) the 5 years assessment and promotion rule of the CSIR and (b) study leave were discussed and passed.

The following were elected to the Branch Executive Committee for 1967.

<i>President</i>	: Dr. Narendra Singh
<i>Vice-Presidents</i>	: Prof. J. R. Lakshmana Rao Dr. V.S. Nair
<i>Hon. Secretary</i>	: Dr. K.R. Bhattacharya
<i>Hon. Jt. Secretary</i>	: Sri A.M. Nanjundaswamy
<i>Hon. Treasurer</i>	: Sri R.Y. Vasudeva
<i>Members :</i>	

Servshri B. Anandaswamy, A.K. Chatterjee, N.P. Dani, S.A. Jaleel, G.V. Krishnamurthy, P. Narasimham, M.V. Patwardhan, B.R. Ramanna, N.S. Singh, K.G. Sreedharan Unni, B.R. Srihari, P.V. Subba Rao, M.N. Vasudeva Rao.

Annual Report

1. Membership was 165 at the start of the year, 17 left, 87 joined (2 on transfer), bringing the final number to 235.

2. *Meetings* :—The Executive Committee met 11 times and General Body twice during

the year. Besides, there were 7 general discussion meetings and numerous study group meetings. Eight delegates attended the Annual Council meeting (28-2-1966 to 1-3-1966) and several attended the CAAUST symposium (25th April—2 May 1966). Dr. B.L. Amla and Dr. Narendra Singh were elected to the CEC.

3. *Service conditions etc* :—Suitable actions were taken concerning special casual leave for central delegates, and on several representations of members concerning 5-year assessment rule, study leave etc. The position of the cadre of J.S.O. is still ambiguous in CSIR and becomes unfortunate and discriminatory in relation to the 5-year assessment and promotion rule of SSA's. This must be pursued and rectified.

An opinion poll on the CFTRI working hours was conducted.

4. *Professional help* :—AIC examination and Russian language classes were arranged for members with voluntary help.

Means of improving the qualification of B.Sc's were considered. After thorough study, a draft amendment to the rules concerning the Ph.D. degree of the Mysore University was submitted to the University. The amendment envisages registration of B.Sc's for Ph.D. after five years of research followed by passing of a special university examination.

Dr. N.P. Gupta addressed a meeting on problems of scientific and technological development on 19th May 1966. Mr. A. Rahman gave a talk on social and historical factors in the evolution of scientific tradition in India, on 6th July, 1966.

Dear Reader,

There has been widespread interest in the subject of "Brain Drain". Recently some reputed daily newspapers have come out with editorials on the subject. The Survey & Planning Organisation of the CSIR have published a study on the "Flight of Scientific Personnel". Eminent scientists like Dr. C. V. Raman, Dr. Atma Ram and some others have also expressed their views on the subject.

Undoubtedly in the development of industrial and economic growth, quality and numbers of scientific and technical personnel are the kingpin. Is India losing a significant number of its trained personnel to the advanced countries? What should be the attitude of the country to the problem of getting back scientific and technical personnel studying or settled abroad; whether their incursion into the pool of scientific and technical manpower in the country would help the process of industrial and economic growth, or would getting them back only add to the problems of the country, has the 'scientists pool' set up by the CSIR 6-7 years back helped the scientific and technical personnel particularly those who would like to return back to country or has the money invested been only productive of human and social problems?

These are burning topics which should be the concern of not only the Government but of every thinking scientist. VIJNAN KARMEE proposes to devote its issue appearing in April 1967 entirely to the problem of "Brain Drain". Communications, letters to editor or studies in this regard would be gladly accepted for publication in V.K. All publications would, if desired, be paid at the usual rates of VK, i.e. Rs. 25/- per page upto a maximum of Rs. 100/- per article and Rs. 15/- per page upto a maximum of Rs. 25/- per letter.

Editor

JAMSHEDPUR STEELMEN WIN SHRAM VIR NATIONAL AWARDS

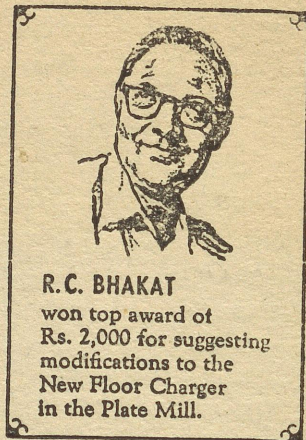
In March 1966, the Government of India held the first ceremony to honour the country's new heroes—technicians and industrial workers—with *Shram Vir* National Awards. These awards will be made every year in recognition of suggestions leading to higher production at less cost.

Of the 27 awards this year, no less than five, including two top prizes, went to Tata Steel employees—the largest number won by any industrial unit in the country.

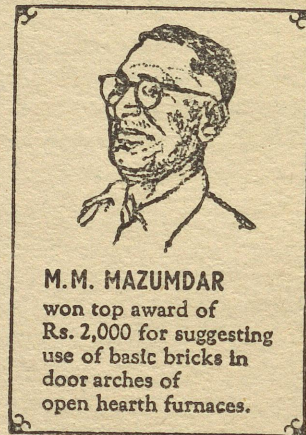
At Jamshedpur, during the last 20 years, employees have put forward over 12,000 suggestions, of which nearly 1,000 have been accepted. These suggestions have helped to increase productivity and make operations safer, and have led to the utilisation of local know-how and materials for self-reliance.

Tata Steel is proud that it pioneered the Suggestion Box Scheme to encourage initiative from the shop floor ... a scheme which is becoming a standard industrial practice in India today.

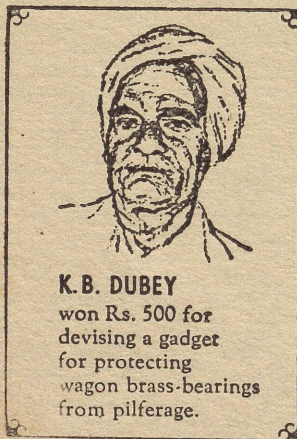
TATA STEEL



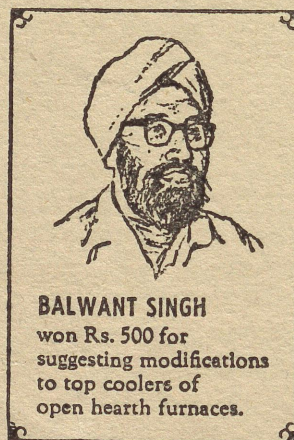
R.C. BHAKAT
won top award of
Rs. 2,000 for suggesting
modifications to the
New Floor Charger
in the Plate Mill.



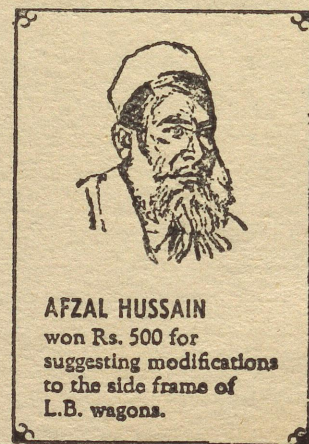
M.M. MAZUMDAR
won top award of
Rs. 2,000 for suggesting
use of basic bricks in
door arches of
open hearth furnaces.



K.B. DUBEY
won Rs. 500 for
devising a gadget
for protecting
wagon brass-bearings
from pilferage.



BALWANT SINGH
won Rs. 500 for
suggesting modifications
to top coolers of
open hearth furnaces.



AFZAL HUSSAIN
won Rs. 500 for
suggesting modifications
to the side frames of
L.B. wagons.

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VIJNAN KARMEE

Journal of the
Association of Scientific Workers of India

VOL. XIX

FEBRUARY-MARCH 1967

NOs. 2-3

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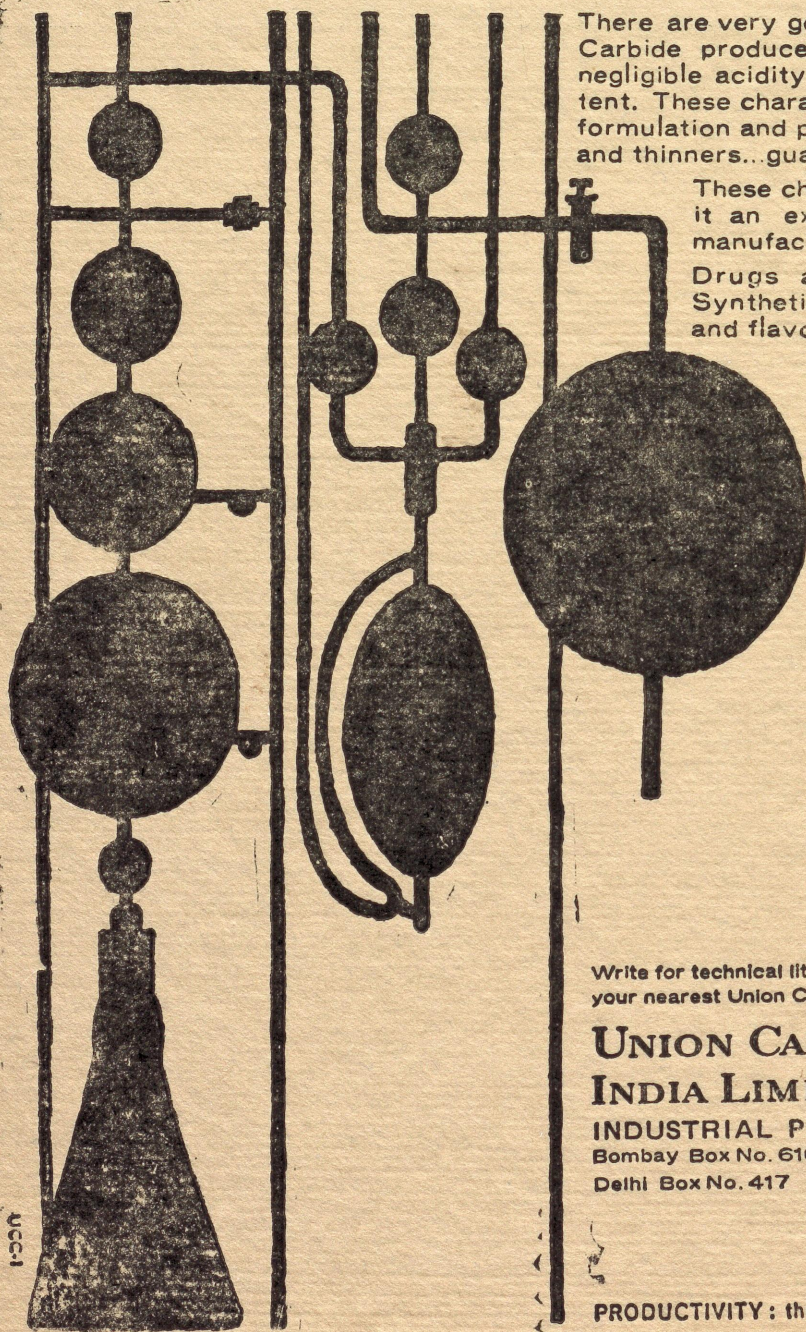
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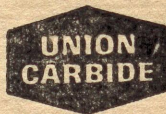
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Editorial

This issue is completely devoted to reporting of the proceedings of the Central Executive and the Council meetings of the ASWI held in the second week of March 1967. The meetings were characterised by free and frank discussions on various topics related to organisational matters and scientific research, service conditions, emoluments and status of scientific workers etc. Perhaps the theme which loomed large in the discussions was the role of Vijnan Karmee in building up a powerful movement of scientific workers to achieve the aims and objectives of the Association. While it was widely recognised that VK could be an instrument for strengthening the organisation, it was equally appreciated that unless there was a substantial support to stabilise its financial and organisational set up, it would not be able to fulfil this role. Various resolutions on the enhancement of the membership fee, voluntary contributions to VK and levy on the branches were moved but were not adopted. Ultimately it was agreed by most of the branches that every effort will be made to provide financial support by voluntary levy and advertisement revenue. During last few years, in spite of appeals published in V.K., the ASWI have not received any monetary contributions or advertisements from the branches. Unless the branches recognise the critical stage through which the Journal is passing and impress upon the

members that something tangible and concrete needs to be done, all brave talk of building up of the organisation will remain so much of wishful thinking. It might be a useful idea that every branch organises and discusses in a special meeting as to how they could contribute financially and materially by way of advertisements, contributions, articles to the VK. Mere reporting of 'organisational matters' could hardly build up ASWI unless worthwhile contributions on such matters which impinge on the daily life and professional work of scientific workers, such as the effect of rising prices on the standard of living, salary structure, recruitment policies and procedures, status of the scientific workers, role of scientific and technical personnel in economic growth, Science Policy, nuclear non-proliferation Treaty etc. are widely discussed and views reported for publication in the VK. The branches can also organise surveys on the state of work in their research and teaching institutions and express opinions on such vital matters as Report of the Education Commission, Science reorganisation, Ministry of Technology, "Brain-Drain" and so on. Unless the branches discuss and build up democratic opinion among the scientific workers, the Bureau of ASWI or the Central Executive, however, well-intentioned, can hardly make an impact on the policies and programmes of the country.

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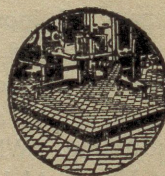
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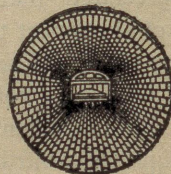
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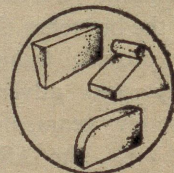
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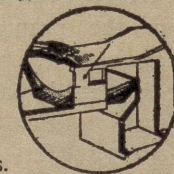
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C.E.C. MEETING

A meeting of the Central Executive Committee was held at 5.00 P.M. on 10th March 1967 in the auditorium of National Institute of Sciences, New Delhi. Dr. N.P. Gupta, the President of ASWI, presided over the meeting. The following members were present:

Dr. N.P. Gupta	President
Shri S.V. Kulkarni	Vice President
Shri Baldev Singh	Gen. Secy. (Publications)
Shri A. Rahman	Gen. Secy. (International Relations)
Shri Y.R. Chadha	Gen. Secy. (Organization)
Dr. S.K. Roy	Treasurer
Shri G.V. Subramanya	Faridabad
Dr. S. Husain Zaheer	Hyderabad
Dr. Narendra Singh	Mysore
Dr. N.M. Khanna	Lucknow
Shri K.S.A. Gnanasekaran	Karaikudi
Shri S.P. Saxena	Kirkee
Dr. T.C. Phatak	Roorkee
Shri V.N. Misra	Durgapur
Shri Y.V. Talwar	Jammu
Dr. K.R. Bhattacharya	Mysore
Dr. Y.V. Kathavate	IARI, New Delhi
Shri K.P. Mukherjee	Dhanbad
Dr. A.K. Lahiri	Jamshedpur
Shri S. Venkatesan	Karaikudi (By invitation)
Shri Ram Prasad	NPL, New Delhi ,,
Shri S. Dutta	CSIR, New Delhi ,,
Dr. Jagdish Seth	IARI, New Delhi ,,
Shri R.C. Tewari	CSIR, New Delhi ,,
Shri D. Bhattacharya	Dhanbad

Shri S. Dutta, Convener of the Local

Reception Committee extended a hearty welcome to the CEC delegates.

