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Special Number on the Occasion of Dr. S. Husain Zaheer's 65th Birthday

Dr. S. Husain Zaheer : the Scientist and the Administrator

P. M. BHARGAVA*

An inevitable consequence of the intimate involvement of science and technology in human affairs in recent years has been the evolution of a new science: the science of administering science. One could call without reservation Dr. S. Husain Zaheer as the "father" of this new science in the country (this is not to detract from his remarkable achievements as a chemical technologist). It is the creative leadership which he has provided in the administration of science that has led, perhaps for the first time in the country, to a recognition of the responsibilities of a scientist and the basic qualities which those responsible for the administration of science must endeavour to develop.

As one whose personal concepts of science have been greatly influenced by Dr. Zaheer, I feel that the best I could do—and it would only be appropriate to do so—at the occasion of his 65th birthday, is to indicate what Dr. Zaheer has demonstrated by personal example to be the basic requirements, criteria and responsibilities of scientists and scientific administrators in the country. Dr. Zaheer's greatest contribution has been the perceptive leadership he has provided in this sphere—a leadership which he never sought but which was given to him spontaneously by a very large proportion of thinking, serious scientific workers of two generations.

We have learnt from Dr. Zaheer that a scientist has two prime motivating forces: idealism and a sense of curiosity. The latter leads to scientific enquiry for its own sake so that a scientific worker finds satisfaction largely in the results of his own investigation: in the answers he has endeavoured to find to questions that have not been answered before. A scientist is highly involved emotionally in his work. An administrator of science must, therefore, not only share with his colleagues, the working scientists, their sense of idealism and emotional involvement in what they are doing, but create an environment which provides for a natural and uninhibited development of these values. The immediate potentialities of a free society may be judged by the sense of idealism and the extent of emotional involvement in their work, in those engaged in creative activity like science in that society.

A corollary to the sense of idealism in a scientist or an administrator of science is basically unselfish. His actions are not guided by personal motives, or the satisfaction of his individual whims and fancies or by the motives, whims and fancies of those from whom he might expect to derive a certain personal advantage. The actions of a scientist or an administrator of science—both in and out of the laboratory—must be guided by what he feels. It serves best the cause of the work he is engaged in, in the broader perspective of the cause of science and the

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larger, legitimate interests of the society he lives in and of humanity at large. An administrator of science has the additional responsibility of safeguarding the interests, both personal and professional, of the scientists who are responsible to him.

Another corollary to a sense of idealism in a scientist is determination and conviction which makes it possible for him to make a sacrifice. Thus, both scientists and administrators of science should be sufficiently motivated to be able to make up sacrifice even at considerable personal cost, for the larger interests of science. There has been a marked tendency amongst Indian administrators of science to feel that the department, the laboratory or the institution they have been chosen to administer is for them and not they for the institution, so that the administrative decisions are primarily directed to satisfy their personal aspirations. Thus it is the institution and not they who ever make a sacrifice! By identifying himself completely with the institution he headed (be it the Regional Research Laboratory at Hyderabad, or the CSIR), by the sacrifices he has made, and by his remarkable unselfishness, Dr. Zaheer has added a new dimension to the science (and art) of administering science. This is the terrain where the infectivity of his qualities was seen at its greatest. Association with him provided indeed the single greatest opportunity in the country in the last two decades to learn how to administer science to the maximum possible benefit of the scientists and the community in which they work. The group of scientists who were associated with him from time to time and who are now providing effective leadership at scientific research laboratories and educational institutions all over the country are a living testimony to his creative and unprecedented leadership in this respect. Dr. Zaheer showed that it is possible for a large number of first rate, thinking scientific workers of the same calibre to work together in harmony—something unheard of in Indian science. The ability to make his colleagues realise, gently but surely, the enchantment of the larger and the more sublime objectives over more restrictive personal interests has been one of the greatest gifts of this great individual.

Dr. Zaheer has shown by rare personal example that a scientist must be rational and objective. He believes that (I am now quoting a statement which a prospective member of the Society for the Promotion of Scientific Temper, of which Dr. Zaheer is a Foundation Member, has to sign) "knowledge can be acquired only through human endeavours and not through revelation and that all problems can and must be faced in terms of man's moral and intellectual resources without invoking supernatural powers". In as much as this, a scientist is opposed to dogma, he does not believe in the supernatural, and he implicitly believes in applying the methodology of science and the ever increasing vistas of knowledge being continuously opened by science, to solving *all* his problems. Unfortunately, most of our scientists suffer from the dichotomy of applying different standards and values in and out of the laboratory. This has been perhaps one of the primary reasons for the lack of emergence of the body of scientists in the country as a cadre of intellectuals and thinkers who could be trusted to make an objective and rational analysis of situations and problems and to bring to bear upon them the unquestionable benefit of the objectivity and rationalism inherent in the method of science. The status in this respect of scientists and technologists in a country is a good index of its emancipation from the bonds of narrow-minded traditionalism and empiricism. In his avowed allegiance to scientific method, Dr. Zaheer has been perhaps equalled by only one person in the country, the late Pandit

Jawaharlal Nehru, who was held in the highest esteem by Dr. Zaheer, in no little measure for this similarity in their outlook and approach. Dr. Zaheer has been the backbone of inspiration behind most of the movements and efforts in the country to promote the understanding and appreciation of science and the application of its method to everyday life as a part of the machinery of evaluation and decision making in every walk of life. Indeed, few leaders in any area of activity in the country have been so completely and utterly free of prejudice as Dr. Zaheer. This expression of humanism at its most sublime level made him one of the easiest man to talk to and carry out a dialogue with, and endeared him to virtually every one who had a chance to meet him even though briefly.

Dr. Zaheer has emphatically believed that a scientist must be aware of the environment in which he lives and works, and he must be able to derive a unique inspiration from it—an inspiration which that environment alone can provide—and give back something to it in return. This requirement is particularly important for one to function effectively as a practising scientist in our country. The tendency amongst our men of science and technology of throwing up their hands in despair when required to meet the challenge of the prevailing environment is only too well known. Few would have achieved what Dr. Zaheer was able to in the hostile environment he unfortunately had to work during the most productive years of his life.

Dr. Zaheer has taught us, again by example, that a scientist must recognise the nature and the importance of the role that science has to play in the affairs of man today: that it (science) must act as the prime instrument of material, intellectual and even moral uplift of man. He must be conscious of the social, economic, political and historical nature of the environment in which he works. Science and technology have now emerged as a strong force which can bring the merging of national and international interests. The actions of a scientist in the laboratory and his conduct outside the laboratory, should therefore be guided by both national as well as the broader international interests. Science is secular and so must be a scientist.

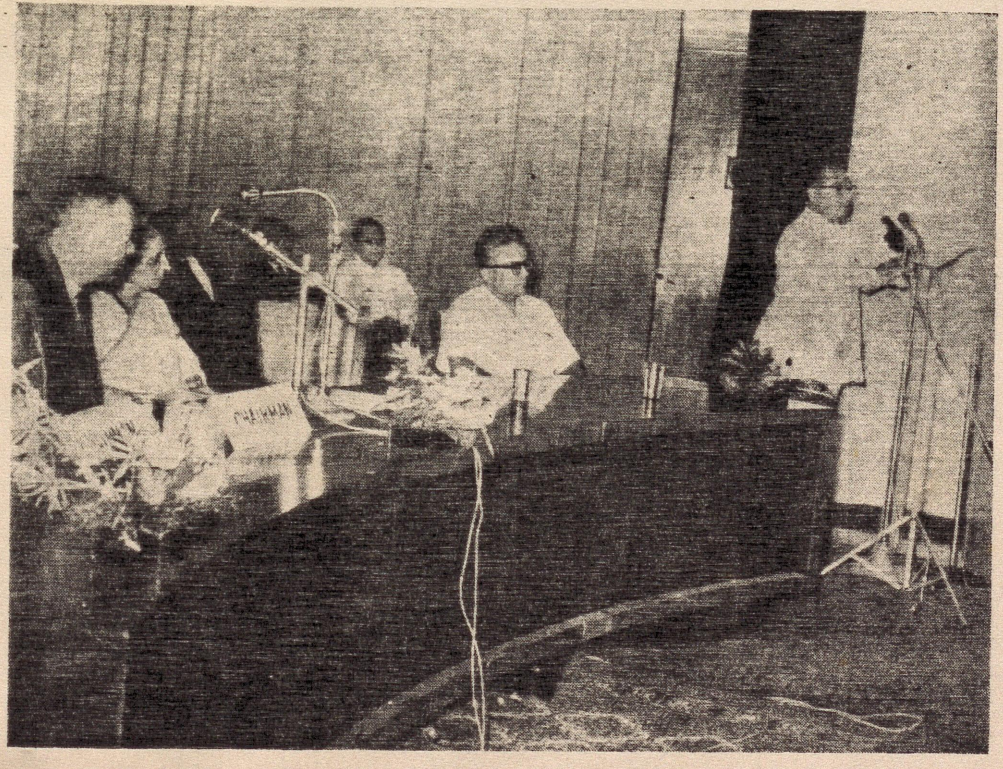
Dr. Zaheer also made his colleagues realise that a scientist's training is incomplete unless he has learnt to view all creative activity as stemming from the same fountainhead. Thus a scientist should take interest and be able to derive inspiration from other creative activities: art and literature, for example. This meeting of the 'two cultures' of C.P. Snow can open up new vistas of creative activity; thus "Time literary supplement" or a book on Michel Angelo can no longer be considered redundant in a scientific library. It therefore becomes imperative that an administrator of science provide an environment in which his fellow scientists are encouraged to take interest in other manifestations of creative effort. Dr. Zaheer has been one of the few administrators of science in the country who have recognised this responsibility. This has given his personality a fullness which strikes even a casual visitor as something unique, and which made the laboratory he established in Hyderabad an exceedingly pleasant and stimulating place to work in. His patronage of literature and art and the refinement of his interests in these areas of human activity are only too well-known.