The President suggested slight modifications in the agenda originally presented and they were approved.

2. Minutes of the previous meeting

The minutes of the CEC meeting held on 1.5.66 was presented by the Gen. Secretary (Org.). Shri K.S.A. Gnanasekaran, Karaikudi delegate pointed out an omission, i.e. acceptance in principle to hold a National Convention-cum-Symposium, at Karaikudi. Dr. Narendra Singh suggested that in item 5 of the minutes, titles of the resolution be included. Shri A. Rahman pointed out that Dr. S. Husain Zaheer's name in item 2 i.e., members present, had not been recorded. The minutes were adopted with the acceptance to incorporate these amendments.

3. Matters Arising

On enquiry from members, Gen. Secy. (Org.) gave a detailed account of action taken on the various resolutions as per decision of the previous CEC meeting.

4. Report of the Gen. Secy (Org.)

Gen. Secy (Org.) presented his report for the year 1966-67 for ratification. Latest information regarding the number of members in the branches was furnished. Discussions were held on many points in the report.

4.1 Dr. S. Husain Zaheer wanted more details on the resolution on formation of 'National Science Council'. He suggested that the Scientific Advisory Committee of the Cabinet may be apprised properly of the

VIJNAN KARMEE

viewpoint of ASWI in this regard. He stressed the need for a permanent office building for ASWI and asked for a suitable budget estimate.

4.2 Dr. Narendra Singh started discussions on affiliation with Indian National Commissions for co-operation with UNESCO and the Indian Parliamentary & Scientific Committee. He wanted the pros and cons of joining such bodies to be examined. Dr. Zaheer pointed out that a body like Indian Parliamentary & Scientific Committee has lot of potentialities and ASWI should regularly send its representatives to attend such Committee/Commission meetings and the representatives should in turn present reports on such meetings.

4.3 Dr. N.P. Gupta stressed the need for the contact of ASWI at all levels—from Parliament down to Panchayat.

4.4 It was suggested that a Commission may be formed to explore the possibility of ASWI's contact at various levels. It was brought to the notice of CEC by a delegate that Defence Science workers were trying to form a Federation apart from ASWI. Dr. Lahiri felt that the President ASWI may try to contact Defence Scientific Workers and try to affiliate them into ASWI, as another all India-body may weaken both the bodies.

5. Report of the General Secretary (Publications)

General Secretary (Publications) presented

his report on V.K. It was decided that discussions on some salient features would be taken up in the Council meeting.

6. Shri Rahman General Secretary (International Relations) had not submitted report on CAAUST symposium for various reasons. Dr. Zaheer agreed to present a report on CAAUST to the Council. Regarding the link of ASWI with CAAUST, it was felt that for 'CAAUST Movement', India would contribute through ASWI.

7. Report of the Treasurer

Treasurer presented his report and explained the financial problems. Dr. Zaheer stressed the need for budget estimates which should include provision for an office and staff for ASWI. The Treasurer explained the difficulties involved in getting Govt. grants. The need for the branches to contribute their share and some reserve amount, if any, was stressed by the Treasurer. It was decided that further discussions were to be held at the Council meeting.

8. Dr. Narendra Singh presented some of the important proposals regarding the amendments to the Constitution. There was good deal of discussion on every point and it was decided to take up the matter in the Council.

9. The meeting ended with a vote of thanks to the Chair.

ANNUAL COUNCIL MEETING

*Proceedings of the Twentieth Meeting of the Council of the ASWI held in
New Delhi on March 11-12, 1967.*

The 20th Annual meeting of the Council of the ASWI was held in the Auditorium of the National Institute of Sciences of India, New Delhi on 11th and 12th March, 1967. Dr. N.P. Gupta, the President of ASWI, presided over the meeting.

The following were present:

Dr. N.P. Gupta	<i>President</i>	Shri S. Dutta	<i>CSIR</i>
Shri S.V. Kulkarni	<i>Vice President</i>	Shri A.S. Raizada	"
Shri Y.R. Chadha	<i>Gen. Secretary (Organization)</i>	Shri R.C. Tewari	"
Shri Baldev Singh	<i>Gen. Secretary (Publications)</i>	Shri Ram Prasad	"
Shri A. Rahman	<i>Gen. Secy. (International Relations)</i>	Shri S.P. Saxena	<i>Kirkee, Poona</i>
Dr. S.K. Roy	<i>Treasurer</i>	Shri K.P. Mukherjee	<i>Dhanbad</i>
Dr. Narendra Singh	<i>Mysore</i>	Shri D. Bhattacharya	"
Dr. N.M. Khanna	<i>Lucknow</i>	Shri V.N. Misra	<i>Durgapur</i>
Dr. S.H. Zaheer	<i>Hyderabad</i>	Shri Syed Sirajul Husain	<i>Hyderabad</i>
Shri G.V. Subramanya	<i>Faridabad</i>	Dr. T.C. Phatak	<i>Roorkee</i>
Dr. Y.V. Kathavate	<i>IARI, New Delhi</i>	Shri Y.P. Talwar	<i>Jammu</i>
Dr. K.R. Bhattacharya	<i>Mysore</i>	Shri Haripal	<i>Jammu</i>
Shri N.S. Singh	<i>Mysore</i>	Shri K. Kashyapa	<i>CSIR (by invitation)</i>
Shri G. Radhakrishanaiah Setty	<i>Mysore</i>	Shri S.B. Deshaprabhu	"
Shri J. Venkateshiah	<i>Mysore</i>	Shri D. Elhence	"
Dr. A.K. Lahiri	<i>Jamshedpur</i>		
Dr. R.K. Dubey	<i>Jamshedpur</i>		
Shri T.V. Prasad	<i>Jamshedpur</i>		
Shri S.K. Bose	<i>Jamshedpur</i>		
Shri S.P. Das Gupta	<i>Jamshedpur</i>		
Shri S.B. Mandal	<i>Jamshedpur</i>		
Shri A.K. Bose	<i>Jamshedpur</i>		
Shri K.S.A. Gnanasekaran	<i>Karaikudi</i>		
Shri S. Venkatesan	<i>Karaikudi</i>		
Shri N. Subramanya	<i>Karaikudi</i>		
Dr. J. Seth	<i>IARI, Delhi</i>		

After the introduction of the delegates, the agenda of the Council was discussed and approved as given below:

1. Confirmation of the minutes of the 19th meeting of the Council held on 28.2.66 & 1.3.66.
2. Matters arising out of the meeting. 2(a) SSA/STA Document.
3. Reports from Branches
4. Report of the General Secretary (Orgn.)
5. Report of the Treasurer
6. Report on CAAUST Symposium
7. Report on World Federation of Scientific Workers
8. Report of the General Secretary (Publications)

9. Discussion on the future policies and programme of ASWI
10. Amendments to the Constitution
11. Formation of ASW—CSIR
12. Resolutions
13. Elections
14. Any other business

1. Confirmation of the minutes of the 19th Council meeting

The minutes already published in March 1966 issue of *Vijnan Karmee* were taken as read and confirmed.

2. Matters arising out of the minutes

2.1 Several delegates were keen to know the action taken by the Centre on the various resolutions passed in the last Council meeting. General Secretary (Orgn.) placed before them the salient features of the resolutions and action taken over them. He was not very happy about the outcome in the form of response from the concerned authorities. He solicited suggestions in this regard from the Council delegates.

2.2 The lively discussion that followed centred round the topic whether a limited number of resolutions should be passed which could be adequately followed up or there should be no limit. The Council agreed that the Branches should give full thought to the resolutions and discuss them in all aspects before finally placing them at the Council meeting. Further action to be taken should be specified in the resolution to enable the CEC to take proper follow-up action. It was also felt that there should be no limit on passing the number of resolutions, since these generally expressed the views and aspirations of the Scientific Community and hence were very valuable. It was possible that in some cases action might be taken on them by the authorities without the

Association's knowledge. A suggestion was made that some of the resolutions could be sent to the Prime Minister's Committee on Organisation of Scientific Research.

2.3 It was agreed that though adequate follow-up action had not been taken on the resolutions, but under the conditions the Branches and the Centre were functioning they were doing their best. It was felt that a permanent office for ASWI and some secretarial assistance might improve matters.

2.4 There was some discussion on the relationship between ASWI and CAAUST Symposium. Dr. Zaheer emphasised the role ASWI played in organising the symposium which was very much appreciated and that ASWI should continue to take interest in the "CAAUST Movement".

2.5 *SSA/STA Document*: The report on the adverse revision of pay scales of SSA/STA in CSIR prepared by Shri T.V. Prasad with the help of a sub-committee of the Jamshedpur Branch of ASWI was discussed and adopted. It was decided that a copy of the report be sent to the DGSIR or Secretary, CSIR, and also the Vice-President, CSIR, for consideration, necessary action, and restoration of the old pay scales with an annual increment of Rs. 25/- in place of the revised pay scale. The Bureau was to take the necessary follow-up action.

3. Reports from the Branches

The reports on the activities of the following Branches were presented by the respective Branch Secretaries/representatives for the year 1966.

1. CSIR Branch, New Delhi
2. Dhanbad Branch
3. Durgapur Branch
4. Hyderabad Branch
5. IARI Branch, New Delhi

6. Jammu Branch
7. Jamshedpur Branch
8. Karaikudi Branch
9. Kirkee (affiliated organization)
10. Lucknow Branch
11. Mysore Branch
12. Roorkee

The activities included arranging lectures, organising classes for scientific staff to improve their qualifications (enabling them to appear for professional examinations like AIIM, ARIC, etc.) and forming study groups to consolidate views affecting service conditions, publication of scientific work, reorganisation of research on the basis of project-oriented research, etc. The difficulties encountered in carrying out the activities were also brought out. It was considered useful to exchange the documents prepared by the study groups, either direct or through the Centre for proper functioning of the Branches.

4. Report of the General Secretary (Orgn.)

Report was presented, discussed and then adopted unanimously. Copies of the first volume of the proceedings of the Symposium 'Science & Nation' were distributed to the members attending the Council meeting.

5. Report of the Treasurer

5.1 Presenting the report, the Treasurer brought to the notice of the Council delegates the financial difficulties of the ASWI. He suggested that all efforts should be made by everybody to augment the financial position of ASWI. There was some discussion on the provision made for International Travel. It was explained that the Association funds as such had never been used for this purpose, and the provision merely reflects the international obligations and outlook of the Association. Dr. Zaheer felt that the provision in the budget for the coming financial year for office and staff was inadequate and

another Rs. 14,000 should be provided. It was also decided that an ad hoc receipt of Rs. 5,000 should be provided as a special fund and Branches should try to contribute to this by donations. With these modifications the report of the treasurer was adopted.

5.2 Dr. S.H. Zaheer announced a donation of Rs. 300/- to the special fund which was gratefully accepted.

5.3 It was decided that M/s K.C. Gupta & Co. may be appointed Auditors with the proviso that fee to be paid to them may be negotiated by the Bureau of CEC.

5.4 Decided that the following advances for expenses, being irrecoverable, be written off—(1) Shri AK Singh—Rs. 22.40; (2) Shri D.V. Verma—Rs. 40.64; (3) Shri S. Ram Bhadrans—Rs. 46.58, Shri M.R. Raman—Rs. 79.55 and Shri J.S. Yadav Rs. 94.20.

6. Report on CAAUST

Dr. Zaheer presented a report on the CAAUST Symposium. The report was discussed and adopted.

7. Report on World Federation of Scientific Workers

The report was presented by Dr. N.P. Gupta along with byelaws for the *New Delhi Regional Centre* (NDRC) and it was endorsed by the Council. He suggested that a page could be provided in *Vijnan Karmee* for news from NDRC on payment basis. The NDRC would also take up the work of distribution of 'Scientific World'.

8. Report of General Secretary (Publications)

8.1 Presenting the report, the General Secretary (Publications) brought to the attention of the Council delegates the precarious financial position. The efforts made by him in cutting down the cost of publication of V.K. and in augmenting the financial position by advertisement, were very much appreciated. Some of the branch delegates promised to secure more advertisements.

8.2 Then a long discussion followed on the basis of notes on V.K. by Dr. N.P. Gupta and Dr. Bhattacharya. Some members expressed the view that V.K. in its present form did not function as a forum of the organisation of ASWI. Others criticised that some articles published have adversely affected the cause of ASWI. Some suggested an active editorial board should be constituted and Bureau should be consulted regarding policy matters. The General Secretary stated that the deficiencies pointed out could be overcome, better liaison could be kept; the cost reduction would be tried without affecting size and more emphasis would be given to organisational matters. It was decided to adopt a resolution embodying the main points of discussion. The report of the General Secretary (Publications) was adopted unanimously.

9. ASWI—Future Policies and programme

Discussions on how to strengthen ASWI ensued based on a note by Dr. Gupta, which was circulated to members earlier. (i) Opening of new Branches, setting up Regional Committees & widening the scope of ASWI by enrolling members from Universities, public sector undertakings and Defence Establishments, etc., (ii) Organising Symposia on subjects affecting science and scientists (on science & scientific research, growth of scientific institutes, recruitment, promotion & service conditions of scientific personnel) to evolve policies, (iii) Devoting more space in Vijnan Karmee for organisational matters, (iv) Striving for official policies on important national issues like Development of Science & Technology, Science Education, Food & Agricultural problems etc. and (v) Organising the Annual Council meetings in the Branches, were some of the suggestions made by members. Need for good publicity for the activities of the Association was also stressed.

10. Amendments to the Constitution

Dr. Narendra Singh presented the salient features of the proposals for amending the Constitution of the ASWI. Since majority of the Branches had not so far given their comments, the members felt that this item be referred back to the Sub-Committee, requesting the Branches to send their comments to the Convener Dr. Narendra Singh of Mysore by the end of May, 1967.

11. Formation of ASW—CSIR

The Council was of the view that the formation of ASW—CSIR should be expedited so that the recognition could be sought from the CSIR as early as possible. A Committee of three members consisting of Sri Ram Prasad (Convener), Shri Y.R. Chadha, and Shri S. Dutta was constituted to draw up the constitution of ASW—CSIR and to prepare a report on its various aspects within three months.

12. Resolutions

12.1 The following resolutions were considered and adopted:

1. Five-Year assessment and promotion rule of the CSIR

Preamble: The ASWI welcomes the recent decision of the CSIR to review cases for promotion independent of vacancy of posts, whenever a scientific worker completes 5 years in one grade. This is a progressive step in the present context. However, it is unfortunate that this provision does not at present apply to all scientific workers but only to those who are in the categories of SSA/STA's and above. Exclusion of some categories (as-JLA's, SLA's and JSA's) from the purview of this rule is neither fair nor logical, and only creates dissatisfaction and frustration among the workers concerned. The members are greatly concerned at this discriminating decision and strongly feel

that, in the legitimate interest of the workers and efficiency of their work all categories of scientific workers should be covered by the five year rule.

Resolution: This Council meeting of ASWI resolves to call upon the CSIR to take immediate steps for extending the 5-year rule of review and promotion, at present applicable to SSA/STA and Scientists A and B, to all other categories of scientific workers, viz., JLA, SLA, JSA/JTA, and scientists C, D and E.