The above qualities allow this great intellectual, who has done so much to give direction to the scientific effort of the country, to be put in the category of a phenomenon. It is only a weakness or two, for good food and good wine, and a love of beauty, which bring him down to the level of man!

No description of Dr. Zaheer and of what he has stood for, can be complete without a

specific mention of his outstanding courage—courage which grew out of conviction, courage which led to unstinted action and sacrifice, and courage which prevented him from making compromises. Here is a man who has never been afraid of "audit objections". "If you feel what you are doing is right, then go ahead and do it, *and then* face the audit objections", he so often said in the laboratory. This was also an expression of his basic trust in human nature: the belief that if what one does is really right, he could finally convince even the audit! He also used to say, "If you can fully justify the expense and feel you must incur it in the broader interests of science, then go ahead and incur it, *and then* find the money for it". And more often than not *he* did find the money. Sometimes his forward-looking nature resulted in none-too-pleasant situations. The wives of many of his colleagues have never forgiven him for his preaching to the husbands "If someone can lend you the money, it only means you are solvent!".

Dr. Zaheer was born "great" (in one of the best-known Muslim families of the country) and became greater by fully exploiting his natural gifts at the slightest opportunity. Others may not be born with his gifts but if they follow him, the chances are that some of his greatness will be imparted to them—such has been the compelling and infective nature of his qualities.



Dr. S. Husain Zaheer addressing the Caaust Symposium. Mrs. Indira Gandhi, Prime Minister of India is in the Chair

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Cosmological Conceptions in the Ancient India and Modern Cosmology

PETER HEDERVARI F.R.A.S.*

It is well-known that India has one of the most ancient cultures in the world. Contemporaneous with the Bronze Age civilization in Europe there already existed in India great philosophers, who occupied themselves with the deepest problems of Existence and Genesis, the origin of our gigantic Universe.

In the first period of the Sanskrit literature astronomy was impregnated with magic, mythological and mystical elements; but actual observations were also being made, chiefly for astrological purposes just as in Europe during the Middle Age.

We may find the first entries of certain astronomical and cosmological relations in the Rig-Veda. Chapter 129 of Book X is the Hymn of Genesis.

The following text isn't exact and authentic, since the present author translated it from Hungarian to English, using a Hungarian translation of the respective section of Rig Veda :

> "....In that time there was neither Existence nor Non-Existence. What was there ? Where ? Under whose protection? Were there waters in space ? There was neither air nor sky above it !....Who knows for certain the origin of this World? Who can explain it? The Gods had been born after the Genesis ! Who knows the birth of the Universe ? In what way did this World come into Existence ? Did He do it or not? Perhaps only the Sublime, the Merciful, the Watcher in the Highest Sky above the World knows ! ....Or.... He doesn't know either ?!"....

These wonderfully deep, abstract speculations show that the ancient philosophers of India not only took pleasure in the grandiose picture of the Universe but also tried to explain the manner of the World's development and to comprehend the dimensions of the Universe.They wanted to understand Man's place in the World-system.

It is well-known that the ancient wise men of India had astonishing intuition with the help of several methods of the Yoga. For example —as the late, famous Hungarian Scientist, Dr. E. Baktay mentioned in one of his books about India—they knew of the existence of bacteria about 2000 years ago, even though they had no microscopes ! With their wonderful intuition they could recognize certain laws of Nature and various correlations among phenomena. Their extraordinary intuition also led them to ideas about the origin and development of the Universe and its dimensions in space and time. Thus they speculated upon the age of of Earth, and even the age of the Universe, as we shall see later.

Both astrological and astronomical observations required very exact knowledge of time. In ancient India water clocks and hourglasses were used besides sundials. The

* Vice-President of International Lunar Society, Budapest, Hungary.

unit of time was the *truti*, which was about 0.0012 seconds. The practical unit of time was the solar year, the time the Sun needs for a complete circuit on the ecliptic. Other units of time were multiples of the solar year. These were the Yugas, which had different lengths. Four Yugas made a Mahayuga. About 72 Mahayugas (more exactly: 71,428,571) made a Mantvantara period, and 14 Mantvantaras equalled a Kalpa, which contains 4.32×10^9(=4,320,000,000) solar years.

The Kalpa is astonishingly a large unit of time. There is no other religion or philosophy in which we may find similar data ! The beginning of the chronology of the ancient Assyrian-Babylonians and Hebrews was only about 6000 years ago; of the Mayas, 12000 years ago. The Brahmans calculated time from the beginning of the present Kalpa, that is—according to their comprehension —*from the birth of the Earth* ! The present Kalpa began 1,955,188,066 years ago, calculated backward from 1966 in our present calendar.

According to current scientific opinion the age of the Earth is between 2×10^9 and 5×10^9 years, the most probable value is about 4.6×10^9 years. Astonishingly, *the old Indian wise men recognized the age of our planet to the correct order of magnitude* !

Nevertheless, the Kalpa were by no means the longest units of time. A Kalpa means "one day-time of Brahma", the Creator. According to the Brahmanist's philosophy, Brahma "exhales" the universe out of Himself at the dawn of one of His days (Kalpas); and then in the twilight He revokes the World into Himself. The name of His night in Sanskrit is Pralaya. In the old philosophical concepts Brahma's life doesn't last infinitely and indefinitely but consists of 100 Brahma-years. A Brahma-year is 360 Brahma-days, i.e., 360 Kalpas plus Pralayas. A Brahma-world, the life-time of *one* Brahma, is 3.1104×10^{14} years! After this time the existence of Brahma ceases, and He is another Brahma who next creates a new Universe. The longest unit of time in the Brahmanist philosophy is the Brahmanda. During one Brahmanda there are altogether 7.2×10^{10} Brahma-worlds, each with its own Brahma-Visnu-Siva Trinity. The duration of one Brahmanda is 2.2394880×10^{25} years !

For comparison: according to modern conceptions in astrophysics, the life-time of a star is "only" about some 10^9 years, and the age of our own Galaxy may be about 16×10^9 years (Hoyle *at al* 1965).

According to the ancient Indian comprehension we are at present in the seventh Mantvantara of the 180001st Kalpa. From the beginning of our Brahmanda there have so far passed about 7.776×10^{14} years. Since the life-time of a Brahma is 3.1104×10^{14} years, we now have the third Trimurti, making our Universe also the third one. Its age is about 1.555×10^{14} years, adequate in order of magnitude for the so-called "long-time scale" of modern astrophysics !

A table on page 3 (top) may help to clarify these concepts.

It is curious that if we divide a Brahma-day (8.64×10^9 years) by the precessional cycle (2.592×10^4 years), we get a quotient of 3,3333333.... .10^5, and each remainder in the division is 8640, one-tenth of the number of seconds in a day.

As we mentioned above, the probable value of the Earth's age is 4.6×10^9 years, a value curiously close to the length of the Kalpa, 4.32×10^9 years. On the other hand, according to a calculation of Gilbert/ Monthly Notices, Vol. 116, No. 6, 1956, the gravity co-efficient "f" is the function of time (Dirac-Gilbert cosmology). The possible maximal value of "f" was valid for the

Table

Time Unit	*Value in ther Units*	*Value in Years*
Brahmanda	7.2×10^{10} Brahma-worlds	2.2394880×10^{25}
Brahma-world	100 Brahma-years	3.1104×10^{14}
Brahma-year	360 Brahma-days	3.1104×10^{12}
Brahma-day	1 Kalpa+1 Pralaya	8.64×10^{9}
Pralaya	about 14 Mantvantaras	about 4.32×10^{9}
Kalpa	same as Pralaya, also 1000. Mahayugas	same as Pralaya
Mantvantara	about 72 (more exactly: 71. 428571 Mahayugas)	about 3.0857×10^{8}
Mahayuga	4 Yugas	4.32×10^{6}
Satya-Yuga		1.728×10^{6}
Treta-Yuga		1.296×10^{6}
Dvapara-Yuga		0.864×10^{6}
Kali-Yuga		0.432×10^{6}

epoch about 4.1×10^{9} years ago. As a matter of fact this data of time is smaller than the real value valid for the age of the Earth; however, Gilbert calls this time as the "age of the Universe". The reliability of this data due to Gilbert is strongly disputable, however, it is very interesting to note the similarity between the length of a Kalpa and the "age of the Universe", the latter in Gilbert's sense.

I should like to give an idea of mine, namely, that it appears possible that *the ancient Indian wise men had some knowledge of the expansion of the Universe*! I have spoken of their truly astonishing intuition. Perhaps, then, when they spoke about the days and nights of Brahma and about His "exhaling" and "revoking" the Universe respectively, they wanted in the first case to express the expansion of the Universe and in the second case its contraction. Of course, they clothed the idea in mystical garb. Also according to Tolman's modern cosmology, the Universe has a *pulsation*. In a first period the Universe is expanding, as is true at the present time, and after a very long time the Universe will begin to shrink. These alternating phases will be repeated. The concepts of the ancient Indian scholars remind us very much indeed of this current cosmology.

We ought to acknowledge that the ancient Indian philosophers showed an extremely interesting imagination about the development of the World and that they had a wonderful recognition of the fantastically long age of our great Universe.