Decision: The Bureau of CEC to call upon the CSIR to take up this matter in the next Directors' Conference on priority basis for recommendation and subsequently to press upon the Governing Body of the CSIR and other authorities for immediate implementation.

2. Study Leave

Preamble: It is logical that study leave, as a means of improving one's qualification and training in the interest of efficiency of work and scientific productivity, should be liberally granted to scientific and technical workers. Even the Second Pay Commission recognised this and recommended that study leave should be liberally granted and the staff should be actually encouraged to avail of such facility, which recommendations were accepted by the Government. Elaborate and tortuous provisions for study leave indeed exist in Government rules. Unfortunately, these provisions, for the most part, remain merely paper provisions. Not a single person having gone on such study leave from the CFTRI during the last several years, and several applications being refused, is evidently not, the Association believes, an isolated situation. This may be prevailing situation in all of the CSIR Laboratories.

The major drawbacks in a practical appli-

cation of this provision are: (1) a lack of recognition of significance of study leave by the authorities, and (2) the great ambiguity of the existing rules governing the grant of such leave. The rules, as framed at present, have been hedged in by paraphrases which make it almost impossible for a scientific/technical worker to take advantage of the provision. For example, study leave is not admissible for studies "in academic subjects", admissible "ordinarily to gazetted" employees only, and "ordinarily" requires 5 years service for eligibility, etc. etc. Then again, the rules in their general vagueness and ambiguity leave a wide scope for use of discretion by the authorities which is either not used at all or only provides scope for nepotical use. With a view to derive effective benefits from a provision of study leave in the interest of efficiency and scientific productivity, the members strongly feel that study leave should be liberally granted to all categories of scientific/technical staff, without any ludicrous discrimination between the so-called Gazetted and Non-Gazetted staff, and that the rules should be framed in such a manner as to leave no room for ambiguity and vague discretionary powers. Phraseologies such as "ordinarily", "normally", etc., sprinkled liberally in the existing rules, should be conspicuous by their absence so that nobody need be in doubt whether any particular person is eligible for the provision.

Resolution: This Annual Council Meeting of the ASWI, therefore, resolves to call upon the CSIR/ICAR/ICMR/other organizations employing scientific workers to accept a clear-cut policy of liberally granting study leave and also encouraging all categories of the scientific and technical staff to avail of such a facility to improve their basic qualification and training in the interest of their efficiency and scientific productivity. The members further call upon the CSIR/ICAR/ etc. to reframe the rules governing the grant

of such leave in unambiguous and positive terms so that the provisions of such a facility may be effectively utilised by the scientific and technical staff.

3. Age of Retirement

Resolved to request CSIR to remove the anomaly that exists in the retirement age of scientific and technical personnel and to make it uniformly sixty.

4. Abolition of the posts of Scientist 'A' (JSO)

Preamble: In one of the conferences of the Directors of the National Laboratories held sometimes at the end of the October, 1963, a decision was taken to abolish the post of J.S.O. corresponding to scientist 'A' in CSIR. In pursuance of this decision no new post of JSO was created and a decision was taken to gradually convert the existing posts of JSO into two categories viz., SSA/STA and Scientist 'B' converting all the existing posts of JSO's.

While the policy was being worked upon, a CSIR circular dated 31.12.65 virtually reversed the above decision by directing that STA's and SSA's should be promoted to Scientist 'A' (JSO) only and not to scientist 'B' after a five yearly review by an Expert Committee.

This is certainly a strange decision as the earlier decision of CSIR had abolished the post of Scientist 'A' (JSO) and permitted promotion of SSA/STA directly to Scientist 'B'. It is obvious that the practice of discrimination and favouritism can find fullest indulgence under the cover of the above anomaly. Cases have already come to notice where the senior SSA/STA's have been promoted to Scientist 'A' by exercising the later directive while the Junior SSA/STA's have been promoted directly to Scientist 'B' by a selection board on a vacant post

which has been in existence due to the abolition of scientist 'A'. This is injustice and causing considerable dissatisfaction among the scientific workers. The CSIR, is therefore, urged to reconsider the above two contradictory directives and modify the later directive so that the expert committee after five-yearly review may recommend promotion of SSA/STA to Scientist 'B'. CSIR is also requested to take steps to abolish the post of scientist 'A' (JSO) for all purposes of promotion and appointment in CSIR.

Resolution: This Council meeting of the ASWI resolves to call upon the CSIR to abolish the post of JSO (Scientist 'A') for all purposes of promotion and appointment.

5. Vijnan Karmee

This meeting of the Council of the ASWI directs that :

(i) The present Editorial and Advisory Board be replaced by a new active Editorial Board,

(ii) the Editorial Board and Bureau of CEC may meet together each month to plan and discuss the future issues of V.K.,

(iii) Columnists be approached well in advance. Individuals in the Association and outside should be encouraged to specialise in various suggested topics. Correspondents be appointed in all Branches and in States where no Branches exist,

(iv) Advertisement & Sales Manager be appointed for procuring advertisements and for selling V.K. as an independent journal,

(v) efforts be made to make provision for a paid whole time Assistant Editor.

6. Science Policy Resolution

Preamble: A resolution was adopted in the Parliament in 1958 to give purpose and direction to the scientific and technological efforts, to achieve the goals of industrial and

economic development. The main object of the resolution was "to foster and sustain by all appropriate means, the cultivation of science and scientific research in all its aspects (pure, applied and education) to ensure an adequate supply with the country of research scientists of high quality and to recognize their work as an important component of the strength of the nation".

This Second Science Policy Conference which was held in 1963 with a view to reviewing the implementation of the scientific policy of the Government of India suggested the idea of an Advisory Board which was formed but abolished subsequently.

During the last few years no action has been taken by the Government of India to implement this science policy resolution.

Resolution: This Council meeting of the ASWI resolves to urge the Government of India to take early and necessary action to implement the science policy as adopted by the Parliament.

Decision: The Bureau to take up the matter with the Scientific Advisory Committee of the Cabinet.

12.2 Resolutions referred back to the Branches.

1. Recognition of the national laboratories for post-graduate research degrees

Resolved to request the University Grants Commission to persuade all Indian Universities to recognise the National Laboratories as research centres for post-graduate research degrees.

Decision: To be referred back to the Karaikudi Branch with a request to redraft it with a suitable preamble.

2. Enhancement of pay scales of the Laboratory/Scientific Assistants.

Resolved to request CSIR to enhance the pay scales of Laboratory/Scientific Assistants so as to attract candidates with brilliant academic records to Research Organisations. (At present teaching profession offers very attractive emoluments for new entrants, when compared to CSIR scale of pay).

Decision: To be referred back to Karaikudi Branch, in view of the Bureau's suggestion to consider the revision of the salary structure for the entire scientific and technical personnel.

3. Starting salary of the scientific technical personnel in the scale of Rs. 400-950.

Resolved that the Bureau of the CEC should draft resolution on the subject and take necessary appropriate action.

4. Gratuity benefits for CPF contributors

"Resolved that gratuity benefits should be extended to CPF contributors also".

Decision: To be referred back to the Jamshedpur Branch for furnishing further details and data.

5. Patent rights and consultancy services

A resolution on safeguarding the interests of scientific workers with regard to "Patent rights and consultancy services" was brought forward by the Secretary, Roorkee Branch. The sponsor was requested to prepare a comprehensive note with details and send it to the Bureau of the CEC for necessary action.

12.3 Besides considering the above resolutions, the Council directed the Bureau to give thought to the following topics and take appropriate follow-up action:

1. Appointment of a 'Commission' by the Government of India for recommending suitable salary structure for scientific and technical personnel.

2. Policy regarding nuclear proliferation and biological and chemical warfare.

3. Creation of a Ministry of science and technology.

4. Suggesting suitable topics for the conference of scientists to be organised in November, 1968, by the Government of India and submitting the same to the Scientific Advisory Committee of the Cabinet.

5. Formation of Regional Committees in various States.

6. Special issue of V.K. to commemorate the 20th Anniversary of ASWI.

7. Liaison with the Indian Parliamentary and Scientific Committee.

13. Election of office-bearers of the CEC for the year 1967-68

13.1 The following were elected office bearers and members of the Central Executive Committee for the year 1967-68:

Office Bearers

President

Dr. N.P. Gupta

Vice Presidents

Dr. Rais Ahmed
Shri M.M. Suri
Shri A. Rahman
Dr. Y.V. Kathavate

Gen. Secretary (Organizations)

Shri G.V. Subramanya

Gen. Secretary (Publications)

Shri Baldev Singh

Gen. Secretary (International Relations)

Shri Y.R. Chadha

Treasurer

Dr. S.K. Roy

Jt. Secretary

Dr. Rajat De

Members of the CEC

Dr. S.H. Zaheer
Dr. Narendra Singh,
Dr. B.L. Amla,

Shri T.R. Venkatasubramanya,
Shri S.V. Kulkarni,
Shri S.P. Dasgupta,
Shri T.V. Prasad,
Dr. N.M. Khanna,
Shri Ram Prasad,
Dr. M. G.R. Menon

Bureau of the CEC

In addition to the office-bearers and members of the CEC in Delhi, the following were elected members of the Bureau:

1. Dr. B.V. Subrayappa,
2. Dr. Rais Ahmed or his nominee,
3. Secretary, Roorkee Branch, or his nominee.

13.2 The new office-bearers would take charge of their respective offices as early as possible. However the out-going General Secretary (Organisation) and the out-going Treasurer would present the accounts and the connected papers for the year 1966-67 to the Auditors of the Association.

13.3 In accordance with the clause 85 of the Constitution the accounts of the Association would be operated under the joint signatures of Shri G.V. Subramanya, the General Secretary (Organisation) and Dr. S.K. Roy, the Treasurer. The accounts would continue to be in the Punjab National Bank Ltd., Parliament Street, New Delhi. Cheques, drafts, etc. payable in favour of the Association would however be endorsed by either of them.

13.4 The Council recorded its appreciation of the service rendered by the out-going office-bearers.

14. The meeting ended with a vote of thanks to the Chair.

Report of the General Secretary (Organization) for the year 1966-67

1. Branches/Units/Affiliated Organisations

1.1 The position of ASWI Branches/Affiliated Organisations and their memberships, as intimated by the Branches, is summarized below. During the year two new Branches came into being, namely at the Indian Veterinary Research Institute, Izatnagar, and the National Dairy Research Institute, Karnal. Contacts were renewed with some of the erstwhile Branches, and as a result, there has been revival of

activity at the Hyderabad and Durgapur Branches.

1.2 Membership drive was made at NPL and Delhi University, and it is expected to bring results in the current year. Effort was also made to revive the Branch at Jealgora. It is hoped that the new Executive would direct its full energy to strengthen the existing Branches, revive others which have now ceased functioning, and establish new ones.

Branches/Units/Affiliated Organizations and the number of members (1966)

<i>Branches</i>	<i>Number of Members</i>
1. Cent. Food Technol. Res. Inst., Mysore	235
2. National Metallurgical Lab., Jamshedpur	168
3. Cent. Electrochem. Res. Inst., Karaikudi	147
4. Cent. Mining Res. Inst., Dhanbad	66
5. National Dairy Res. Inst., Karnal	116
6. Indian Vet. Res. Inst., Izatnagar	76
7. Indian Agric. Res. Inst., New Delhi	160
8. CSIR, New Delhi	87
9. National Physical Lab., New Delhi	11
10. Delhi University	10
11. Cent. Mech. Engg. Res. Inst., Durgapur	63
12. Regional Res. Lab., Jammu	80
13. Regional Res. Lab., Hyderabad	40
14. Lucknow	70
*15. Indian Inst. of Petroleum, Dehra Dun	40
16. Cent. Building Res. Inst., Roorkee	58
17. Cent. Salt & Marine Chem. Res. Inst., Bhavnagar	58

Affiliated Organizations:

1. Ass. Sci. Workers—Ordnance Est., Kirkee	160
2. U.P., P.W.D. Res. Inst. Sci. Workers Ass., Lucknow	35
3. Ass. Sci. Workers—Ordnance Est., Khamaria (Jabalpur)	265

* The Branch has not furnished the information.

2. CEC Meeting

During 1966, the Central Executive Committee met twice—(i) in February, 1966 at the time of the Council meeting, and (ii) on May 1, 1966 at the time of the Caaust Symposium. It would have been desirable to have held at least one more meeting, but lack of finances came in the way.

3. Bureau meetings

3.1 The Council at its meeting held in March, 1965, had decided to set up a Bureau of the CEC at the Association Headquarters, to carry on work on behalf of the CEC. The Bureau had been meeting regularly during the year and conducting business of the Association. The proceedings of the Bureau meetings were circulated to the CEC members and the Branch Secretaries, for information and comments. In all, nineteen meetings were held during the year.

3.2 The meetings of the Bureau were usually well attended by the members; in addition, a number of other active workers of ASWI, have been regularly attending the meetings, by invitation, and assisting the Bureau. The setting up of the Bureau has greatly smoothened the working at the Central Office and resulted in its working as a team.

4. Resolutions adopted by the 19th Council Meeting

4.1 *On Service Conditions*—Resolutions on service conditions were pursued with the concerned authorities, but some of these were of too general in nature and/or not backed by relevant data, to bear any result. For instance, there is a resolution (No.7) on upgrading of status of cities like Jamshedpur, Durgapur and Dhanbad. It is pointless to follow this up with the Government, without having proper statistical data with regard to the increase in cost of living at these places. The branches at Jamshedpur

and Dhanbad were asked, as per decision of the CEC, to collect the relevant data, but I regret to say that the required information is still to be furnished to me. Resolution No. 10 concerns the revision of the pay scales of the SSA's in the CSIR. Shri T.V. Prasad of NML, Jamshedpur, was requested to prepare a suitable case to justify the restoration of original increment. He has now kindly prepared the note and this will be discussed by the Council.

4.2 National Policy

4.2.1 The resolution on the setting up a National Science Council, which was forwarded to the Ministry of Education, attracted attention in the Parliament. A question as to what action the Ministry of Education was going to take in this regard was tabled in the Parliament.

4.2.2 The 19th Council meeting had directed the CEC to organize a National Convention of Educational and Scientific Workers. A brochure on the proposed convention was prepared and circulated to the Staff Associations and some individuals in the Universities and Research Institutes all over the country. Since the response was poor, due to unsettled conditions in several of the universities besides other factors, it has not been possible to hold the convention so far. Possibly another attempt can be made at a later more appropriate date.

4.3 On ASWI

4.3.1 The Sub-Committee constituted by the 19th Council to suggest amendments to the Constitution has submitted its report which has been circulated to all the Branches. The proposed amendments will be considered by this Council.

4.3.2 The 19th Council meeting had resolved that the various ASWI Branches in the CSIR laboratories be requested to form

themselves into a Federation with the objective of demanding recognition by the CSIR. The Sub-Committee constituted for the purpose has already circulated a note on this subject to the Branches. This will also be considered by the Council delegates.

4.3.3. Resolution No. 17 had directed the Central Office to try to provide free accommodation to the delegates attending the Association meetings. I have great pleasure in reporting that all those who required have been provided with lodging facility. Also, the reservations for return journey have been made for the delegates who had asked for it.