National Convention of Educational and Scientific Workers

The 19th meeting of the Council of the ASWI, at its meeting held in New Delhi, on March 1, 1966, passed the following resolution:

The Council

Believes that all organisations of scientists, technical and educational workers be united in a common effort :

(*a*) To get a better deal and status to scientists, teachers and technologists in Indian society;

(*b*) To ensure that the fruits of educational, technological and educational efforts benefit the people as a whole;

(*c*) To participate in the great and enobling effort to build a modern, technologically advanced, democratic socialist India a peaceful world;

(*d*) To ensure optimal utilisation of scientific and technical advances;

(*ii*) *Recommends* to the CEC and the Bureau to take immediate steps for negotiations with all organisations of teachers and technologists and scientists for National Convention to discuss matters of common interest and to take all organisational steps towards establishing a common programme of work.

In pursuance of this resolution, the President ASWI has addressed the following letter to the teachers and staff associations in the various universities and scientific organizations in the country :

Dear Friend

We seek to approach you and your Association to consider the desirability and necessity of holding a Convention of these Associations in the country, which are concerned with the social, cultural and economic welfare of teachers and scientists in universities, research organizations, and other institutions of higher learning and research.

All of us are aware of the existence of a large number of Associations which function locally, but there have been few opportunities for us to meet together on an all-India basis to discuss our conditions of work and living, and exchange experience in various spheres which are common to all higher scientific and teaching institutions.

India is passing through a critical period of its history. Stresses and strains of life are affecting all sections of our people. Intellectuals engaged in teaching and research have a heavy responsibility towards society and its development. They, in fact, have to play a pivotal role in finding solutions for the vast mass of problems of economic and social development.

It is against this background that the Association of Scientific Workers of India is keen to know whether your Association is willing to join as a sponsoring organization for the proposed Convention. If for any reason you do not wish to join the sponsors, would you participate and send a delegation to the Convention?

The Convention is proposed to be held towards the end of January 1967, in Delhi for 2-3 days. The final decision, of course, will be taken by the sponsoring organizations.

We shall be grateful if you could send us your reply in affirmative at an early date, along with a copy of the constitution of your Association and other documents or resolutions concerning your activities.

Yours truly
Sd/- N.P. GUPTA
President, ASWI

Development of Science in East Africa

D. ODHIAMBO*

Introduction

The countries of East Africa covered by the East African Academy are Uganda, Kenya, and the United Republic of Tanganyika and Zanzibar. The three countries have some of their services administered jointly by the East African Common Services, two of which are Scientific Research Institutes and the University. Thus the problems of research and development of science are, to a large extent, common to them, and the formation of the East African Academy, which is also interested in problems of research and science in general, was a logical consequence of this set-up. The Academy operates under a legal notice of recognition issued by the East African Common Services Authority which is the supreme organ of the EACS Organization, and consists of the President of the United Republic, and the Prime Ministers of the other two countries.

Organisation of Science

Our Academy is just over one year old, and hence it has not had the time to put into practice much of what it considers should be done, and most of its work so far has been in preparation of suitable background for major tasks ahead. One of the problems in which the Academy is interested is the organization of science in East Africa. The present set-up in East Africa does not differ very much from the one in colonial days since these countries are only a few years old.

*The East African Academy, Nairobi

In many new countries, the problems requiring immediate solution often take up so much time and energy of the administrators and governments that the importance of science and hence of Scientists to the national development is not sufficiently appreciated. Most of the civil servants are non-scientists, brought up in the colonial days when a systematic use of all natural resources was not the aim of the government, but rather, a quick exploitation of the most abundant natural resources. It was the realization of this by indigenous East African Scientists that led to the formation of the East African Academy as a medium through which science could be given its proper place in our society. This, the Academy hopes to achieve by three different ways.

First, the Academy attempts to organize the Scientists themselves into a coherent force, and give them a platform from which they can make themselves felt. Individual scientists, working in remote stations, without a feeling of belonging to a scientific community, cherishing certain values, very often become absorbed in the civil service administrative machinery and lose their independent qualities. The work of such scientists then becomes mere routine, and no creative research can thrive. Our Academy is already fulfilling this first role. Through organized symposia, specialised conferences, publication of papers, and emphasis on research, the East African Scientists are beginning to feel a sense of belonging to a community of Scientists.

Secondly, science and its applications can only develop if the public at large appreciates its importance and is receptive of new ideas. Government information services alone cannot sufficiently educate the public in this respect, and the second function of our academy is to explain to the public, through simplified publications, radio and television programmes, the importance of science as is illustrated by its application in agriculture, medicine, transport, nutrition, etc. Further, this public education is a necessary precondition to investing reasonable amount of funds to scientific development and research. The public has to appreciate the reasons why, for example, its money is being spent in setting up a research laboratory. The main difficulty in the past has been that the little information available to the public on science came through government departments, often in English, and not understood by many. Now, the Academy, consisting of well-known members of the public, serves as a better source of this information from the public point of view.

Thirdly, rapid development in science, like in anything else, must be organized. This is not possible without governmental support and active participation. Our Academy therefore has set itself the task of acting as a watchdog for scientific development as well as being a pressure group, constantly edging the governments on to progressive scientific policies. All this is not possible without good relations with the governments; indeed in other countries, the governments themselves set up their Academies to advise them on scientific policies. Although our Academy was founded outside the governments, we have established very cordial relations since by now, the governments themselves have been convinced of the benefit accruing to the nation through the Academy, and as already mentioned, we are operating under a legal notice of recognition issued by the East African Common Services Authority. We are aiming at the point when the Academy will not only be represented in the various research councils in East Africa, but will also take over fully the task of advising the governments on all problems connected with science. The exact machinery for this has not been finalised, but the Executive Committee of the Academy is currently working on various proposals aimed at achieving this, one of which is illustrated below :

GOVERNMENT

EAST AFRICAN ACADEMY

Social Science Research Council	*University Research Council*	*Natural Resources Research Council*	*Medical Research Council*	*Industrial Research Council*	*Govt. departments*

In drawing out the broad research plan under this scheme, each council, institute, or University department would first be consulted by a committee of the Academy on which members of the Government Planning Commission sit. This committee would draw out the plan of research taking into account possible economic implications. This plan would then be submitted to the Academy for scrutiny, and final submission to the government. In this way, all the important problems requiring investigations would be given due attention and each problem as it arises would not be ignored without careful consideration. The two vital conditions for the successful operation of such a scheme, however, would be that the Council of the Academy consists of leading

scientists, elected by their own fellow scientists and that the governments give due recognition and mandate to the Academy on all matters relating to science and research.

Each of the East African countries, at present, has a few research stations mainly dealing with Agricultural, Veterinary and Medical problems, attached to their respective government departments. The bulk of research is, however, carried out in the Research Institutions of the East African Common Services Organization, a list of which is given at the end, and the University College departments. The research done under the Common Services Organization is controlled by two Research Councils—The East African Natural Resources Research Council and the East African Medical Research Council. These councils give general direction to the work of the research institutes, and also act as scientific advisory councils to the governments of the individual countries when called upon to do so. They appoint research coordinating committees to advise on the progress of research in the various fields in East Africa and also to make recommendations for new or revised programmes of research. Most of the funds for the activities carried out under the Research Councils come from the general revenue of the East African Common Services Organization and the Councils prepare their own budgets; which for example, in 1963/64, devoted 66 per cent to Agricultural Sciences and 34 per cent to Medical Sciences. There is no corresponding Council for industrial research and the University departments carry out their own research programmes by raising funds from University sources. There is one Institute of Social Research attached to Makerere College, but there is a great need for the expansion of research in the social sciences since our society is rapidly being affected by new ideas and changes in mode of life, the effects of which need constant assessment if we are to build our plans on firm grounds.

This, briefly is the picture of the situation from which our Academy has to take East Africa in the way of organization of science. On the whole, the East African Government are reasonably aware of the importance of science and scientific research; nevertheless, we have still far to go if our Academy is to fulfil all its aims, in this respect.

Potential for Scientific Investment

It is next necessary to say a few words on the potentiality of the East African countries to invest in science i.e. in Scientific Education and Research. I must confess however that I am limited by the fact that I am not in a position to obtain figures and statistics as I have had to write this paper outside East Africa. Confining myself therefore to general observations, I am convinced that by streamlining our choice of problems for research, we could make better use of our available capital, both human and financial. I have no doubt that having evaluated our requirements in the correct order of priorities, we can find sufficient funds from both internal and external sources to invest in more scientific requirements. Our first requirement, therefore, is to make a systematic evaluation of our Natural resources in terms of land and what can best be produced from it, water, power, mineral resources etc. Such a task would no doubt be a big undertaking, extending over a few months and involving a large team of scientists. It is, however, a necessary precondition to any scientific investment, and indeed to any development plans. This is, therefore, one way in which the East African Academy would greatly welcome assistance from progressive sister organizations. Of course the individual governments of the East African

countries have carried out economic surveys from time to time, but what we envisage is a detailed survey carried out by scientists who are not necessarily limited to what is readily economically producible, but who would simply catalogue what we have and what we could produce from them.

One of our greatest problems today is the shortage of trained manpower. This applies even more to scientists at all levels. As an illustration of this fact, in 1963, there were 120 research scientists employed by the Research Institutions controlled by East African Common Services Organization. Of these, less than 10 were East Africans. At the same time, there were 32 technicians of whom less than 15 were East Africans. The picture is no better in the University which only hopes to raise the percentage of its East African members of staff to 40 by 1967 and even this is considered by many to be a mere dream. Thus investment in scientific education in general and training of more technological manpower is vital if we are to go any further. Here again the East African Academy is thankful to those friendly organizations and countries, such as the Republic of India, which have offered fellowships to East Africans in the past, and the Academy would still welcome more fellowships particularly in specialised branches of science and technology although the East African countries themselves are of course currently investing a high percentage of their income on education in particular.