5. Problems of Economic & Service Conditions

In addition to the resolutions on service conditions, a number of economic and service conditions problems were referred to the Central Office by the Branches/Affiliated Organizations. The matter was pursued with the concerned authorities in all the cases.

6. Vijnan Karmee

Vijnan Karmee was brought out regularly during the year, and a report from the General Secretary (Publications) is being presented separately. Dr. N.P. Gupta has also prepared a working document on the running of *Vijnan Karmee*. Since there will follow full discussion on this important topic, I shall not go here into further details.

7. Proceedings of "Science and the Nation"

Volume I of the proceedings of the Symposium on "Science and the Nation during the Third Plan", organized by the Association in July, 1964, was brought out during the year. A publisher in Calcutta had undertaken to publish the proceedings, in two volumes, free of cost. The Association has received gratis some copies from the publisher.

8. Finance

The financial position of the Association remains very difficult as will be obvious from the report of the Treasurer. This has to be remedied immediately. It is however linked with the cost of running the V.K. The General Secretary (Publication) has done a good job in raising the revenue by way of advertisements and has also tried to cut down the expenditure on V.K. Further, expenses on running the Central Office have been reduced to the minimum. But still there is a substantial deficit and to meet this the Council has to give a serious thought.

One of the way out is to increase the membership fee. The Sub-Committee on the revision of the Constitution has made a suggestion in this regard and the delegates will have the opportunity of discussing it.

9. CAAUST Symposium

9.1 The Caaust Symposium organized by the Association during April 27-May 1, 1966, in New Delhi, was a great success. It was attended by delegates from nearly 38 countries and representatives of the WFSW. The Symposium provided the Association an opportunity to break-through the international scene and establish contacts with scientists in the countries of Asia and Africa. The Association places on record its gratefulness to the Ministry of Education for the grant-in-aid to hold the Symposium.

9.2 The proceedings of the Caaust Symposium, have been finalized and are expected to be sent to the press very shortly.

10. Affiliations

10.1 The Association has continued its affiliation with the World Federation of Scientific Workers. The President of ASWI, attended the meeting of the Executive of the W.F.S.W. held in Verna last year. The

WFSW has set up a Regional Centre for S.E. Asia at New Delhi, with Dr. N.P. Gupta as its head. A report by Dr. Gupta will follow.

10.2 The Association is also continuing its membership with the Indian National Commission for cooperation with UNESCO, and the Indian Parliamentary & Scientific Committee.

11. Conclusions

11.1 During the year, the membership of the Association has shown a steady increase, but it has yet to make a major breakthrough in the country. The membership is confined mainly to CSIR and ICAR. The primary task of the Association is to spread out to other research organizations, universities and industrial concerns. If the ASWI has not been able to show appreciable results with regard to economic and service condition problems of its members, it is mainly because it lacks strength. An intense membership drive therefore needs to be undertaken, coupled with efforts to secure recognition from the employers.

11.2 The financial instability persists and this requires drastic remedy.

11.3 V.K. has improved considerably, but still there is room for improvement in its contents. The gap between the receipt and expenditure on V.K. is substantial.

11.4 The Central Office has neither any permanent accommodation nor any regular staff to run the office. No organization can function effectively like that for long. This is, however, linked up with finances.

11.5 I have mentioned above a few of the pressing problems that face us to-day. It hardly needs to be emphasized that if the ASWI is to receive, as it should, the recognition as the representative trade union organization of the entire scientific community of the country, concerted efforts have to be made by the Central Office as well as the Branches to solve these and other problems. The Centre has to be more active while the Branches must come forward, and I do hope they will, in forming new Branches and securing advertisements for V. K. The question of strengthening our organization deserves serious and urgent attention. I believe the new Central Executive Committee which this Council will elect, will do all it can to rectify the shortcomings, and give the Association a position of strength and stability.

12. In the end, I would like to express my sincere gratitude to my colleagues in the Bureau, the other CEC members, and all the Branches particularly their secretaries, for their constant help and cooperation.

Thank you,

Sd/- Y.R. Chadha

Report of the General Secretary (Publications)

I have great pleasure in reporting that Vijnan Karmee had been published regularly during the year 1966. Eleven issues were brought out, July-August being a combined issue. May 1966 was a special issue devoted to CAAUST Symposium. It contained besides abstracts from the Welcome Address

by Dr. N.P. Gupta, introductory remarks by Dr. S. Husain Zaheer and the inaugural address by Dr. Zakir Husain, Vice-President of India, some of the selected papers and recommendations of Commissions for the Symposium. July-August 1966 was a special issue which dealt with an important problem

'Should India manufacture Atom Bomb or not?'. October 1966 was again a special number issued on the occasion of Dr. S. Husain Zaheer's 65th birthday. About 1700-1800 copies per issue had been printed. The mailing lists contained members of ASWI, complimentary copies to some members of Parliament, members of Governing Body of CSIR, some members of W.F.S.W., Directors of National Laboratories. Seven institutions had enrolled as institutional members during the year.

The revenue expected from eleven advertisers is expected to be of the order of Rs. 7,500/-.

The following is the list of the parties whose advertisements appeared during the year:

1. M/s Allied Resins & Chemicals (P) Ltd. .. 11 half pages
2. M/s Bombay Chemicals (P) Ltd. .. 11 quarter p.
3. Hind Chemicals .. 2 quarter p.
4. Tata Iron & Steel Co. .. 5 full pages

5. Kirloskars .. 3 half pages
6. Indian Chemicals .. 5 half pages
7. Amar Dye-Chem. .. 1 full page
8. General Radio & Appliances .. 2 half pages
9. Hyderabad Chemicals & Pharmaceuticals .. 3 full pages
10. Hyderabad Allwyn Metal Works .. 6 full pages
11. Aniline Dyes & Pharmaceuticals .. 1 quarter p.
12. Jeena & Co. .. 4 full pages
13. Biological Evans (P) Ltd. .. 4 half pages
14. Indian Detonators Ltd. .. 1 half page

We are pleased to say that we were able to get postal concession for the despatch of V.K. copies and that brought down the expenses considerably on despatch.

The total expenses on bringing out and despatch of V.K. during the year were about Rs. 16,000.

Sd/- Baldev Singh

Treasurer's Report

I have the pleasure in submitting the following report on the financial affairs of the Association for your consideration.

I have circulated the audited statement of accounts of the Association for the financial year 1965-66 along with the balance sheet as on 31.3.66. The accounts for the year 1966-67 will, as usual, be audited after the close of the financial year on 31.3.67.

I need hardly emphasise the difficult position of our finance. During 1965-66, the overall expenditure exceeded the income by a large amount. The situation in the year before was no better.

The only source of revenue for the Centre is the share of the membership subscription, advertisement revenue and grant-in-aid from the Govt. of India. On account of share of membership subscription the Centre received about Rs. 2,000/- during 1965-66; the upto date receipt on this for the current year is somewhat less. The amount received in 1965-66 is about half of what is due. I would request the Secretaries and Treasurers of the Branches to look into this. The advertisement revenue has shown an improvement in course of the last two years, but it is yet much below what it should be. My aim would be atleast Rs. 12,000/- per year and

I would once again seek the cooperation of branches in achieving this target. The grant from the Government has become a matter of uncertainty. In 1965-66, we received only Rs. 3,000/-, and that too at a very last stage. The grant for the current year is still to come and we are negotiating.

In my humble opinion the Association must look for some resources for augmenting its revenue. All efforts should be made to increase the realisation from advertisement. In this connection I cannot but strongly commend for the consideration of the delegates the question of membership fee. Rs. 5/- per year per member was fixed long ago. The cost of publication of journal, postage, stationery, as a matter of fact everything, have considerably gone up since. The fee is inadequate even if we have to maintain a minimum activity.

Sometimes back, if my recollections are correct, the Bureau appealed to the Branches to consider making a donation of their saving

to the Centre fund. I would again commend this for the consideration of the Branches. Any Branch or any individual member is welcome to donate any amount to the Centre fund.

I have also the pleasure of presenting to you the Budget estimates for 1967-68 for your consideration. The overall estimated deficit is about Rs. 50,000/- and I would welcome your suggestion for meeting this.

Finally, I propose that M/s K.C. Gupta & Co. Chartered Accountants, who audited the accounts of the Association for the last three years be appointed as Auditors of the Association to audit the accounts for the year 1966-67 also. The fee to be given to M/s K.C. Gupta & Co. may be negotiated with them by the Bureau and decided.

I would also record my grateful thanks for the cooperation received from my colleagues in the Centre and the Branches.

Sd/- S.K. Roy

Budget Estimate For 1967-68 (as finally approved)

Income	Expenditure
1. Centre share of subscription received at Branches	1. Establishment
Rs. 3,000/-	(a) Salary and Wages of typists and editorial assistants
2. Advertisement revenue	Rs. 12,000/-
Rs. 7,500/-	(b) Rental of office accommodation including water & electricity
3. Sale proceeds of V.K.	Rs. 10,000/-
Rs. 1,000/-	2. 12 issues of Vijnan Karmee including printing charges despatch charge etc.
4. Adhoc receipt from Branches to support V.K.	Rs. 16,000/-
Rs. 5,000/-	3. Travelling and conveyance
Rs. 16,500/-	Rs. 3,000/-
	4. Travelling and conveyance for attending meeting of WFSW
	Rs. 16,000/-
	5. Stationery, Printing and Office equipments
	Rs. 2,500/-
	6. Postage and telegrams
	Rs. 4,000/-
	7. Affiliation fee
	Rs. 500/-
	8. Depreciation
	Rs. 500/-
	9. Audit fee
	Rs. 600/-
	10. Miscellaneous
	Rs. 1,000/-
	<u>Rs. 66,100/-</u>

ASWI Activities

MYSORE BRANCH

Development of science and technology has been the subject of lively discussion and study in the Mysore branch of ASWI during the year 1966. A number of topics bearing on the subject were discussed first in small study cells and later in general meetings. Besides bringing into focus the various aspects which require thorough consideration in the healthy development of science and technology, an additional advantage of these meetings is their usefulness in strengthening the Association organizationally. This would indirectly help protect the interest of scientific workers more effectively.

Rational recruitment policy needed

Recruitment and promotion of scientific workers is one such topic on which discussion was initiated by Dr. K.R. Bhattacharya in a meeting on April 14, 1966. This topic assumes importance chiefly from the standpoint of maintaining morale which profoundly influence the atmosphere and productivity of scientific institutions. The present system is admittedly irrational, the greatest drawback being that promotions have to be shown as "selections". These "selections" are based on arbitrary creation and advertisement of posts and thus become a matter of chance. It has been urged, therefore, that replacement of this system by a more rational one is essential so that promotions instead of being made through repeated selections against fictitious posts would be obtainable on one's own right, after rigorous assessment, and that advertisements would be only for new requirements. Formulation of such a system,

although difficult, must be accepted as a challenge. Meanwhile, it was pointed out, that scientific workers must recognise that it is the existing *system* which is erroneous and not the *selections* that follow.

A study group of the Mysore branch is now engaged in studying the question more deeply and evolving concrete proposals.

Project-oriented research

A colloquium held on July 26, 1966 took stock of the working of the project-oriented research system in CFTRI, and made some useful suggestions for improvement. There was a unanimity of view that properly implemented, project orientation would enable optimization of scientific efforts for the greatest benefit of the country in the shortest possible time. The main suggestions indicated the need for a clearer enunciation of norms for selection of projects as well as an effective and well-understood machinery for the formulation, selection, assessment and follow-up of projects. A caution was made against unbecoming status-consciousness of project leaders.

Productivity of scientists

Various social, economic and psychological factors responsible for the generally poor productivity of Indian scientists were analysed and remedies suggested at a colloquium held on October 5, 1966.

Language Problem

The Mysore branch arranged an interesting discussion on the language problem in relation to higher education on August 18, 1966.

The discussion was initiated by Prof. J.R. Lakshmana Rao. The discussion brought to the fore the urgency of replacement of English by the mother tongue as the medium of instruction for the rapid expansion of scientific education down to the mass level. The use of English, as many speakers pointed out, not only caused delay and wastage, but also a dangerous gulf between the elite and the masses. Difficulties that might have to be confronted in the replacement of English by the mother tongue, it was pointed out, were amenable to solution by a right approach to the problem, without sentiment and vested interests.

Standards for publication

A discussion meeting held on December 19, 1966 emphasised the need for maintenance of quality and standards in the publication of research findings. An important test of research is its publication and unpublished claim is always suspect. However, the quality of publication must be ensured. It was felt that fostering an intellectual atmosphere in laboratories by giving due consideration to the value of one's scientific contribution instead of one's status and ensuring rightful title to one's own work would go a long way in maintaining standard of research and publication. Journals must also maintain standards, if necessary by reducing number of issues per year; and professional bodies should zealously keep a watch over professional standards. Authors should be encouraged to submit papers to standard journals irrespective of nationality.

It was stressed that setting up of standards for authorship is also essential. Evidently, to be an author, one must have made substantial contribution in the work as a whole involving planning, experimentation and interpretation. Neither uninvolved 'planning' nor mechanical 'bench work' alone should entitle one to authorship.

Dr. N.P. Gupta, President of ASWI addressed the members of the branch on 'problems of scientific and technological development in underdeveloped countries' on May 19, 1966. Mr. A. Rahman, General Secretary (International Relations) of ASWI gave a talk on 'social and historical factors in the evolution of scientific tradition in India' on July 6, 1966.

CSIR Chief Meets ASWI Members Many Problems Discussed

Dr. Atma Ram, Director General of Scientific & Industrial Research appears to be not in favour of creating temporary posts under various schemes in the national laboratories. This constructive approach of him was welcomed by the members of the Mysore Branch of ASWI when he told a deputation of the Branch who met him on 24th March, 1967 that he would give no room for any temporary posts under schemes hereafter.

Scheme posts

The representatives of ASWI who met Dr. Atma Ram during the latter's visit to the Central Food Technological Research Institute, Mysore urged that the benefits of the rule in respect of five-year assessment promotion should be extended to those scientists who put in a total of five-year service partly in a regular post and partly in a scheme post. The Director-General felt that those who change over from regular posts to scheme posts normally do so with some financial benefits. As such, in his opinion, the question of considering them at par with those who continued in the regular job was not justifiable and, therefore, the regular personnel ought to be given the first benefit of assessment. However, he was against schemes which created such problems. He felt that whenever an agency advanced some money for a specified work, the best courses, in his opinion, would be to accept

the money and credit it to the general funds of the CSIR or the Institute and to treat the consequent posts as regular posts. The deputation welcomed this suggestion and requested him to implement it as soon as possible.

Five-Year Assessment for Promotion Rule

The question of extending the scope of the Five-year assessment rule to other categories of scientific and technical workers not covered by this rule at present (below SSA/STA) was also raised by the ASWI members. Dr. Atma Ram, while agreeing with the views of the ASWI in the matter, indicated that this question should be taken up for careful study by ASWI, based on specific proposals containing constructive suggestions for an alternate method of promotion in the light of the economic situation prevailing in the country and be put forward to him.