The Supply and Maintenance of Scientific Equipment

The non-industrialised countries of East Africa, and indeed of any part of Africa cannot hope to be able to supply themselves with their own scientific equipment in any near future. On the other hand, there are many instruments now being produced in world market and one problem which often faces scientists, is the decision as to which model should be ordered. It is true that many of the firms dealing in scientific equipment have their own salesmen around but this does not often lead to the right decision, since to them each of their equipment is first class. So, unless the scientist has had the opportunity of using the instrument before, he has to go by the catalogue. I have known many equipment ordered at some expense not working at all, and some not as well as was expected. We, in East Africa, have not had so many laboratories to equip as yet, and in any case most of our scientists have hitherto been British, coming out with a knowledge of their equipment and returning home from time to time when they can catch up on some new equipment which they happen to like. The situation is however now changing and our scientists are taking over. Moreover, due to the widened relations of our Governments with other countries, we now have many other instrument makers offering what they claim to be instruments of better performance. Thus, there is a real need for some local means of testing the worthiness of an equipment before many laboratories in the country order it, i.e. some organization independent of the manufacturers which would, so to speak, carry out research on the instruments.

For this purpose a regional scientific equipment organization, serving the interest of a number of countries, would greatly help. Initially, such an organization should enter into arrangements with manufacturers to try out, where possible, their new equipment under the countries' own climatic conditions and pass on their recommendations to the various laboratories. If an equipment was unsuitable, it could be returned and if suitable, passed on to a laboratory needing it.

Such an organization could also take on the task of maintenance particularly of the more expensive equipment in its area, and possibly also the training of technicians. I am convinced that a scheme on these lines, financed initially by the governments of the countries concerned, would prove very beneficial. As soon as it is possible the countries concerned would of course start producing their own equipment, thus reducing the need to rely on import.

In East Africa, we have not as yet had the problem of foreign exchange, but no doubt it is soon going to arise. The danger is that where there is limited foreign exchange the purchase of scientific equipment may become restricted and hence the progress of scientific research slowed. This is the sort of problem which I believe a forceful body of scientists, operating outside the government so that it is not inhibited, but at the same time with access to the highest person or body in the government, would be able to obtain for the scientists a fairer deal. Otherwise, the scientists become frustrated and begin hiring their skill to other countries better able to supply them with the necessary equipment, for the scientist today cannot compete without some of the necessary instruments. In spite of what I have said the solution to the whole problem of foreign currency for scientific equipment depends to a large extent, on the position that science and research in general is accorded in the government plans and in the public mind. This unfortunately depends on what the scientists themselves have done and are doing to improve their image.

The Problem of Scientific Vocabulary, Text Books and Other Publications

It is often argued that it would be impossible to teach science in any language other than those already established namely, English, German, French, Russian, etc. This argument is only true so long as the people teaching and the students are not sufficiently versatile in the proposed language. The problem of scientific vocabulary as such is not difficult, since most of the scientific words are in any case similar in the various established languages. Thus it would be quite legitimate to use "geografia" in Swahili instead of "geography". What is important is that if a decision is made that the national language be used, then sufficient time must be allowed for the working out of a scientific vocabulary in the national language, and then sufficient time for the switch over. This would have to start from primary one in the schools, and proceed only as fast as both the teachers and pupils can think rationally in that language. We in East Africa have not had this problem, but I have no doubt that at some future date, there will be demand for the use of Swahili in our schools and colleges, and it is therefore one of the many problems that our Academy intends to investigate.

Our main problem at present is the text-books. Practically all the text-books in use in East Africa are British, quoting examples from the British background, and generally assuming that the reader is familiar with the British way of life. The Academy considers this problem so important that it has set up a research and publication committee to look into the methods of correcting the situation. Tentatively, we intend to approach the problem by asking individual members of the Academy, competent in their own rights to write text-books, either to produce the East African versions of particular books by arrangement with the authors, or where not possible, simply to produce new text-books suitable for East Africa. Of course this is bound to be a slow process particularly as we are short of manpower, but it is a

task we are according top priority as part of our drive to give the coming generation of scientists firmer roots in East Africa. Here again, regional cooperation between countries with similar backgrounds would more easily facilitate production of suitable text-books than each country going it alone. This is even more so since one of the important factors involved is the availability of a modern press capable of undertaking any type of printing.

The writing of text-books is intimately connected with publication of research work. It is from research material that one eventually obtains materials for one's books. Our Academy therefore places great emphasis on publication of periodicals, journals and monographs, not only as a means of stimulating its members into further research work but also as a means of spreading out further knowledge of East Africa. Our first publication to come out is the proceedings of our first symposium held at Mackerer in June last year. We also have in preparation a number of monographs dealing with economic and historical problems of East Africa, but, perhaps the most important of all our publications, will be scientific and research facilities in East Africa. This will contain the results of a survey which we have just made and which will soon go to press. I hope that any one interested in East African Scientific problems will find it of great value. The Academy will be pleased to give any of its publications to other learned societies on an exchange basis.

Apart from publications of the Academy, all the Research Institutes of the Common Services Organization publish annual reports which are available on requests; and may also be obtained through libraries. The East African Wild Life Society, the East African Institute of Social and Cultural Society, both Institutional members of our Academy, also publish their journals, that of the Institute being a monthly one; but apart from these there are other societies with membership all over East Africa like the Chemical Society, the Institute of Electrical Engineers, Institute of Biology, Geographical Society, etc., which also publish their journals from time to time.

Conclusion

In this brief survey, I have touched on a few problems connected with the development of science that we have come across in East Africa and how in many cases we are thinking of solving them. Of course Science is international, and the experience of one country is likely to be of value to another. It was, therefore, with great pleasure that our Academy accepted the invitation of the Association of Scientific Workers of India to attend this symposium, so that our representatives may have an opportunity to exchange experiences on what are no doubt common problems. I therefore hope that the contacts made in this symposium will be continued and will prove of great value to the furtherance of scientific knowledge and to the development of our countries. I believe this contact could be maintained along the following lines:

(*a*) Continued exchange of any information relating to scientific developments in our respective scientific organizations, or through the embassies.

(*b*) Wherever possible, invitations extended to representatives of other scientific organizations to participate in conferences, etc. This no doubt needs finance and organizations such as our Academy which depend on members' subscriptions, may find it more difficult, but the governments

of our countries and other interested bodies will no doubt realise the immense importance of these contacts and could therefore be persuaded to lend a hand.

(*c*) Material support to Scientists to help them organize themselves and become effective forces in their countries. This is important since the fruits of scientific work now determine the course of lives of millions of people.

(*d*) Establishment of a joint consultative body to meet from time to time, as finances may permit, to discuss matters of mutual concern and map our best ways of tackling scientific problems of the developing countries. Such a body could perhaps make use of the facilities of international organizations like UNESCO FAO, WHO etc.

Institutes under the E.A. Natural Resources Research Council

The Tropical Pesticides Research Institute, P.O. Box 3024,
Arusha,
Tanganyika.

The East African Marine Fisheries Research Organization, P.O. Box 668,
Zanzibar.

The East African Agriculture and Forestry Research Organization, P.O. Box 21,
Kikuyu, Kenya.

The East African Veterinary Research Organization, P.O. Box 32,
Kikuyu, Kenya

The East African Fresh Water Fisheries Research Organization, P.O. Box 343,
Jinja, Uganda.

This paper was presented at Caaust Symposium held in New Delhi during 25th April-2nd May, 1966.

(Copy of the letter received from Secretary General, World Federation of Scientific Workers

To Affiliated Organisations,
To Members of the Executive Council,
To Corresponding Members,

27th September, 1966.

Dear Colleague,

Very alarming news is reaching us from our colleague in the Argentine Republic, news that entirely confirms what you have without doubt seen in the Press. The measures taken by the new Argentine Government against university freedom have been followed by police brutality directed systematically against professors and students, and this in the absence of any provocation.

The response of our colleagues has been rapid and has shown a high degree of solidarity. At the present time, some 1500 professors, lecturers and assistants of the University of Buenos Aires have resigned; 500 others have done the same in Argentine University centres.

It is very important that we vigorously show our total solidarity with our Argentine colleagues:

(*a*) by sending letters or telegrams of protest to the Argentine authorities and to the papers of that country.

(*b*) by investigating the possibilities of finding suitable posts for those of our Argentine colleagues who might be forced to leave their country following repressive measures. Various cases have already been given to us and, *at your request*, I shall supply you with all the desired information.

Finally, I should like to inform you that on 23 August, 1966, our President sent the following telegram to General Ongania in Buenos Aires:

"The advancement of its own scientific research is fundamental for the general development of any country. We therefore express the urgent hope that your Government will do everything necessary to ensure academic freedom to your scientists and scholars so that your professors may withdraw their resignations and scientific progress may continue in your country" signed: C. F. Powell—Nobel Laureate—President of the WFSW.

Please let me know, without fail, what you will be able to undertake.

Yours sincerely,
Sd/- P. BIQUARD
Secretary General,
10, rue Vauquelin,
75—Paris Veme.

ASWI Activities

Bureau of the Central Executive Committee

Four meetings of the Bureau of Central Executive Committee were held during Sept.-Oct., 1966. The following important business was transacted;

1. The General Secretary (Organization) reported that a letter had been addressed to all the Branches explaining the financial position of the Asscciation and communicating Bureau's suggestion about the pricing of V.K. for members at the concessional rate of Rs. 5/- per annum.

2. *Convention of Educational and Scientific Workers*—Dr. Gupta read his note on the proposed National Convention of Educational and Scientific Workers. There was a good deal of discussion on this topic and it was decided that the invitees should be restricted to persons engaged in institutes of higher learning and research. It was also decided that a circular letter be sent to all the staff associations in the Universities, higher technological institutes, research institutes, etc., indicating the objectives of the convention and inviting them to participate.

Karaikudi Branch

1. The Executive Committee met on 22.8.66 and decided to have two separate meetings to felicitate (i) Prof. K.S.G. Doss on his 61st birthday and (ii) the recipients of Inventions Promotion Board awards for 1966.

2. (a) A special meeting was held on 16th August, 1966 in which Shri K. Thiruvengadam, Scientist, Defence Science Laboratory, Delhi gave a very interesting lecture on "Queuing Theory".

(b) An extraordinary meeting was convened on 2-9-66 to offer greetings and felicitations to Prof. K.S.G. Doss the founder President of this brach on his attainment of 61st birthday. Shri M.I.A. Siddiqi, Shri R. Chokkaiyan, Shri K.S.A. Gnanasekaran, Dr. M.S.V. Pathy, Shri B.A. Shenoi and Dr. G.V. Suryanarayana offered felicitations. A memento was presented to Prof. K.S.G. Doss in appreciation of his services to ASWI.

(c) In a meeting held on 3-9-66 this branch congratulated the Inventions Promotion Board awardees, Prof. K.S.G.Doss, Dr. K.V.N. Rao, Shri A.K. Abdul Waheed, Dr. K.S. Rajagopalan, Shri N. Subramanyan and Shri M. Sundaram.

Prof. K.S.G. Doss and Dr. K.S. Rajagopalan gave a resume of their inventions.

Message sent to Dr. S. Husain Zaheer, the outgoing D.G.S.I.R. on the eve of his laying down office.

"Karaikudi Branch of the ASWI wishes to place on record with deep sense of affection and gratitude the services rendered by its beloved Dr. S. Husain Zaheer on the eve of his laying down office as the Director General of CSIR. It is needless to speak out in detail his multifaceted personality and its impacts on the growth of Indian Science and technology that geared the economic and industrial development of the Nation as well as the world science. His interest in the welfare of the world scientific workers and organised scientific activity will be remembered for ever. He infused a new dynamic spirit into the thinking and working of the scientific community.

This Branch wishes him long and happy life and would like to derive continued inspiration from him for its future activities.

May his services be further utilised for the service of the Nation."

Message sent to Dr. Atma Ram, the new D.G.S.I.R.

"Karaikudi Branch of ASWI learns with great pleasure the news of the appointment of Dr. Atma Ram as the Director General of the Council of Scientific and Industrial Research. We are confident that under his dynamic leadership, the CSIR will play a greater role in the technological and scientific growth of the nation. It wishes him a long and successful career in the new assignment and assures him of its full and unstinted cooperation in the great task that lies ahead of us".

U.P. P.W.D. Research Institute Scientific Workers Association

The following have been elected as office bearers of the Branch Executive Committee for the year 1966-67 :

Dr. Manohar Lal.. ..	President
Dr. T.N. Chojer ..	Vice-President
Shri S. Shamim Ahmad..	Secretary
Shri R.N. Nagar ..	Astt. Secretary
Shri U.C. Gupta ..	Treasurer
Shri J.P. Bhatnagar ..	Member
Shri G.S. Bhandari ..	Member
Shri R.D. Khare ..	Member
Shri B.P. Singh ..	Member

Ordnance Establishments (Kirkee)

Compulsory offer of quarters to ERDL members

In E.R.D.L., quarters were offered to members, on seniority basis. When a senior member refused quarter his H.R.A. in lieu of quarters was retrenched even though there were a good number of others who needed this quarter. Because of the fear of forfeiting H.R.A. the senior member was forced to choose the only alternative of accepting the quarter even though he might not require one. Association approached Ministry of Defence and the Ministry in its reply has stated that such members who did not require quarters need not apply for one nor they need forfeit their H.R.A.

Canteen-Store in H.E.F.

A C.S.D. Canteen Store on the model of one existing in A.R.D.E., E.R.D.L. or elsewhere is highly essential in H.E. Factory as employees could purchase commodities from here at comparatively cheap rate. Now employees are thrown at the mercy of fastidious and implacable shopkeepers outside, who charge exorbitant prices for their commodities. A proposal for setting up a canteen store is put before G.M., H.E. Factory. It is under his active consideration.

Prospects of Senior Draughtsmen Jig (Tool)

Senior Draughtsman has to go through the channel of either Sr. D/Man to Sr. D/Man (J & T) to Chargeman Gr. II and then to Assistant Foreman or Sr. D/Man to Chargeman Gr. II to the Assistant Foreman. In the latter case the step of Sr. D/Man (J & T) is omitted in the channel. As a result of this system Sr. D/Man following the former channel, have been suffering from supersession and the delay in promotion to the Assistant Foreman. The association had represented to D.G.O.F. that in no case Sr. D/Man (J & T) should be superseded by anybody due to this faulty system of promotion.

House rent at the rate of 15%

In B1 cities the rate of C.H.A. payable to a N.G.O. is 15% of his basic pay as declared by Govt. of India for Central Govt. employees. But actually it is paid at the rate of 10% at present.

This matter was discussed with the Minister for Defence Production. The rigorous follow-up of this is going on.

Homage to the colleagues who died in the explosion

Association requested G.M./H.E.F. that a memorial meeting be convened to pay homage to our colleagues who died in the explosion of August 1965. The request was granted by the General Manager.

Executive Committee Meetings

The E.C. is meeting regularly to conduct the business of the Association. The E.C. held six meetings so far.

H.E.F. Silver Jubilee Fund

In H.E. Factory a meeting of all representatives of the Associations and Unions was held on 16-9-66, to consider the utilisation of H.E.F. Silver Jubilee Fund. The G.M. was in the chair. Following unanimous decisions to the best satisfaction of all were taken:

1. The Association had been pursuing the proposal of a C.S.D. canteen with the Gen. Manager, H.E.F. since 1-1/2 months. The same had been agreed by all and the amount of Rs. 6000/- was reserved for the initial expenditure.
2. Rs. 5000/- were donated to Ordnance Factories' Accident Fund raised by D.G.O.F.
3. Rs. 4000/- were set aside for the equipment of Dentist-Chair. Teeth of H.E.F. employees are exposed to nitrous fumes which causes many tooth-diseases. The purpose is that any one can often get examined and serviced his teeth on nominal charges in the factory.
4. Celebration of the Annual day of H.E.F. would be started and the amount of Rs. 2000/- was spared for the expenditure of first celebration.
5. Rs. 9000/- were donated to Range Hills School for a class room, which will be named as "H. E. F. Silver Jubilee Memory."

Dehradun Branch

The following have been elected as office bearers of the Executive Committee of the Branch for the year 1966-67 :

President	..	Shri P.K. Goel
Vice-President	..	Shri A. Sethuramiah
Secretary	..	Shri G. Balamalliah
Jt. Secretary	..	Shri S.K. Bhatnagar
Treasurer	..	Shri Y. Kumar

Regd. No. D-1650

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Editorial

Strategy for research and development in developing countries

The science and technology in the developing countries have to be the instruments for accelerated industrial development and economic growth through optimum employment of limited resources. The main task before the policy makers and planners of research and development is to bridge the gap between their low level of economic development and that of the advanced nations and obtain many times higher return in terms of economic growth from per unit investment in research. The resources available by way of scientific and technical manpower with requisite specialisations and investment for equipment, instrumentation, apparatus, chemicals, services etc. would in any case be much less in the developing countries. The approach would be to use these resources to maximum effect by a careful choice of the areas of their application catching up at an advanced stage.

If it is accepted that it is necessary and possible for the developing countries to catch up with the advanced ones, then the first task would be to plan scientific and industrial research within the frame-work of the plans of industrial and economic growth. The conception of science and technology as something independent and abstract must be discarded and planning of research and development made an integral part of economic growth. While in no way under-estimating the non-economic returns by way of cultural advancement and satisfaction to creative minds, the sights must be clearly set in regard to basic objectives of science and technology in the developing economies. Science and technology can in such circumstances be planned with greater clarity and promise of results expected.

The first task is for the policy makers, planners, economists, industrial and agricultural authorities and scientists in their respective fields to come together and determine the areas where research and development is required in relation to the plans of economic growth. These areas may be in the form of surveys and investigation of local raw materials, transfer of technology from advanced countries, adaptation of known processes, planning of industrial projects etc. Once the areas for research treatment have been delineated, their breaking down into research problems and project would be the task of scientists, experts and specialists, who at that stage would take over the detailed working out of resources required for the results expected. Allotment of resources and allocation of priorities in keeping with national needs lies in the field of scientific and economic policies. The task of science policy and coordination thereafter would be to establish an effective line of communication between the authorities in charge of research and development and those of economic planning, and effect changes which the results of research or direction of economy may demand from time to time. They would also have to ensure an effective means of putting research results to industrial practice as soon as it shows sufficient promise.

No developing country can have any hope of catching up, much less of becoming a leader in any field of science and technology unless it starts from an advanced stage and develops specialist technology of its own thereafter. Transfer of technology from the advanced nations to the developing ones is one of the major planks for rapid and accelerated industrial growth and should figure prominently in the national economic and scientific policies of the developing countries. Advanced technology ensures application of concentrated research and development experience at points of maximum return in the developing economy. Choice of technology from competing ones, economics of it, adaptation and orientation in keeping with the national resources of raw materials and genius of the people should form one of the main tasks of a science policy and industrial research. It would hardly be wise or economic to make any effort to recreate technology or permit limited resources to be used to infructuous ends by choice of problems unrelated to national needs. The effective transfer of advanced technology would itself require a sound technological base in the recipient countries to ensure speedy adaptation and assimilation and further development. It is countries who are themselves engaged in research and development that are able to make maximum use of imported technology. Planning of scientific and technical manpower and science education are equally a part of science policy and planning for economic growth. While advocating transfer of technology, the terms and conditions on which it should be brought in are of importance. Since the objective is to start at an advanced stage and from there on make the imported technology serve national needs, it is important that this process is not permitted to subvert the national interests through indiscriminate transfer of technology or at terms which may cripple national initiative and harm economic growth. The association of scientists and technologists for settling terms of transfer and planning its future assimilation, utilization and development thus assume significance. Not many countries have the scientific expertise in their machinery for negotiations which are usually handled through administrative ministries. The transfer of technology would be much more rational if the administrative ministries would have the benefit of association of scientists and technologists at various levels. Optimum returns from meagre investment can only be achieved if the choice of area of application of science and technology is considered on the basis of maximum returns. As the economy grows it not only expands in its physical dimensions but also undergoes an internal orientation. It is well-known that the advanced nations are investing more resources in research sensitive and research intensive areas such as electronics, engineering, synthetic fibres, metallurgy etc. as compared to slow growth and research insensitive areas such as textiles, food industries and agriculture. The planning of research and development must be such as to give greater emphasis on research sensitive areas. Use of latest techniques of social research such as operational research, management techniques, systems planning and programming through computers must be employed to forecast the requirements of scientific and technical resources and manpower and work out systems in the developing economy where research can be employed to give maximum returns in terms of economic growth.