Abolition of Scientist 'A' posts

The abolition of Scientists 'A' (Junior Scientific Officer) posts was urged by ASWI members since the existence of these posts has created widespread confusion and anomalous situation resulting in a great deal of frustration among junior scientists. The ASWI put forward the suggestion that the grade of scientists should start in the existing circumstances at a minimum salary of Rs. 400/- which is the start given to Scientists 'B'. Another suggestion was that Scientist 'B' post must be the entry point for the scientific service and before that, the performance of work should be tried out by giving research fellowships for a period of three years. The Director-General pointed out this was being examined at the proper level as any change in the present pattern has a bearing on other government departments. He personally did not favour the idea of recruitment through fellowships or the abolition of the posts of Scientist 'A'. He pointed

out that many of the government departments also do not subscribe to the idea of dispensing with this grade. He, therefore, advised the ASWI members to discuss these matters among themselves, analyse the advantages as well as disadvantages of the present situation, and come out with concrete suggestions.

Study Leave

The Mysore Branch drew the attention of the Director-General on the existing procedure regarding granting and availing of provisions of study leave which is not only cumbersome but also vague and ambiguous. They urged that the present rules should be modified and a liberal policy for grant of study leave be brought into operation. They also appraised him of the thorough study on the subject made at the Association level. The Director-General suggested to the members to send him draft revised rules for his consideration.

Pool Officers

As regards absorption of Pool Officers, another point which came up for discussion, the Director-General was of the view that since Pool Officers were generally posted to various institutions after ascertaining their background, specialisation etc., it should not be difficult for the Director of an institute to create supernumerary posts and thus absorb them if found really suitable.

Staff Quarters

Another point discussed at the meeting was about making available a reasonable number of residential quarters for the staff. The Director-General while accepting the need for more staff quarters, pointed out the paucity of funds for this purpose. He, however, gave an assurance that he would make all possible efforts to provide additional staff quarters.

These discussions were held on the basis of a memorandum that the deputation presented to the Director General. The Mysore branch of ASWI has already initiated more detailed study of the problems that arose out of the discussion.

JAMSHEDPUR BRANCH

Revision of SSA / STA's Pay Scale

In accordance with the decision of the last Annual Council Meeting of the ASWI, Mr. T.V. Prasad was entrusted with the preparation of a report on the adverse revision of pay scales of SSA/STA in C.S.I.R. ASWIJ formed a sub-committee and a report was finalised and sent to the Central Executive Committee. The main recommendation was that the rate of increment in the old scale prior to the revision should replace present rate of increment in the revised scale.

Abolition of JSO in C.S.I.R.

Some time back the posts of JSO were abolished in CSIR. Later, as members are aware, some SSA's were selected directly as Scientist 'B'. Subsequently, it was decided by CSIR that SSA's, Scientist 'A' (existing) and Scientist 'B' who have put in five years' of service may be promoted after assessment by a Committee. In this scheme, some Scientists 'A' were promoted as Scientists 'B' and some Scientists 'B' were promoted as Scientists 'C'. But the SSA's were promoted only as Scientists 'A' or 'A1'. Since this post was earlier abolished, ASWIJ strongly felt that the persons concerned should have been promoted as Scientists 'B', as in earlier cases some SSA's were directly selected as Scientists 'B'. This kind of discrimination has led dissatisfaction among a section of workers and the policy of promoting some SSA's as Scientists 'A', (by reviewing committee) and some as Scientists 'B' (by selection) is incompatible with the earlier decision taken

to abolish the post of J.S.O. ASWIJ has made a detailed study of this aspect and a report has been made for submission to the Council.

Forwarding of applications

Some cases of non-forwarding of applications of members of ASWIJ to jobs outside were brought to the notice of ASWIJ. ASWIJ sent a letter to the Scientist-in-Charge, N.M.L. requesting that the applications of scientific workers should be forwarded as per rules.

Construction of Staff Quarters

In view of the acute scarcity of accommodation in Jamshedpur, ASWIJ has sent a letter to the Scientist-in-Charge requesting him to take steps to expedite the construction of staff quarters.

Bye-laws for local branch

A sub-committee has submitted a report on the formation of Bye-laws for the functioning of ASWIJ branch. The report is under discussion.

Amendments to Constitution of ASWI

As the present Constitution of ASWI is pretty old, it was felt in the last council meeting that the Constitution needs some revision. A sub-committee was formed to look into the matter. The branches were also asked to suggest amendments. ASWIJ, accordingly, formed a sub-committee to formulate necessary amendments for discussion. The proposed amendments are being discussed by the Executive Committee of the ASWIJ.

Establishment of Central School

The Sub-committee has taken up the matter with Ministry of Education, Government of India. A letter was addressed to the Minister of Education. The Ministry of Education has forwarded the letter to the Central Commi-

tee for Central Schools for further action. In the meanwhile, the sub-committee is making a detailed survey to determine the actual necessity for such school in Jamshedpur. As a preliminary measure the sub-committee has worked out a proforma for collecting the data and circulated it to proper authorities of all the Central Government Offices at Jamshedpur.

Film Shows

The sub-committee on popular lectures has continued its activity by arranging to show interesting technical films. A film intitled "Friendship Seven" (in two parts) was exhibited. It was about U.S. Astronaut John Glenn's historic space flight.

Socio-economic survey

Out of 285 forms distributed to the staff members of N.M.L. only 100 were received duly filled in. Even though it was emphasized that the scientific personnel should cooperate in this regard for making the survey successful it was unfortunate that only one third of them returned the forms. It was felt that tabulation and analysis of results for only 1/3 of the scientific staff would not be representative. For any future survey, it was felt that the necessary data should be collected by personal interviews.

ASWIJ Classes for A.I.I.M. Examination Part I

The classes were conducted as per schedule. Since September, 1966, 16 engineering drawing classes were held. 12 lectures on basic metallurgy were given. Practical classes are now being held to make the engineering training classes more useful. ASWIJ has purchased number of drawing boards for the convenience of those attending the classes.

KARAIKUDI BRANCH

Achievements of the Branch during 1965 & 1966

A three day discussion was held on "Reasons why young and younger scientific workers do not work after office hours" and several difficulties and opinions were given. Some of the difficulties have since been solved.

Aprons were provided to all scientific workers and free transport facilities were assured in case scientific workers were to stay after office hours (beyond 7.00 pm) provided prior intimation is given. This was unfortunately not availed of.

The need for proper lighting arrangements to be provided in staff quarters were voiced. It is gratifying that this has been almost completed.

ASWI resolved to request CSIR to implement their decision to enhance the stipend for Junior Research Fellowship from Rs. 250 to Rs. 300 pm at the earliest. The decision was implemented. In this connection it may also be mentioned that during previous years ASWI had been requesting CSIR for increased stipends to JRFs.

A request was made to CSIR to implement an insurance scheme as that of Employees State Insurance Scheme in CSIR labs. to safeguard the interests of scientific and technical personnel. Such a scheme is being implemented by CSIR now.

ASWI requested the Institution of Chemists (India) to institute a Research Diploma equivalent to that of Ph. D. degree and get recognition by Government of India. The Institution of Chemists (I) is in favour of such a diploma and details are being worked out for its introduction at the earliest.

The Vice-Chancellor of Madurai University was requested to recognise this Institute as a post-graduate research centre and

Madurai University has accorded recognition.

A request was made to the Alagappa Educational Trust to provide accommodation to the ladies employed at CECRI at their ladies' hostel. They have agreed to the request.

One of the objectives of Branch is to extend and improve scientific and technical education and the professional training of those seeking to become fully qualified scientific technical workers. In this connection AIC and AMIE courses were stated. So far about 300 lecture classes in AIC and 150 lectures in AMIE have been held apart from some group discussions.

Text books for AIC and AMIE costing about Rs. 700 have been purchased by the CECRI Library at the suggestion of the ASWI, Karaikudi Branch.

News, Meetings

I. Shri T.R. Venkatasubramanian has been elected as a member of the Central Executive Committee.

II. The AIC study group conducted a group discussion on 'Organic Reagents in Inorganic Analysis' on 5th March 1967 under the chairmanship of Dr. H.V.K. Udupa, Scientist, CECRI.

III. The following members attended the meetings of the General Council and the Central Executive Committee of the ASWI as representatives of the Branch: Sarvashri K.S.A. Gnanasekaran, N. Subramanyan and S. Venkatesan. They presented the matters emanating from the Branch for consideration and participated in the business of the meetings.

IV. The Executive Committee met on 29-3-67. The following are some of the points considered:

1. The minutes of the CEC meeting and the Central Council meeting were presented and discussed. Report by Shri Gnanasekaran about the arrangement of practicals for AIC students was read.

2. The committee authorised Shri Gnanasekaran to secure advertisements for Vijnan Karmee.

3. The post of Secretary falling vacant consequent on the resignation of Shri R. Thangappan may be filled up in a bye-election and Shri P.R. Natarajan was requested to be the Returning officer to conduct the election.

4. It was agreed to send a delegation to the Madurai University to impress upon them the following:

- i. Registration of B.Sc. graduates for Ph. D. Course.
- ii. Registration of M.Sc.'s of other universities for Ph. D. course.
- iii. Admission of B.Sc. (Chem) graduates with three years' experience in research to 2nd year M.Sc. class (similar treatment as for demonstrators and teachers). Shri T.R. Venkatasubramanian was requested to take the initiative.

5. To improve the local activity and to increase the membership, it was resolved to bring out a special issue of ASWI NEWS (April issue) highlighting the activities of our branch and to distribute to all members of staff eligible for becoming members of ASWI.

6. It was decided to meet Shri V. R. Nedunchezian, Minister for Education & Industries, Government of Madras (during his visit to Karaikudi) to acquaint him with proposal of conducting a symposium at Karaikudi on problems of scientific research and to explore the possibility of getting a grant from the State Government.

FORM IV
(See Rule 8)

- | | |
|---|--|
| 1. Place of publication | New Delhi |
| 2. Periodicity of its publication . . . | Monthly |
| 3. Printer's Name | Baldev Singh |
| Nationality | Indian |
| Address | C.S.I.R., Rafi Marg.
New Delhi-1. |
| 4. Publisher's Name | Baldev Singh |
| Nationality | Indian |
| Address | C.S.I.R., Rafi Marg.,
New Delhi-1. |
| 5. Editor's Name | Baldev Singh |
| Nationality | Indian |
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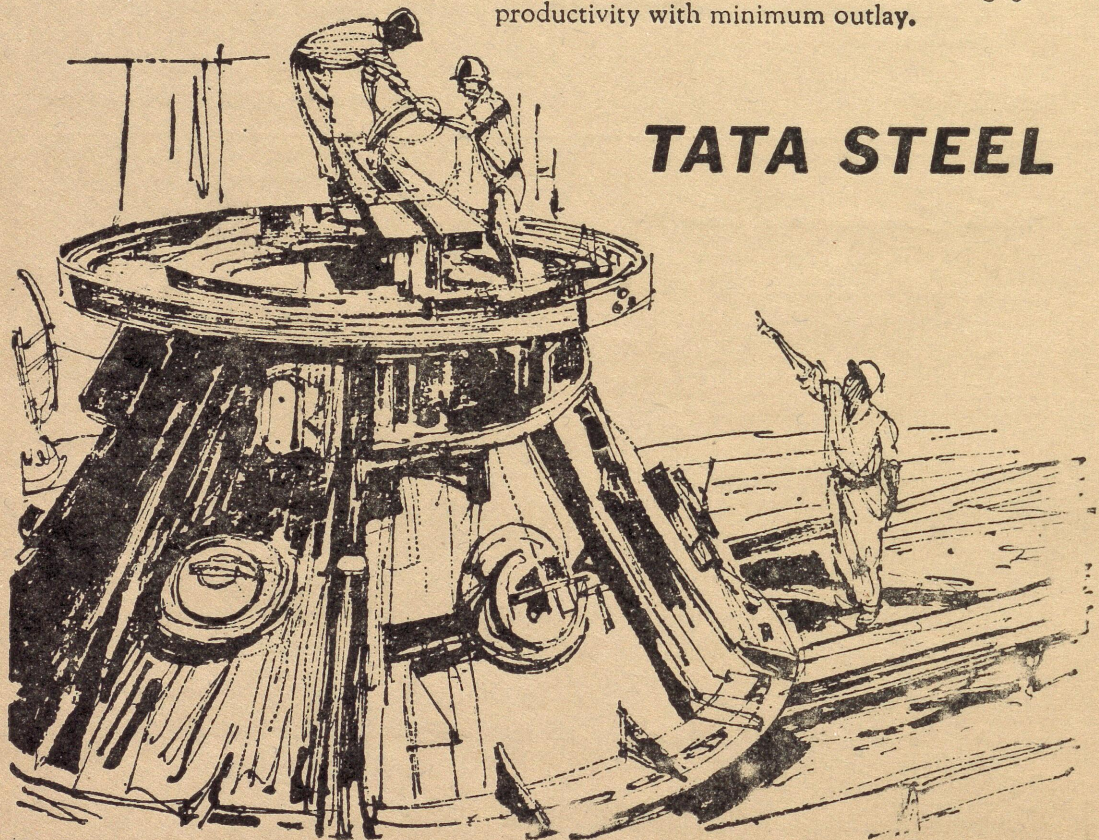
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VOL. XIX

APRIL-MAY 1967

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National Loss of Scientific & Technical Personnel

In this issue we are presenting a variety of views and opinions on "brain drain". This expression should not be confused with loss of scientists of academic eminence but is primarily concerned with the migration of scientific and technical personnel from the developing countries to the comparatively advanced ones, mostly U.K. and U.S.A. It is commonly agreed that a few thousand scientifically and technically trained Indians are abroad and increasing numbers are proceeding to U.S.A. and other countries every year for higher education in quest of foreign degrees. The primary question to be answered is whether the absence of these personnel is being "felt" and whether the country's economy and industry needs them for rapid development. If the authorities in the country and their policies for education, research and industrial development are such that they cannot usefully absorb these people then it will only be an embarrassment to make such efforts to get them back. There must be something fundamentally wrong with the policies of a developing country which finds itself having a surfeit of scientists and engineers and is at a loss to know what to do with it. There appears to be a curious identity of views by the American author and some Indian authors in the sense that the former feels that the employment problem of the developing countries is helped by the migration of technical personnel and the advanced countries are lending a helping hand and the latter feel that nothing is lost by scientific and technical personnel migrating abroad.