Scientists and Psychological Barriers

M.A.V. DEVANATHAN*

Introduction

A rapid growth of science and technology requires no doubt adequate research facilities and material resources. However there are some other growth inhibiting factors peculiar to the developing countries. These factors arise largely from the outlook or attitudes of scientists in the developing countries to science. This paper discusses some of these psychological problems.

The Psychological Barrier

To appreciate the reality of this psychological barrier, we must first compare the quantum of well established scientific work from the developing countries with the achievements of the West. Here we must accept the unpalatable fact that this is totally insignificant. India can boast of Raman or Bhabha, but what of the other developing countries, and subjects other than Physics? These deficiencies may be the legacies of colonial rule, but the fact is that science to the student in the developing countries appears foreign. The text books, the journals and even the very units of measurements bear the names of foreign scientists. This subconsciously produces a sense of inferiority with respect to scientific and technological subjects. Thus the traditions which are a source of inspiration to the science student in the West urging him to excel his predecessors, produce the opposite effect in the minds of the science student in the developing countries. As a result, scientists in the developing countries are content to follow rather than to lead the West and prefer to imitate a product rather than attempt to excel it.

Scientists Trained in the West

One expects such inferiority complexes to disappear after training or deputation abroad, but this is not usually the case. Scientists going abroad for higher studies often insist on working with eminent professors. But usually they are only nominally associated with the great man, the supervisor being often an able, but not so well known, junior colleague of the professor. The innate abilities of the man determine the extent to which he profits by association with the scientists in their natural habital in the West. An able person soon sheds his notions about the superiority of the West as he sees for himself that they too are ordinary fellows prone to make mistakes like him. The confidence in himself arising from the knowledge that the others in the West are no better, enables him to persue his research on return, though at a reduced rate owing to the usual lack of facilities.

A less able person too returns with his doctorate, though no publications may come from his thesis, but prefers to bask in the reflected glory of his eminent professor. Lack of facilities is only a good excuse, for in their minds, they know they are inferior to their Western counterparts. Often this inferiority is created in their minds while abroad by an over-exposure to the scientific traditions of the Oxbridge Universities. The less traditional Redbrick Universities do not seem to stifle the minds of scientists

*Central Electrochemical Research Instt., Karaikudi.

from the developing countries. An examination of the research records of foreign returned scientist, reveals this surprising fact.

Those whose training abroad has not been particularly fruitful have a habit of creating difficulties for the staff under their charge. They see to it that none of them are able to outshine them in research and have a tendency to belittle the work done, despite handicaps, by their subordinates. In some Universities in developing countries if the professor is a Ph. D., he may extend post-graduate facilities up to the M.Sc., but not to the Ph. D. level for fear of dilution by his own students. Such persons welcome the training abroad for post-graduate students because such privileges must necessarily be conferred on a smaller number. They very rarely establish schools of research. Those deputed for foreign training for periods of less than a year will never be able to shed their complexes as the time for disillusionment is too short.

Scientific Dissent

Progress in science arises from the clash of views following the classical sequence, thesis, antithesis and synthesis. This behoves senior scientists to encourage independent thinking on the part of their subordinates. In scientific discussion in the West, a professor would make a proposition and would challenge his juniors or colleagues to 'shoot it down'. He makes it clear that he would change his views if he is proved wrong, of course lively discussions result. By contrast, foreign experts in developing countries have confessed their inability to evoke any discussion or criticism from scientists and students even when a patently absurd statement was deliberately made. They seem to think that excessive politeness inhibits frank criticisms.

However, a more plausible reason is that in the training of scientists in the developing countries the traditions of discussion and criticism are almost non-existent. Hence an invitation to criticise in a seminar or group discussion produces no response. This attitude is inevitable if the senior scientist is regarded as a religious GURU giving monologues to his SHISHYAS and not one who is thinking along with his juniors as the problem goes through various phases. Unfortunately total allegiance to his views is that the senior scientist insists on. Even for papers or reports, some lip service to the pet hobby horse of the boss is essential if the paper is to see the light of publication.

Another aspect pertaining to the right of scientific dissent is the attitude of senior scientists to the literature and to criticisms of the work of foreign scientists. Invariably the literature is regarded as the sacred scriptures never to be questioned however contradictory are the views of various authors. Further if a junior has the temerity to cast doubts on the views or work of some foreign scientist, he is immediately cut down to size. His insignificance is contrasted with the eminence of the foreign scientist and his confused ideas with the clear thinking of the foreign scientist however muddled the latter's views are. Under such conditions, juniors usually adopt the path of least resistance and take to non-controversial and necessarily dull 'mopping up' type of research and often cease to think independently. Taking the literature too seriously is known to brainwash the reader, but this along with intellectual bullying kills the blossoming of scientific spirit. Senior scientists in the developing countries bear a heavy responsibility for the intellectual development of their subordinates.

Hypersensitivity to Criticism

It is a fact that scientists in the developing countries already conscious of their

inferiority vis-a-vis their foreign colleagues are hypersensitive to criticisms of their work. Their scientific work must last a thousand years unchallenged like the sacred scriptures. This attitude arises from the tradition that the GURU like the medieval kings can do no wrong. Criticism of his work is a loss of face for the GURU in the eyes of his SHISHYAS, worse still non-scientists think that if a piece of research is criticised then the author must be unintelligent! This fear of criticism has dissuaded many able but timid scientists from making useful contributions, intellectual sterility being the lesser of the two evils. The history of science shows no work that is worthwhile, ever escapes the criticism essential for remodelling and revamping of scientific ideas. To quote Cardinal Newman "A man would do nothing if he waited until he could do it so well that no one would find fault with what he has done"! Those who are hesitant to express their scientific views for fear of criticism can take comfort from the repartee of Sibelius, the composer (much harassed by music critics) "No one ever erects statues for critics".

Attitude towards applied research

All scientific activity is primarily directed to the material betterment of mankind. There is no 'pure' science which cannot find application. Theory and application may alternately lag or go ahead of each other so that what appears at one point of time as 'pure' or academic finds application in some new technology. In the West 'pure' or academic research has been until recently confined to Universities. Applied research had been left to the industrial and technological laboratories. This division of research effort between Universities and industrial laboratories has disappeared with the realisation that such a compartmentalisation inhibits the growth of science and technology. But in the developing countries, a kind of scientific caste system exists in which the Brahmins are the pure scientists who sniff their noses at the inferior 'applied-walas'. This attitude apparently stems from the notion that pure or academic research is intellectually more satisfying and inherently superior to the trial and error 'ayurvedic' work that applied research is alleged to be.

The essential difference between pure and applied science is the time lag for application. Both require the same level of intellectual prowess. Since developing countries will necessarily emphasise immediately, applicable research, it is necessary to dispel the notion that applied work is intellectually inferior in order that able scientists will be attracted to this field. In developmental work, careful design of experiments is required to extract the maximum information with a minimum of outlay. It is worth pointing out that it is precisely the absence of the necessary fundamental or theoretical knowledge in such areas which necessitates lengthy and costly investigations. Thus applied research offers ample scope for theoretical or fundamental investigations for those who posssess the capacity to apply basic scientific knowledge to unknown fields. The example of Japan may be cited here where even the University pilot plant investigations of commercial processes are doctorate problems! Such objective basic research as it is termed, is vital to the advancement of technology especially in developing countries which do not have the material and financial resources for costly development programmes.

Conclusion

The historical fact of the growth of science and technology in the developed countries acts as a psychological barrier to the scientists of the developing countries. This fact colours the attitudes of seniors who maintain their

positions over their juniors by the exercise of authority rather than by their own achievements. The junior scientists do not get the encouragement they need from their superiors. Such a climate is not conducive to the flowering of scientific thought and progress. These unfortunate attitudes will disappear only when leadership in science and technology is no longer a monopoly of the devoleped countries and is increasingly shared by the scientists and technologists of the developing countries. Recognition of these psychological difficulties and methods of eliminating them will remove the non-material barriers in the way of the scientific and technological progress of the developing countries.

Scientific Research

—Progress of Expenditure

The following table shows the progress of both plan and non-plan expenditure under the head "Scientific Research", in the Council of Scientific and Industrial Research, the Department of Science in the Ministry of Education, and the Department of Atomic Energy in each plan period.

TABLE 1

Expenditure in First, Second and Third Plans and Outlays in the Fourth Plan.

Rs. crores

Plan Period	*Plan*	*Non-plan*	*Total*
First Plan (1951-1956)	14	6	20
Second Plan (1956-1961)	33	34	67
Third Plan (1961-1966)	75	70	145
(a) Total (1951-1966)	122	110	232
Fourth Plan (1966-71)	140	130	270

2. Expenditure on Research and Development (R and D) has increased very rapidly having more than doubled during each five year period. The estimated expenditure of Rs. 270 crores during the Fourth Plan period would be substantially higher than the total expenditure of about Rs. 230 crores which had been incurred during the 15 year period (1951-1966) of the three previous five year plans.

3. In addition to the three agencies mentioned above, several other ministries in the Government of India have under them scientific organisations with research responsibilities. The total expenditure for programmes for these organisations is estimated to be about Rs. 160 crores of which Rs. 70 crores would be the plan outlay. The total expenditure on research and development as a whole would be about Rs. 430 crores during the Fourth Plan.

4. At a rough estimate the R and D expenditure in the last year of each of the three previous plan periods was about Rs. 8 crores, Rs. 25 crores, Rs. 60 crores respectively; and is likely to be about Rs. 100 crores or so at the end of the Fourth Plan. The R and D expenditure expressed as a percentage of the gross national product, which is called the research ratio, is estimated at about 0.6 per cent, 0.16 per cent, 0.26 per cent, and 0.35 per cent at the end of the four successive five year plan periods respectively.

Evaluation of Research and Development Activities

5. Much has been achieved in science and technology but much more remains to be done. Large capacities have been built up and more would be established during the Fourth Plan. It is necessary to utilise these facilities effectively for the promotion of economic growth. With rapidly increasing expenditure on research and development, evaluation of programmes and results in relation to economic needs is becoming particularly important.

6. The aim of basic research is to seek fuller knowledge or understanding of the

(Figures includes R and D expenditure in the Department of Atomic Energy which was outside the First and the Second Plans).

subject under study, and publication of results is essential. Basic research of high quality is an end in itself in satisfying intellectual curiosity, and is also indispensable for the building up of the scientific tradition and for the training of research personnel for the future. In advanced countries, basic research and the training of research personnel is carried out mostly in association with higher education. In India basic research, particularly in association with higher education and training, has not been receiving adequate support and is relatively weak. Some distinguished work is being done but a good deal of the work under the name of basic research would require attention. There is need to give discriminating support on the basis of high quality of work.

7. 'Applied research' is directed towards the practical application of the results of basic research and, when successful, would lead to 'development' which is directed towards the production of useful materials, devices and methods, including the design and development of prototypes and processes. In the advanced countries, excluding military research and development, which is financed by Government the greater part of the total expenditure on non-military research and development is directed to economic ends, is incurred within industry, and is financed by industry itself, through the ploughing back of a part of the additional profits generated by research and development. This feed back arrangement has been mainly responsible for the rapid increase of expenditure on non-military R and D in recent years in a number of countries including Japan.

8. In India applied research has absorbed the greater part of the R and D expenditure without, however, leading to design and development in sufficiently large measure. There is very little research and development within industry whether in the public or in the private sector. The share of the expenditure on research and development within industry often comes to 60 per cent or 70 per cent of the total non-military R and D expenditure in the advanced countries while in India its share is only about 5 per cent. In consequence, research and development has not made adequate contribution to economic growth so far. India remains weak in design and development, and much too dependent on the import of foreign design and technical knowledge.

9. Basic research is intrinsically open-ended with a free time programme. Projects of applied research and even more so, of design and development, must have specified objectives, time schedules, and some idea of expected benefits in relation to casts. Projects in India are, however, not always formulated in this way which makes evaluation difficult or impossible and leads to waste of resources. Sustained efforts must be made to have proper specification of projects for applied research and development together with periodic evaluation of the results.

Imbalance in Research and Development

10. Some recent studies have shown that there are large disparities between different institutions and subject fields in respect of capital and current expenditure and particularly of foreign exchange. Higher education and technological institutions and non-government research institutes have suffered good deal in this regard.

11. At a very rough estimate, the number of R and D scientists and technologists may have increased from about 9,000 at the end of the Second Plan to about 15,000 at the end of the Third Plan. There is danger of such a high rate of expansion weakening the quality of work because it takes several years

of experience to gain some proficiency to research. In any case, to maintain a high rate of growth of research it is necessary to initiate a long term programme of training for research personnel in association with basic research.

12. Present facilities for the training of research personnel are however, inadequate partly because of the weakness of basic research in higher educational and training institutions, and partly because of lack of instruments, accessories, equipment, stores and other facilities. It is, therefore, necessary to make some special provision for strengthening scientific research in association with the training of research personnel.

13. An overwhelmingly large number of R and D personnel are working in Government laboratories, in most cases without adequate contact with either higher educational and technological institutions or with industrial establishments. The research staff in higher technological or educational institutions have little contact with industry, while the number of R and D staff within industry itself is very small.

14. An important task during the Fourth Plan would be to utilise as large a part as possible of the R and D staff and facilities in Government agencies and in higher educational and technological institutions to promote research, design and development within, or in collaboration with, industrial establishments in both public and private sectors. It is also necessary for scientists in government and other research agencies to participate in the activities of educational and technological institutions.

15. It has been mentioned earlier that the research ratio in India in 1965-66, the last year of the Third Plan, was over 0.25 per cent. The total research ratio is much higher in the advanced countries, for example, it is about 3 per cent in the United States or 2.5 per cent or so in the United Kingdom and USSR, and between 1 per cent and 2 per cent in other advanced countries. If the military R and D is excluded, the research ratio even in the most advanced countries would be below 1.5 per cent or 1 per cent; of which the greater part (between about 30 per cent and 70 per cent) is within industry (compared with only 5 per cent in India). If the expenditure on military and industrial R and D is excluded, the research ratio in the advanced countries would fall to the level of something between 0.2 per cent and 0.5 per cent.

Some special Needs

16. The present research ratio of over 0.2 per cent in India, representing the civilian R & D outside industry is already of the same order as the research ratio in many advanced countries for the same type of R and D activities. To increase R and D expenditure for purposes of economic growth, it is essential to bring research and development into industry close to production.

17. In comparison with advanced countries, the gross national product (GNP) in India being lower, the same research ratio, that is, the same fraction of GNP, would make available, for the same number of R and D staff, a much smaller amount of money per R and D scientist. The cost of instruments, equipment, stores, etc., much of which have to be imported, would be higher. To provide similar facilities for research it would be, therefore, necessary to have a proportionately higher research expenditure in India.

18. Vigorous efforts must be made to develop rapidly the manufacture of instruments, equipment and accessories required for research and industrial purposes. A progressive instruments industry is an indispensable condition for a self-reliant economy.

19. A brief reference may also be made to a basic issue. The attempt to attract Indian scientists from abroad by setting up the Scientists Pool in the C.S.I.R. was only partly successful. Many or most of the abler scientists did not come back. Although personal factors must have been responsible for some of the scientists not returning to India, this could not have been the only reason. Also, many Indian scientists continue to take up posts abroad every year. Evidently, whatever be the reasons, a career in scientific research in India is not yet sufficiently attractive.

20. Research and development to promote the best utilisation of domestic resources and to stimulate competitive efficiency of production are, however, essential requirements for a self-reliant economy and independence. How to make scientific research sufficiently att active to m.n of talent and ability, and how to use applied research and development to promote economic growth are the two crucial problems to which continuing thought will have to be given.

Outlay and programme

21. The outlay proposed for the three agencies, the Atomic Energy Department, the Council of Scientific and Industrial Research, and the Scientific Department of the Ministry of Education, is Rs. 120 crores which is equal to the total plan outlay spent during the previous three plan periods taken together. In addition, a provision of Rs. 15 crores has been made for strengthening scientific research in association with the training of research workers, and another provision of Rs. 5 crores for the support of high priority programmes in connection with food, import substitution and export promotion, specially within, or in collaboration with industry. The proposed outlay for research in the Fourth Plan is given below:

Provision under the "Scientific Research"

(*Rs. crores*)

Department of Atomic Energy	50
Council of Scientific and Industrial Research	46
Department of Science, Ministry of Education	24
Scientific Research and Research Training	15
Priority research and development programmes	5
Total	**140**

22. It is proposed that efforts in the Department of Atomic Energy would be directed mainly to the atomic power programme with special emphasis on import substitution of hardware, maintenance and replacement parts, and on the use of atomic energy for other peaceful purposes.

23. The Council of Scientific and Industrial Research would give highest priority to projects for food, import substitution and export promotion. It would also try to promote research and development within industry in both public and private sectors through the active collaboration of its own staff with industrial enterprises and the establishment of cooperative research associations.

24. The Survey of India would be strengthened for the systematic preparation of maps as essential pre-requisites for hydro-electric power, irrigation, flood control, minerals development, etc. Anthropological, botanical, sociological and other scientific activities of the Department of Science, Ministry of Education, would concentrate on the consolidation and utilisation of development schemes taken up in the Third Plan.

25. The need of a long term programme of training for research personnel has been stressed. Such training can be given most effectively in association with basic research

in higher educational and technological institutions. A special provision of Rs. 15 crores would be used for this purpose to give selective financial support, on merit, to individuals projects, or institutions to strengthen basic research in science and technology associated with research training in any subject field independently of existing administrative channels or institutional affiliations. The present provision of Rs. 15 crores would also be used to correct disparities which have arisen through imbalances in the allocation of resources and lack of adequate support of nongovernment institutions and scientists.

26. A provision of Rs. 5 crores has been made to give support to high priority projects of applied research and development relating to food, import substitution and export promotion especially within or in association with industrial enterprises in both public and private sectors. The question of a suitable machinery for carrying out the administration of the above two programmes is under consideration.

Planning of Scientific Research as a Whole

27. The advance of science and technology is marked by increasing specialisation through the emergence of new subject fields and, at the same time, by increasing integration through the strengthening of interconnections between different subject fields. An advance in one subject or in instrumentation may have large repercussions on research programmes in other fields. Also, research in the same or overlapping subjects has to be done in different Ministries, agencies and industrial enterprises. Planning of a scientific research as a whole is, therefore, necessary for the maximum utilisation of available resources.