It is decidedly not true that most of the Indian technical personnel abroad are reluctant to come back. In fact most of them yearn to return to their country and would do so if the conditions of work and useful employment in this country were more congenial. It is also not true that most of them have a superiority complex and expect a red carpet treatment and cushy jobs on return. It is true that not every scientific and technical person abroad is superior to his counterpart in India or is deserving of preferential treatment. The fact is that most of them—the Indians abroad—would only be too happy to come back at a modest salary and be willing to contribute to the industrial and economic development. It may be true in certain cases that specialised instruments and equipment for the subjects of their special study may not be available in India but such cases will be few and far between. Most of our scientist countrymen abroad are aware of the conditions at home and would have no hesitation in adjusting themselves to local conditions and facilities. The jealousy of the local trained people against those who have the benefit of training abroad is only indicative of a restricted outlook and need not cloud the basic issue. The major avenue of absorption of scientific and technical personnel is not and cannot be the research laboratories and teaching institutions. Their main demand must come from the industries who should absorb and utilise increasing numbers of scientists and technicians. It is here that the challenge lies and the spotlight

should be turned to. Unfortunately, the industrial policy of the government and the attitude of the industry is such that it precludes any efforts by industrial firms of their own at research, development or technological improvement of their products, processes or technologies. In fact, some of the foreign firms and their subsidies in India are setting up research institutes to employ cheap 'scientific' labour for their own benefit. They are creating centres of 'brain drain' right in this country. In our country the government plays a predominant part in every sphere of life and economy and hence the main responsibility of orienting the industrial policy as to give greater scope for utilisation of scientific and technical personnel to the benefit of industry and economy rests with the government. There is equally a need to make a searching probe into our policies on technical education to determine if the resources for education are not being invested in channels of training and levels of technological sophistication not of direct relationship to the needs for industrial development of the country. Besides all this, there is the human aspect of the problem. No Indian abroad will feel proud of his country if he has a feeling that he is unwanted back at home. It will be disastrous to our prestige if nothing is done to correct the policies which lend a justification to this feeling in India and in the advanced countries that scientific and technical personnel are not needed in India and can usefully be employed elsewhere.

While too much of controversy has gone on

in regard to brain drain, the data on which to base definite conclusions appear to be lacking. Has the Scientific Advisory Committee to the Cabinet, the National Institute of Sciences, the Indian Science Congress ever discussed the problem or given advice to the government? Is it a fact that a large number of vacancies in research institutes, medical colleges, agricultural research and technical posts in government departments are unfilled due to non-availability of suitable scientific and technical personnel? What is the extent of actual loss in terms of scientists, engineers and medical personnel that India is suffering every year? How can these people be absorbed usefully in the tasks of industrial, economic and social development? What is wrong with our industrial and scientific policies? What is the position in regard to perspective plans and projects for scientific, technical and vocational training? Are these suited to the requirements of the country? This and many other questions must be answered through intensive surveys, collection of data and country-wide studies. We understand that UNESCO has recently set up a project for the study of brain drain in the developing countries. Would it not be worthwhile for the science organisations and the Government of India to devote urgent attention to the migration of scientific and technical personnel who are a loss to this country and whose training only benefits the advanced countries thus widening the technological and economic gap between them and the developing nations?

BRAIN DRAIN PROBLEM

DR. S. HUSAIN ZAHEER

About 20,000 Indian scientists, engineers and medical doctors, etc. are roughly estimated to be working abroad mostly in the United States, United Kingdom and Germany and smaller numbers in other Western European countries. It is also estimated that nearly 5,000 trained Indian scientists, engineers and medical doctors leave the country every year for further training and advanced studies. Nearly half of these go abroad on the basis of bilateral agreements, fellowship and training programmes of the Government of India, International agencies and other public institutions and in due course return to the country. A great majority of the other half going on their own, however, fail to return even after completing their studies and take up their temporary or permanent appointments abroad.

The Indian scientists working abroad can be broken down into 3 categories:

The first category will include a few hundred scientists belonging to the 'Scientist elite' and working in the highly sophisticated fields such as higher mathematics, nuclear physics, aeronautical engineering or modern biology. These stay abroad as there are not adequate facilities and the proper challenging intellectual "atmosphere" for them to do creative work in India. This situation will take a long time to remedy; but temporary programmes to bring them to India for short periods at frequent intervals can be worked out.

The second category will contain about half of those who may have decided to stay abroad on the basis of their preference for

the social life and living conditions abroad as against those existing at present in India. These have taken a positive decision and shown their preference for the many attributes of prosperity in the West which may be unfortunate as far as the developing country is concerned but against which one can hardly take any objection, the matter being a question of personal choice and individual freedom.

The third category contains such scientists, engineers, etc. who have temporarily decided to stay abroad, sometimes on higher emoluments which are not available in India, but who still retain their roots in the country and would like to return or who can be induced to return to India. It is this last Category which still continues to be of interest to the developing countries. If it is accepted that a trained scientist, engineer, technologist, agriculturist is a 'capital asset' generating and creating wealth where he works, everything possible should be done to facilitate the return of this class of Indians back to the country. Among the steps suggested are:

- (i) Extension and further liberalisation of the 'Pool' scheme being operated in India;
- (ii) The creation of a very much larger number of posts than exist at present and wider opportunities for work for scientists, engineers, technologists, agriculturists, medical doctors, etc. at all levels; i.e. not only in academic and research institutions and Government departments, but

also in Industry both in the private and public sector, both large and small scale. Creation of opportunities in industry will, of course, depend upon an accelerated rate of growth of industries requiring skilled scientists and engineers. This issue is also related to a correct industrial policy by the State and encouragement to development of indigenous competence.

- (iii) It has been observed that the off take of Pool scientists and engineers by industry has been almost negligible. The reasons for this state of affairs should be closely examined and the obstacles removed.
- (iv) Streamlining of the methods of recruitment and promotion:
- (v) Creation of healthier surroundings for creative work in academic, research and industrial institutions, public and private sector undertakings and public works projects.
- (vi) Creation of liberal facilities for travel abroad for further studies and training and participation in scientific conferences;
- (vii) A greater appreciation by all concerned of the vital role of science and scientists in a developing society.

Council of Scientific & Industrial Research took creditable steps on these lines since the last five years. This was partly due to the jolt given to Indian complacency about science and scientist through the Chinese attack on India in 1962. Suddenly the great value of scientists and engineers was realised and a number of steps, including a Cabinet Resolution were taken to facilitate the return of Indian scientists from abroad. As a result, the actual number of scientists returning back to India every year increased from about 200 in 1962 to 1200 in 1966, and in all about 4000 scientists have returned through the Pool Scheme within a period of about four years. Almost all of them have been absorbed; there being some difficulty in the permanent absorption of only less than 200 (5%) and about 100 (2-3%) having gone back *abroad*.

The emergency having passed—although the country is still faced with great perils both internal and external where the services of scientists/engineers, etc. could be invaluable, the CSIR appears to be getting complacent again and some responsible people are almost saying that they do not want the Indian scientists to return unless they can first find jobs for them. This is a complete reversal of the Pool Scheme initiated like so many other worthwhile schemes in India by Jawaharlal Nehru.

BRAIN - DRAIN

N.S.K. MURTHY*

On reading the Editor's note in the January 1967 issue of Vijnan Karmee, I am tempted to place my views on the subject of brain-drain as follows:

I remember, once Dr. C.V. Raman remarked to the effect that in reality this brain-drain that we think is taking place, is to be encouraged rather than made fuss of; at least it is not a subject worth any worry. We have enough talent in the country. To worry about those who work away from us is unwarranted.

Trying to be unbiased and unsour about our men who stay abroad for whatever reason they may have, I am inclined to agree with Prof. Raman that we are wrong to think that the stay of any scientists in countries outside India is a loss to us. Firstly, it is a narrow outlook to life and the world that makes us think so. I may say it is an unscientific attitude. Is it not that a vacuum is never, left unoccupied for long? And secondly, it suggests lack of courage on our part to accept the truth that all men are potentially superb scientists capable of excellent creativity and action based on it. Each Indian is as good as his brethren who stay away abroad. Let us accept this fact and encourage those here to develop their creative scientific talents.

The human mind is prone to be easily corrupt. Talk too much of a man's need

and indispensability, he swells and imagines himself as centre of everything. He ends up only in imagination and confuses action for it. This is particularly true of us, Indians. So it is better to talk less of brain-drain. On the contrary local talent should be inspired to widen their knowledge and become more useful to us. It will be an insult to local talent to unwittingly heap an indirect praise on those abroad, be they Indians or others. This love for things foreign, education foreign etc. speaks of a blindness to our own ability to think well, act well and thus rise up.

Once again coming down to hard facts, I know well that most of our foreign educated brethren are not any way better than those who have learnt only in India. These foreign returned invariably develop a false attitude to life. Being neither Indian nor Western in thought, a hanging outlook haunts them. They dream about their bygone pleasures enjoyed abroad. It takes them long to resolve this mental conflict. And what concerted effort does one expect of a diffused and dreamy mind?

However, I know also of a very small number of those who are back home, who are capable of deep thinking and excellent creative work. This, I attribute to their innate abilities that are a product of Indian thought and culture. These people who come back, do so voluntarily, prepared for the roughness of life here. Those who

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stay away do so out of the love of comfort they are assured there. Sometimes atmosphere for work surely plays its role. We cannot blame the stayaways. Each does according to ones own mental outlook and development of the heart. A well developed heart loves the motherland enough in intensity to stir up a spirit of service to her. Hence, those who stay away, the moment they realise their error, are bound to be back. None can instil idealism into a pleasure loving mind. Idealism is inborn or cultivated by constant heart churning. It is waste of effort to woo the unidealistic mind to come and work here. Wooing is weakness. The positive way is to create here conditions as would attract them to come home. These conditions are not made by merely paying more. More money means more desire to indulge. This does not help. All of us have to voluntarily accept the average Indian standard of living, until we have by self effort, raised it generally. Some marginal better facilities have accrued to us already. Hence no scientific worker whether he has been abroad or not, should, if he is true to his country or conscience, demand or accept a salary so high as would remove him from the average Indian brotherhood.

To elaborate on the conditions that would help the growth of scientific spirit, I may say that in our laboratories there is a general lack of proper atmosphere. This thing called atmosphere makes all the difference. It is a sort of vibration that stimulates like thoughts. If into a group of ten intensely devout scientists you inject one superstitious mind, it does not take long to convert this lone

mind to scientific thinking. Hence all efforts to inculcate a scientific outlook and temper in our laboratories, and through these, in our country, should be made. The present incorrigible system of bureaucratic heirarchical system of grading men's talent which is so firmly entrenched in the blood of all of us (save the younger ones and some men at the helm) should end. This alone, coupled with a pure mind made sharp for scientific enquiry, would soon produce such a bumper crop of creative and scientific men that we would not mind letting them go abroad in as many number as they desire. This is the positive way of science to tackle this illusory problem of brain-drain. Where is the lack of brains in a country of 480 millions? It is pure shortsightedness and waste of effort to indulge in the soft mental exercise of crying for our men abroad to come back. Let them work there.

Let us allow these drained brains a chance to think for themselves. They are mature citizens, temporarily beguiled by the glamour available abroad. Let them search their hearts for the true values of life. Our doing the thinking for them, is useless.

Finally, I must not be misunderstood as thinking that those abroad are unwanted here. They are wanted only if they return voluntarily and with the expectation of hard work, and not prestige or high position. Hard work and fulfilled duty spontaneously yield the happiness that the beguiled soil seeks in pursuit of pleasure or position. It is a psychological problem that we tackle when we think of brain drain.

Brain-Drain or Brain Down the Drain*

N. SUBRAMANYAN

It has become fashionable for some vested interests and some misguided souls in our country to make a fuss about the so-called "brain-drain". The fervour in appealing to the powers that be to arrest the export of talent has gone to such an extent that it has been suggested that "the government must do something on a war-footing". And our Prime Minister, Mrs. Indira Gandhi has obligingly said that something would be done!

The difference between brain-drain and export of talent has to be noted to make a reasonably correct appreciation of the loss to the country by way of both.

The expression "brain-drain" implies that there are brains available, but they are lost by being drained off to other countries. In this sense, the further implication is that there is a paucity of brains or talent and the available stock has to be conserved within the country! This will be an amazing stand to take in this age of computers, because the compact human-brain is a marvellous mechanism for the amount of information it can register, codify and remember and the complex functions it can perform compared to the size and capabilities of computers that have so far been constructed; and our astounding population figure is an index of brains available indigenously!

So, the matter actually to be considered is the flight of trained brains or talent. According to Sir C.V. Raman, our only Nobel Laureate in Science, it is a sham to speak of drain of scientific talent, since the country has

plenty of scientific talent and even if scientists go abroad, they can be replaced. However, if the cause of the worry over drain of talent is examined, two aspects of the problem emerge clearly: (1) *The inadequacy of training and channellizing of the millions of brain available to maintain an inexhaustible source of talent:* This has to be tackled with reference to our educational system ranging from schooling to university research training, and (2) *Lack of congenial conditions of work for talented personnel:* While this aspect certainly deserves careful consideration from the point of view of providing healthy atmosphere for work, it has to be realized that the extent of patronage that can be given, depends on the demand for the particular type of talent in the country in the present stage of development. And the emoluments and material benefits that can be given to such trained personnel have also to be in keeping with the general standard of living. Otherwise, the extraordinarily preferential treatment given to talent can result only in the creation of a new type of casteism.

In this connection, it is to be pointed out that most of the complaints about brain-drain have been voiced by persons who have had some training or stay abroad. This gives an impression that there are vested interests behind this slogan. What is more important is the millions of brains going down the drain for want of proper direction and utilization. This is our national wealth and let us make the best of it!

* Reprinted from ASWI News, Karaikudi Branch.

Brain Drain : An Opportunity to give a Shake-up to India's Science

KSHIROD RANJAN BHATTACHARYA*

There has been a lot of talk on 'brain drain' in India today. This is good in itself. Unfortunately, much of this talk has been misdirected—some, I believe, deliberately.

If scientists go and stay for prolonged periods or settle abroad, it must be in consideration of either money or a proper working atmosphere. Money cannot be a very large factor, because the pull of money is undoubtedly counterbalanced by the pull of sentiment. In fact a number of investigations and case studies have revealed that it is the second factor that plays the predominant part. As a recent editorial in *Science* (Vol. 150, p. 3692, 1965) says, "A current fallacy is that brains go where money is. Infact, brains go where brains are. Brains go where there is a challenge. Brains go where brains are valued for intellectual as well as practical achievements".

In short, brains go where brains flourish and have a chance to flourish; i.e., brains go because conditions here make it impossible for them to flourish.

Briefly, these conditions, in their worst form, are: the medieval, patriarchal structure of the society where everything flows from the father figure and descends down the hierarchy, and each successive lord holds sway over his respective jurisdiction; the unspoken demand that you prop up the scientific reputation of your boss by giving him a cut—sometimes the major cut—of your work, and the servile acceptance of this demand by incompetent

subordinates to jockey for position; judging the worth of scientist by his position in the hierarchy rather than by the value of his scientific work; the consequent replacement of quality by debased quantity in matters of scientific publication; a wholly outmoded system of recruitment and promotion where everything depends either on your luck or your familiarity with your director; and an indolent, corpulent administrative system which frustrates every effort and initiative. Another recent irritant is the unfortunately superficial interpretation of the otherwise admirable concepts of 'planning' and 'the social role of the scientist' whereby a serious worker is continuously distracted by having to write countless notes, projects reports, plans, working papers, techno-economic reports and popular articles and by being submerged in an endless series of study groups, seminars, symposia, conferences and workshops which are more in the nature of jamborees than occasions for serious exchange of ideas.

True, conditions are not so bad in all places, and there have been many isolated improvements in the recent past. But fundamentally, taking the country as a whole, the basic pattern remains. What seems worst is that a smug complacency and inertia prevent any attempt to appreciate the difficulties or any communication to develop.

This is the disease. Can any creative effort flourish in this atmosphere? Not surprisingly, only the crass thrives; the imaginative either

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commission to enquire into and suggest remedies for the nature of the malady that afflicts science in the country. This commission should not, like the various reviewing committees, use only the directors and science languishes, or turns cynical and perishes—or else runs away.

The pernicious consequence of this disease on the country is that science does not get a chance to take root. Huge edifices of research organizations remain meaningless. Large sums are invested in the glamorous name of research, but its contribution to the country's technological development remains negligible.

Naturally, the disease also leads to what is called the brain-drain. But, whatever its magnitude or importance in terms of loss to the country, it is after all incidental and nothing but a symptom of the underlying disease. The disease has to be treated not so much to alleviate the symptom, which will take care of itself, but to save the patient.

Yet the grave public debate on brain-drain consistently ignores this true perspective and gets lost in an infructuous discussion on whether it is a drain or migration or flight; on whether and how to bring them back. Much of this is indeed naive and misinformed but, in others, I suspect, there is a design in the naive. Vague symptoms of these inhibitory and retrograde factors in India's science have appeared many times earlier (e.g. the Joseph episode); feeble voices of protest have been raised continuously for years. But those with vested interest in this post-independence empire have consistently denied these charges and stood in the way of reform. Today brain-drain has appeared like an ugly sore that threatens to expose the underlying rot to public gaze. The naive discussion on brain drain is now an attempt to divert attention away from where it hurts, an attempt to show that it is only a surface sore and can be treated as such; hence the discussion on brain drain in isolation, hence the debate whether it is a real loss. Those who have a stake in the true progress of science and a technological revolution in the country should see that this attempt is frustrated. They must seize the opportunity provided by this phenomenon to expose the underlying disease and to adminis-

ter a rigorous course of treatment to the structure of science in India.

Having discerned the broad nature of the malady from the symptom of brain drain, the first job will be to carry out an accurate differential diagnosis with the help of careful clinical tests. These clinical tests may take two forms.

The first is to convene a national symposium or conference on the problems of scientific research in the country, to be attended by working scientists and the true lovers of science among its leaders. This conference would examine and recommend action on such factors as the social context inhibiting the development of science, vested interests in scientific empires, ethics in scientific publication, structure of India's scientific institutions, a rational system of recruitment and promotion for scientific institutions, a rational system of administration in science, education of science, selection and training of scientific personnel, etc. Care should be taken that this conference does not degenerate into one more jamboree, to which end its initiative must be kept in the hands of *working scientists*. Also, it must be remembered that the object of this conference would be to examine problems facing the *establishment* of science, not *utilization* of science which presupposes that a vigorous science has already been established. This in fact has been the drawback of the otherwise excellent Pugwash-like conferences. They have discussed objectives, planning and priorities of scientific effort for the development of underdeveloped countries, forgetting that the first problem in all these countries is how to establish science in a society whose structure and outlook are essentially unfavourable to science.

Alternatively, or following the conference, the Government should set up high-power administration as their source of information, and also go to the working scientists who know where the shoe pinches. Finally, it will remain for the country's leaders to courageously act on the findings and administer a swift and ruthless course of treatment.

This is the true lesson of the brain-drain and the challenging opportunity it has thrown up.

Can They Halt the 'Brain Drain'?

"United Kingdom sends recruiters to U. S., Canada to talk expatriate chemists into returning home."

The British government and the British chemical industry are determined to halt, and ultimately to reverse the "brain drain"—the migration of talented scientists to the U.S. and Canada. And even as the government seeks ways to prevent further losses from its technological reservoir, British chemical makers are combing U.S. campuses and commercial labs. to talk English expatriates into returning home.

No one in the United Kingdom knows precisely how seriously the drain is affecting that country's economy, but there's ample evidence that the British recruiters' work is essential. According to one U.S. estimate, 650 U.K. physical and natural scientists will come to North America this year. Only a little over 100 will move the other way.

The U.K. Manpower Resources Committee for Science and Technology says Britain suffered a net outflow of at least 4000 scientists and engineers between 1958 and 1963. Since then, the committee adds, "our impression is that there may have been a greater flow of scientists and engineers to the U.S. . . . and that this has been particularly marked in the last year or two."

Not all authorities regard the brain drain as a disaster. Some say it makes little difference where the research is done since it will eventually become available to all countries

—and the U.S. has the money and the facilities to pursue projects more successfully. But companies locked in worldwide competitive battles don't see it that way. They will have to pay in terms of market penetration or royalties for failing to develop new products themselves. And the British, boasting advanced technology, hope to use it as a major point in their bid to join the Common Market.

Drain Stoppers : The Manpower Resources Committee says that the "deliberate and planned recruitment" of qualified personnel, primarily by U. S. companies, "shouldn't be allowed to go too far without remedial action." The remedy may be revealed next spring when the committee makes its report.

A hint of the proposed cure came recently from Sir Solly Zuckerman, scientific advisor to the British Cabinet. He told a U.S. recruiter, William Douglass, of Careers Inc. (New York), that Britain planned an all-out drive to provide inducements for U.K. talent to stay home.

Douglass, whose clients include Union Carbide, Mobil Chemical and Esso Research Engineering, claims to have recruited 450 British scientists in the past 18 months.

A six-man counterattack team recently toured 45 U.S., and Canadian universities

for Imperial Chemical Industries Ltd., its sixth foray to North America. Just back from the U.S. is a four-man unit from Unilever Ltd., which visited about 60 U.S. campuses in search of talent for its four U.K. research laboratories. This was Unilever's fourth annual hunt.

A representative for the U.K. Atomic Energy Authority Harry Hoff, has recruited in the U.S. for nearly 10 years. Laporte Chemicals Ltd. sent a team in 1965, but didn't follow up in 1966.

Both Glaxo Laboratories and Distillers Chemicals and Plastics group establish contact with prospects heading for the U.S. before they leave. If a man shows particular promise, they correspond with him while he is abroad. When senior company officials go to the U.S. on other business, they are requested to interview the prospect in hopes of convincing him to return to Britain.

All these efforts are concentrated primarily on British-trained scientists, mostly those with Ph.D.s, who have come to the U.S. for post-doctoral research work. ICI, which has two-man units covering Eastern, Midwest and West Coast North America, has since '61, induced about 100 men to return. Unilever's teams have talked 40 scientists into returning.

Why They Come: More money and better equipment are important reasons for coming to the U.S., but many scientists cite something else, of which the foregoing are symptoms. Says one, writing in a British scientific publication:

"The fact that American companies are willing to put out this kind of money makes the scientist in industry feel he is a rather more significant figure than he was in Britain, where his company's research department was perhaps built only as a tax writeoff." He also refers to "a massive inertia in British

industry that prevents the majority of its scientists' ideas from getting through to the outside world."

An opportunity to pursue freely a field of interest and 'stay on the bench' are additional incentives.

Says ICI recruiter Eric Howells, aware of a salary gap (a ratio of two to one or more) between offers in the U.S. and in Britain: "We don't argue salary. We promote interesting jobs where these men, born and trained in Britain, want to live."

And ICI recruiter Roger Laird describes the Britons he talks to in the U.S. as having "one foot firmly planted in Britain, and the other dangling. We are crystallizers, not persuaders."

To and Fro: Unilever recruiter D.W.G. Dicker estimates that half the Englishmen who move to the U.S. "eventually stay there after all the to and fro is done". Many Britons initially study in the U.S. on a two-year exchange visa, return to the U.K. for a couple of years of comparison, and then move back across the Atlantic, this time permanently.

The problem facing British firms talking to U.S.-born prospects is money. "The salaries they're looking for are much higher than we're prepared to pay," a Laportes spokesman says.

But Dicker suggests that Unilever will continue to try to attract U.S. scientists to Britain. "Of course, the Americans couldn't be regarded as permanent employees, but they provide good service and a fresh attitude for several years," he says.

Going Where They Are: Overseas expeditions are expensive, ICI concedes. "But ICI has to look after its own interests by going where the scientists are," Howells says.

Unilever could meet its laboratory personnel requirements without going to North

America, Dicker says, but "we should have to lower our standards" if the efforts to recoup "some of the cream" that has gone overseas wasn't made.

The question of expense is the main challenge now being taken up by the Royal Institute of Chemistry. "This overseas recruiting is an exercise only the large companies can afford," says the Institute's A.L. Buley. It is the small companies that are feeling the pinch on trained people."

In countermove, Buley describes a plan now being devised by his agency, whereby chemists going overseas would register with the institute and indicate their interest in future employment. "We would also hope to have industry sign up with us, and help coordinate recruitment efforts", he says.

"This way, perhaps we can overcome the losses that occur when the British scientist finishes his studies, finds himself without a British job contact, and often thus stays in America." Such a programme, Buley believes, should be particularly helpful to the British chemical industry, which is winning less than 30% of graduating British chemists to its ranks—not enough to maintain its growth pace.

TWO BRITISH SCIENTISTS EXPLAIN WHY THEY WENT BACK

Chemical Week talked to two men lured back to Britain by ICI—Jack Wolstenholme, 31, and Tony Blythe, 30. Both received all of their higher education, including Ph.D.s, in Britain. Wolstenholme was studying physical chemistry at the University of California; Blythe, molecular beam research at Wisconsin.

Says Blythe: "I wasn't impressed by ICI's salaries. No one expects to be, comparing British companies with American. I was impressed by the facilities and arrangements

at the petrochemical and polymer laboratory here at Runcorn."

Sunshine and Money: Wolstenholme also stresses the value of the recruiting. "If ICI hadn't been quite so efficient in their recruiting effort, I would have thought about staying in the U.S. I was enamoured with many things—especially the California climate."

"There were strong temptations to stay in the States," agrees Blythe. "I felt my training was particularly suited to the needs of U.S. industry, the salaries were high, the facilities excellent."

"I was quite floored by the facilities, too," says Wolstenholme. "There was almost too much in the way of equipment, reference material and instruction. I was spoiled at California—it kills ingenuity, its almost too easy. In the states, they use mass spectroscopy to identify the presence of carbon dioxide when ordinary lime water would do."

"Up through the end of the '50s, "Wolstenholme says, "facilities were poor in Britain. But when I returned from the States, I noticed a positive change. The contrast wasn't nearly as great. This was true not only at ICI, but at the universities as well."

Patriots: Blythe says, "I returned for patriotic reasons. I didn't feel quite in rapport with the Americans. Like many others, I didn't make up my mind to come back until after a year or so. This is why the timing of the ICI mission was so important."

Wolstenholme says, "I came back to see the changes in Britain. I felt that if I didn't like what I found, I'd return to the States for good." Sums up Blythe, "One leaves only because certain pressures get too frustrating. If I went back, I suppose it would be the financial pressures here that would drive me to it."

The Brain Drain : A U.S. Dilemma

The nature and extent of the brain drain, its effects on welfare, and its implications are analyzed.

HERBERT G. GRUBEL*

The migration of highly skilled individuals from the rest of the world to the United States, often called "the brain drain", puts U.S. Society and policy makers on the horns of a genuine dilemma: On the one hand the United States is morally and politically committed to assist the development of the poorer regions of the world, and anything retarding this process, such as the loss of high-level manpower resources through emigration, runs contrary to the declared foreign policy of the nation. On the other hand, the United States has considered it to be in its national interest to restrict general immigration and make it selective through a set of laws and regulations that favour individuals with high levels of training. Furthermore, the country has a tradition of respecting personal liberty, welcoming the poor and oppressed and avoiding coercion, so that under certain circumstances students are permitted to become immigrants even though laws and visa regulations would otherwise require them to leave the United States after completion of their studies.

In recent years countries throughout the world have awakened to the brain drain, as is evidenced by frequent articles in the foreign and U.S. press (1); the authors expand and popularize whatever empirical evidence regarding the magnitude of the migratory flows has been assembled by international agencies, national governments, and scholars. The catchy phrase "brain drain" has penetrated the public consciousness and its implications are

frequently discussed among intellectuals. The U.S. Department of State in June 1966 held a conference during which government officials, representatives from private organizations, and scholars discussed the issues surrounding the brain drain. The United Nations, the Pan American Health Organization, and the Organization for Economic Cooperation and Development are preparing studies and conferences to assess the magnitude of the problem and to arrive at policy stands. Recently, Walter F. Mondale, U.S. Senator from Minnesota, spoke (2) of the problem on the Senate floor; he summarized the government's dilemma by quoting Assistant Secretary of State, Charles Frankel:

This is one of the steady, trying, troublesome diplomatic issues confronted by (our) government...one of the most important problems faced not just by the Department of State, but more important, by the United States and by mankind as a whole.

Before the United States can develop a program to deal with the complex phenomenon so conveniently labelled the brain drain, its nature and magnitude must be understood more clearly than hitherto.

As most researchers in the social sciences have discovered, journalistic exploitations of individual episodes, or even concern by governments or international agencies, are a poor base from which to make projections of

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general validity. The brain drain is no exception, and efforts to examine more deeply the nature of the phenomenon and somehow quantify its magnitude unveil unexpected complexities and difficulties.

At the very outset, there arises the conceptual problem of which immigrants should be considered contributors to the drain. Most countries welcome general emigration of their citizens, since it relieves pressures on population and resources. An ordering of such general immigrants by the levels of their skills shows a continuum ranging from uneducated children to unskilled labour, skilled artisans, students at various levels of educational attainment, and professional (including scientific) holders of degrees—fresh out of universities or with many years of experience. Thus the question is where in practice does one draw a line between immigrants whose departure is welcomed by their native countries and those who are considered contributors to an undesirable drain. One study has arbitrarily chosen a university degree as a cut-off point in defining brain drainers(3).

Students present a special problem of measurement and definition. In most studies students are distinguished from immigrants by the type of visa under which they enter the United States, but many graduate students, postdoctoral fellows, and established professionals come to the United States with immigrants' visas even though they definitely plan to return home after their periods of training. These people tend to prefer immigrants' visas because thus they are permitted greater flexibility in choice of employment during their temporary stays. On the other hand, many visitors arrive on student visas with permanent immigration as their ultimate goal.

In one sense, definition of students by type of visa is irrelevant because, as far as their

native countries are concerned, any young person leaving for study abroad is unskilled and relieves population pressures. At the same time, a student's studies abroad and his failure to return home do not mean that his native country's stock of educated people is reduced by one; rather that the stock of uneducated people is reduced, since the emigrant's vacant place in his country's educational system is taken by a person who otherwise would not have received the schooling. In the light of this fact, countries benefit from having their students in the United States, even though none return. In fact, however, the State Department estimates that only about 10 percent of foreign students remain permanently in the United States (4).

Many people argue, however, that the relevant distinction is not between having and not having U.S. study programs for foreigners, but between having these programs and ensuring that all students return home rather than become permanent immigrants. From this point of view, the student problem is logically analogous to the broader question of whether a country is better or worse off when some of its highly skilled citizens emigrate.

The answer to this broad question depends decisively on the definition of the country one chooses and what one considers to be the proper index of national well-being that a country's leaders should maximize. On the one hand, there is the concept of the nation as an aggregate of individuals living in a given geographical area. The index to be maximised is the nation's standing in the world community in terms of population, military power, national output, cultural achievements, and so on.

In recent years, the world has seen a revival of the game in which countries try to maximize this index, a phenomenon known as the growth of nationalism.

There is no doubt that the emigration of skilled manpower is a loss in the eyes of nationalists. Perhaps the entire worldwide concern over the brain drain can ultimately be attributed to the revival of nationalism, and the United States will have to accept it as an unavoidable fact of life. However, while the United States is impotent to deal with the desire of other countries to seek nationalistic objectives, there is a real question as to whether U.S. policies should be designed to help countries to achieve such objectives. Nationalism, with all its costly manifestations of excessively large armies, inefficient showcase industries, and monuments, often reduces severely the income of the countries' populations, whose power-seeking leaders never give them a choice between higher levels of real income and consumption of more nationalism.

Instead, and in line with the second concept of a country, the United States has the option of designing policies to increase the welfare of people regardless of where they happen to reside, most importantly through helping them to a higher level of real income. Under this second concept, a country is a collection of individuals born in a certain geographic area, and the index to be maximized by national policies is per capita income. From this point of view, voluntary emigration increases the welfare of the total population if it makes the emigrants themselves better off—as it should do if they choose to migrate—and if the remaining people's incomes are not reduced.

Given this focus on the welfare effects of migration, the entire problems of understanding and measuring the magnitude of the brain-drain phenomenon takes on a different form and should center on the issue of whether or not the emigration of highly skilled people reduces the well being of people remaining in the country of origin.

Effects on Non-emigrants

Economic theory establishes a very strong presumption that emigrants, brainy or not, do not affect the well-being of the remaining population. Individuals on the average are paid amounts equal to their contributions to the value of national output. This marginal-productivity theory of wages and interest, widely accepted as a basic hypothesis, implies that emigrants take along both their contributions to and claims on production, thus leaving the other incomes unchanged. Similarly, in terms of "free" government services, emigrants cease to claim them when they stop paying taxes. Even the fact that the emigrants may have been educated through public school systems, does not affect the well-being of others, since education is most rationally viewed as a process whereby the currently productive generation provides resources for the education of its children. An emigrant does not pay his share of the cost of education, but neither does he contribute children to be educated.

Logically, arguments about losses in welfare in the relevant sense must be based on the following conditions:

First, there may be short-term losses resulting from inefficiencies when established, highly skilled persons leave functioning working groups without leadership; this factor is theoretically a significant possibility when truly outstanding persons are attracted to the United States. No data are available to document the frequency and magnitude of such losses, but one should remember that no person is irreplaceable in the literal sense, and that other countries have very effective nonmonetary methods of retaining their outstanding scientists and other professionals. At the same time nonreturning students can safely be assumed not to cause losses of this kind, since they never were integrated in their native economies. However, case studies of losses in this category are needed badly.

Second, people must effect the well-being of others in ways for which the market does not reward them, so that their departure reduces output by more than they were being paid for. Nor is there documented evidence of the extent to which brainy migrants produce more than they are paid for, although this source of welfare effects on others is probably the most significant through such phenomena as "leadership" "entrepreneurship", and other elusive qualities of successful people.

One of the most important sources of welfare benefits for which persons are not rewarded individually is the field of research, especially basic research. But there the argument about losses of national welfare breaks down because knowledge produced by the emigrants in the United States becomes freely available to their native countries as soon as it is produced—and it does so at zero cost.

Third, the person emigrating is above average in his contribution to government revenues; this point is likely to be true if the migrant is highly skilled. But the validity of the complete argument that his departure reduces welfare, depends on proof that he would not have also absorbed more than an average value of government services. There are strong indications that above-average taxpayers also use more roads and other services—as well as demand above average education for their children than do average taxpayers and that only a relatively small margin of their taxes goes toward redistribution of income.

Fourth, the emigration of highly skilled people leads to more than just "marginal" changes in wages and output, so that the classical marginal-productivity theory of wages is invalid. This possibility is rather

remote for the developed countries of Western Europe. One study shows that during the period 1957-61, on the average 3150 scientists and engineers immigrated annually to the United States from 11 Western European countries and Canada. For the European countries these losses averaged as much as 9.2 per cent of the annual output of first-degree engineers and scientists (5). Unfortunately, similar statistics are not available for scientists from less-developed countries, but some fairly reliable evidence suggests that the annual immigration of non-Cuban doctors of medicine from Latin America is roughly 250 to 350—about 5 per cent of the annual production by all Latin American medical schools outside Cuba (6).

While classical economic analysis presents a strong theoretical case for the proposition that welfare in the emigrants' native countries is not reduced, a good theoretical argument can be made that emigrants have some positive influence on their former countrymen's welfare. The empirically most significant case has already been mentioned, in which talented scientists and engineers add to the stock of human knowledge through their work in the United States. This knowledge then becomes available at zero cost to their native countries and represents a net addition to knowledge, since the costly research could not have been done outside the United States. Moreover such people send home remittances, raising the disposable income of their relatives; they often give counsel to their home governments and in general retain an interest in the affairs of their native countries, spreading goodwill about them in their new habitat.

Researchers concerned with human migration and the brain drain have worked out these theoretical arguments about welfare losses in considerable detail without being

able to quantify any of the empirically relevant measures that their theoretical considerations have shown to be important. In part this failure is due to the elusiveness of welfare effects in general, which tools of economic measurement have been unable to capture; the well-known lack of statistics on the nuisance value of industrial pollution is another example of this general failure to quantify effects on welfare.

Available data and measurement techniques were nevertheless applied to the calculation of some statistics relevant to the brain drain. Unfortunately these statistics concentrate on the number and value of human migrants and educational services crossing international borders, thus expressing the importance of the drain from the nationalistic point of view and giving it greater play than it deserves according to the theoretical considerations.

With this fact firmly in mind, one is interested to note that, between 1949 and 1961, 43523 scientists and engineers (as classified by the U.S. Immigration and Naturalization Service) entered the United States as immigrants. The human capital embodied in these persons (that is, the resources spent on instruction, plus the value of their output they had produced rather than studied from the age of 14) amounted to more than \$ 1 billion; and they represented approximately 10 per cent of first degrees awarded in the U.S. during the period. Very few of these scientists and engineers came from underdeveloped countries; most were born in or came from the major countries of western Europe or Canada (7).

Such flow data are not very reliable because many of these alleged immigrants ultimately return to their native countries. So

that the net effect of past flows back and forth could be seen in perspective, the stocks of some U.S. professions were examined with respect to the national backgrounds of their members. For example, 12 per cent of all U.S. economists are foreign-born; of these, 75 percent also have a foreign high school diploma, but only 25 per cent have been fully educated abroad. On average, completely foreign-trained individuals are paid less than are their colleagues born and trained in the U.S., while economists having European or Canadian high school backgrounds plus U.S. professional training receive above average salaries (all in comparable employment and age brackets). (8) Recent analyses of other scientific disciplines covered by the National Register of Scientific and Technical personnel show that in physics, chemistry, biology, and similar fields individuals of foreign birth and foreign secondary education represent 7 per cent of the total membership of these professions — a figure remarkably close to the 8 per cent found for economists in the previously discussed independent study (9).

Other complicated calculations, using the human-capital concept and refined estimates of social costs of education, have led to the conclusion that on balance the world as a whole receives capital from the United States through exchange of foreign students, even with due consideration of the "value" of non returning students; thus in the year 1962-63 the 64,700 foreign students in the U.S. entailed a gross social cost of \$ 148 million while the resources absorbed by 17,100 U.S. students abroad were valued at \$ 30 million. The nonreturning students— 10 per cent on average (assumed)—charged against that accounting year represented human capital worth \$ 72 million. After some additional adjustments, the calculations showed

a net transfer of resources totaling \$15 million from the United States to the rest of the world in 1962-63 (10).

Canadian politicians and newspapers are particularly vociferous about the brain drain to the United States. Surveys and calculations of the U.S. and Canadian economics profession show that on balance Canada has received U.S. resources in the exchange of training of individuals who in 1964 were active members of the profession in the two countries (11).

More empirical evidence regarding the magnitude of the brain drain problem, both as a simple measure of international transfers of resources and more importantly, as a source of welfare effects, needs to be produced. In addition, sociologists and psychologists are needed to study the personal characteristics of migrants, so that future U.S. policies can incorporate the most effective incentives for the achievement of policy objectives.

Basic Principles and Recommendations

The existing theoretical and empirical research, however, permits formulation of some basic principles and specific recommendations that should be incorporated in U.S. policies. Foremost is the principle that the main responsibility for ensuring that highly skilled people either do not emigrate or do return after studies abroad, rests with the countries of origin. If severe restrictions on the free movement of people must be imposed, they can be imposed more easily at the point of departure than after the arrival in the United States. At the same time, however, the United States can assist foreign countries in keeping track of its foreign nationals and helping to bring to justice individuals convicted by due process of law in these countries. Such cooperation would

leave the initiative for and choice of specific policies to foreign official agencies knowing best the needs of their countries and the amount of personal sacrifice and subjection they can demand from their own citizens in the name of nationalism.

The United States government, by unilateral action, can change the size and composition of its foreign-assistance programs entailing the formation of human capital. The argument about gross and net cost of U.S. student exchange that I have just presented suggests that Congress should consider the net figure, rather than gross expenditure, as the relevant target when it decides the magnitude of foreign-aid appropriations (12). Alternatively, the United States can change the composition of its international program of education, by reduction in the number of foreign students in the United States and increase in the number of U.S. teachers and professors abroad. Shifts of this nature may be limited, to the extent that training abroad is an imperfect substitute for schooling in the United States, since the latter includes direct exposure to U.S. culture and institutions, which are considered important by many proponents of international-exchange programs.

The U.S. government can furthermore act unilaterally to remove domestic imbalances in the demand and supply in some professional fields, especially the medical. Sharp increase in the output of medical schools would be socially desirable on many grounds other than its effects on the immigration of foreign medical personnel.

It is at the nongovernment level, however, that the United States can cope most effectively with the problem of the brain drain. Private individuals, as teachers of foreign students, can encourage them to return home by awakening and nurturing patriotic

sentiments and by refraining from offering them employment and opportunities for complete integration into U.S. academic, institutional, and social structures. Teachers here are free to balance the advantages and disadvantages of each decision in their own minds, closely comparing a gifted student's possible contribution to knowledge through research in the United States to the use to which his talents might be put in his native country. A teacher's advice regarding a student's curriculum should be geared closely to his country's needs, without however, stifling his special talents and interests.

Most foreign commentators on the brain-drain problem point to inhospitable intellectual, political, social and institutional climates in native countries, rather than lower wages, as the main causes of the reluctance of students to return (13). American social scientists, and intellectuals in general, can have an important influence on the future environment and institutions in these countries through scholarly analysis of their shortcomings and advantages and through constructive suggestion of alternatives. Influencing foreign intellectual life and institutions is definitely not the role of the U.S. government, and, although the process of change through private scholars and by the indication of alternatives, may, be discouragingly slow, it is the only sure method of producing durable new institutions and customs suited to the need of each country. The non-return of students and the emigration of high level man power are in themselves powerful forces creating demand for changes.

United States charitable foundations as private agencies can, through appropriate subsidies and programs of expenditure, create incentives for changes in the environments of foreign countries along the lines

suggested by U.S. scholars in consultation with progressive elements of these countries' intellectuals-which may well include returned students. The U.S. foundations, independent of the government and held in high regard in most countries, are uniquely suited to carry on these types of programs. (14)

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Reprinted from (*Science*, December 16, 1966, Vol. 154, No. 3755 pp. 1420-1424).

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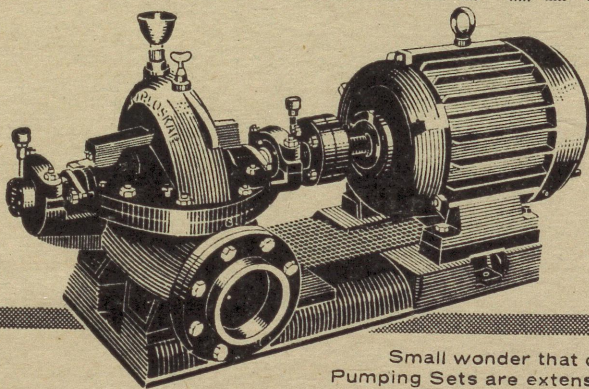
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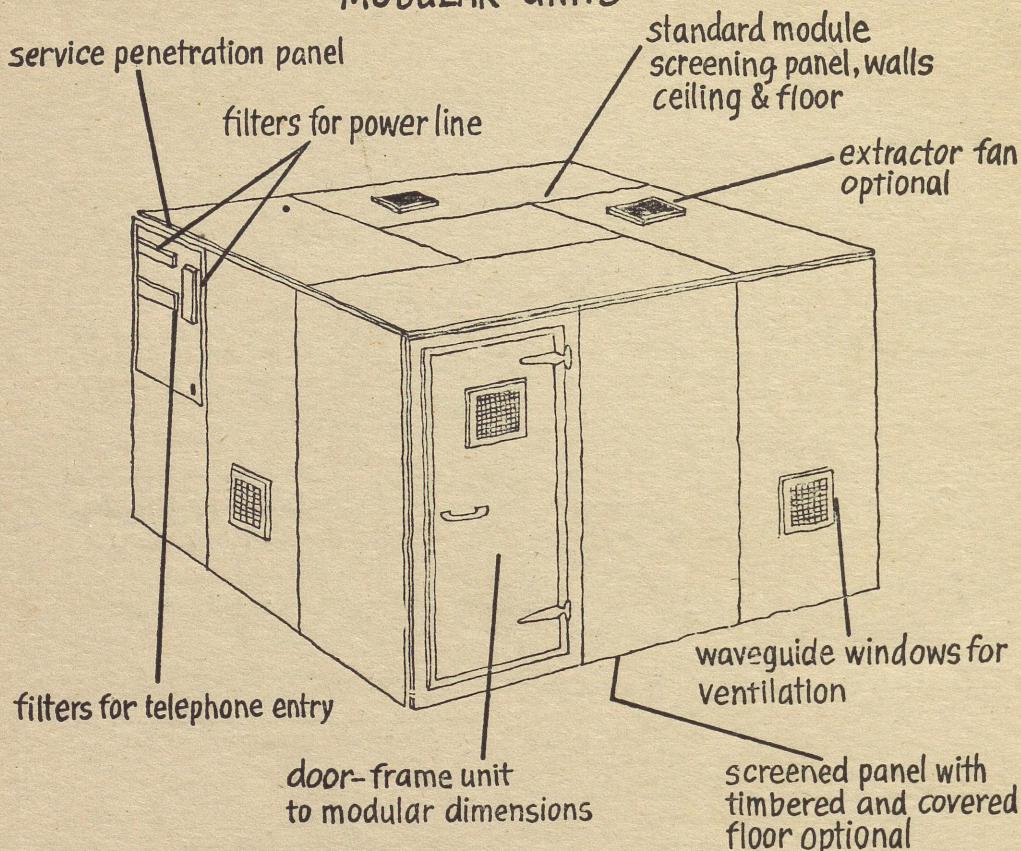
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Printed and published by Baldev Singh at the United India Press, Link House, B. S. Zafar Marg, New Delhi.

Regd. No. A-1468