28. The Study Group for Scientific Research of the National Planning Council has recommended the planning of scientific research as a whole, and stressed the need of keeping open multiple channels of support for scientific research. The Estimates Committee of Lok Sabha recommended early in 1966 that arrangements should be made for the planning of research as a whole especially directed to economic needs and for the review and appraisal of research programmes and results.

29. Planning of research and evaluation of programmes and results would have to be undertaken not only by one single body but at many different levels. At the national level, planning would be concerned with policy aims and objectives, priorities for allocation of resources future supply of research personnel and equipment, and also with over-all evaluation of results. Further consideration of programmes and evaluation of results would be the responsibility, at successive levels of the concerned Ministries, Departments, Agencies (A.E.D., C.S.I.R., U.G.C., etc.) and then of individual laboratories and operating units. Two way flow of information and consultation would be indispensable for which committees and working groups with overlapping spheres of interest would have to be set up at different levels.

30. Divergent views often arise among scientists regarding very expensive projects in different and competing subject fields, such as large optical or radio telescopes, high energy accelerators space research, etc., such questions, for lack of a common denominator, cannot be settled by discussions at purely scientific level but has to be decided at governmental level. The important point in the case of such issues is to ensure that all divergent views among scientists receive due consideration by persons responsible for making final decisions.

Reproduced from Fourth Five-Year Plan (A Draft Outline).

Reorganisation of Agricultural Research in India and Status of the Indian Agricultural Research Institute at New Delhi under the New Set-up*

A reorganisation of Agricultural Research and Education, commensurate with the scientific advancement of the country, is most certainly to be whole-heartedly welcomed and greatly appreciated in view of the several difficulties encountered with by the research scientists so far. The Union Minister for Food, Agriculture, Community Development and Co-operation, Shri C. Subramaniam, fully appreciating this urgent national need, had indicated on various occasions that agricultural research work in the country should be undertaken by an autonomous and corporate organization of scientists themselves under the leadership of an eminent scientist and not under an administrator, that selections for appointments to posts should be also through a committee of scientists, that there should be adequate running scales of pay the maximum of which should be attainable to every scientific worker through meritorious work, and that all audits should be through a firm of chartered accountants. He also set up on the recommendations made by two Indo-American Teams (1955 & 1959) and an Agricultural Research Review Team (1963), a Scientists' Panel, which appears to have taken into serious consideration the following for rectification through a reorganisation:

1. Shortage of technically competent scientists,
2. Selection of wrong candidates to scientific posts by the Union Public Service Commission for want of co-option of scientists of the right calibre to advise them in selections,
3. Low and several scales of existing pay,
4. Frequent shifts of scientific workers in quest of improvements in salaries, rendering specialisation in any particular field to a high degree difficult, if not impossible,
5. Unrealistic and irritating audit procedures mostly due to complete ignorance of requirements of scientific laboratories.
6. Inordinate delays caused by interminable red-tape involved in making purchases and getting work done through the Central Public Works Department, etc., etc.,

While the prompt attention paid by the Hon'ble Minister to the reorganisation is very laudable indeed, it is equally disheartening that a changeover has been accomplished from the 1st April, 1966, so far as the Centrally administ red research institutes are concerned, in a very reckless, hasty and unplanned manner, causing a great shock to the majority of the agricultural research community of the country.

The Department of Agriculture of the Government of India passed a resolution reconstituting the "Indian Council of Agricultural Research" Society (registered under the Societies Registration Act, 1860) and issued

* Contributed by IARI Branch of ASWI

a memorandum and circular letter on 21st February, 1966, to all employees working in nine Centrally administered research institutes, including the Indian Agricultural Research Institute, conveying the decision to transfer the administrative control of these institutes from the Government of India to the Indian Council of Agricultural Research with effect from the 1st April, 1966, and declaring them as surplus to the needs of the Department of Agriculture. They further demanded from the employees, if agreeable to this changeover, a letter of *resignation* from Government service and acceptance of service under the Council. They also extended a threat that if the employees are not agreeable "the Government will be constrained, in the case of permanent Government servants, to adopt the procedure of dealing with Government servants whose posts are abolished and in case of temporary or quasi-permanent Government servants to terminate their service in accordance with the provisions of the Central Civil Services (Temporary Service) Rules, 1965". The final date given for exercising this option was the 26th March 1966, thus giving each employee only a little over a month to take a decision. In view of the fact that the Council had not been reorganised in accordance with the recommendations of the Teams mentioned, with clearly set forth rules and bye-laws embodied in a constitution duly approved by the Parliament, and the terms and conditions of service therein made available to the transferred employees, they naturally felt extremely paincky about their future and made repeated representations to the authorities through all possible means. Nevertheless the authorities remained adamant except for the issue of a corrigendum to the orignial memorandum, dated the 6th October, 1966, to the effect that the employees, instead of resigning from Government service need only to agree to "*cease to be Government Servants*" and extending the date of option to the 15th November, 1966. Soon, however, this date also was postponed indefinitely in view of a writ petition by one of the affected employees, questioning the validity of the said memorandum filed before the Hon'ble Punjab High Court. On the Hon'ble Court's disposal of this petition the authorities started a drive to mislead the employees through a D.O. letter issued on the 9th November, 1966 to the Directors of the Central Research Institutes that those employees who opted by the 30th November 1966 would be considered in service with the Council from the 1st December, 1966 indicating thereby that their seniorities are likely to be affected, and even use coercive tactics to extract the agreement from them to cease to be Government servants from an early date and join the Council's service.

The Indian Agricultural Research Institute has been the very first Scientific Research Institute to be established in the country, as early as 1905, and until the 1st April, 1966 it has been running under the administrative control of the Government of India. All the other Institutes affected by this changeover have subsequently been born out of the good work turned out from this Institute. There can also be no gainsay that it is the excellent turnover from this Institute, despite the defects pointed out by the Teams mentioned above, which formed the basic background for all the scientific agriculture now practised all over the country. "The C. Subramaniam Institutional Award for the Development of the Sorghum Hybrid CSH I" just handed over to the Director of this Institute by the Hon'ble Minister himself on the 17th December, 1965, bears excellent testimony to the fact that bright talent is still not lacking among its employees. Starting with almost a handful of scientific workers, this Institute has by now

developed into a small town-ship by itself, with over seven hundred research scientists and, more than five hundred post-graduate student/research workers, besides several other technical and ministerial personnel. The voice of these workers has not been heeded in effecting the administrative changeover of this Institute.

In this connection it must be mentioned that a similar administrative changeover from the sister Department of Food, of the same Ministry of the Government of India, to the Food Corporation has been recently made in a different way altogether. The memorandum to be issued to them, as proposed, was made accessible to the employees before they were actually served with it. Therefore they could obtain expert legal opinion before expressing their resentment. As a result they have not been served with the memorandum, the changeover has been effected through an Act of Parliament. On the other hand those of the Department of Agriculture, whose administration has been transferred to the Indian Council of Agricultural Research, are considered temporarily as on foreign service pending the exercise of their option to serve under the Council or termination of their services under the Government of India.

What are the benifits achieved through this abrupt changeover in the administration of agricultural research in the country? Every affected employee feels that the constitutional safeguards and protections and above all the security of service enshrined in the Articles 14, 16, 309 and 311 of the Constitution of India have been wrenched from him. The strangle-hold of administrative interference involving procedural delays and red-tape, has only tightened up. The Staff Selection Committee set up in place of the Union Public Service Commission has proved in no way superior or even at par with the latter. While the UPSC demanded only a single set of the details of the candidates work and published papers, the Council demands *ten extra copies* of them (which goes even against the Hon'ble Minister's own directive to make frugal use of paper) for the relative assessment of merits, and yet makes certain *ad hoc* appointments, of even fresh outsiders, apparently on the basis of previous knowledge of the merits of such candidates. Certain appointments offered to selected candidates "in anticipation of whatever terms will be decided by the ICAR later" are quite unheard of under any employment procedures and reflects very well the unsettled nature of the Council's rules. While service transfers of existing employees have been effected adequate financial transfers have yet to be made so much so that thousands of Rupees due to the employees prior to the transfer are still locked up. There had also been certain delays in the prompt encashment of cheques issued to the employees for shortage of the Council's amount available in the Bank. Administrative delays have been longer and unprecedented. In fact in all spheres the employees have encountered more difficulties and hardships. Very strong feelings of unhappiness and absolute insecurity have been created in the minds of the general mass of scientific workers as against betterment in the pay and prospects of a few privileged persons. The result is progressive deterioration in the morale of the employees and increasing mutual distrust completely thwarting their enthusiasm for any scientific research work and this is quite a retrograde advancement quite contrary to the very principles on which the Hon'ble Minister conceived of an "Agricultural Revolution."

The Association of Scientific Workers of India (IARI Branch) taking full note of the situation, called a General Body meeting of the Branch on the 4th November, 1966 and unanimously resolved that:

"the authorities be requested to

1. withdraw forthwith the memorandum of February, 1966 as amended on October 6, 1966 which is quite unacceptable to the Association,
2. indicate clearly the benefits of the changeover to agricultural research and the incentives proposed to be given to the scientific workers, taking into full consideration their views in the matter.
3. effect the changeover as accepted by the scientific workers through Parliamentary Legislation, pending which to restore *status quo* as on 31st March 1966, and
4. undo unjustified actions in the matter of appointments including *ad hoc* appointments, to the scientific posts of raw and junior outsiders over senior and fully qualified scientists of the Institute, promotions, and reversions at the Indian Agricultural Research Institute."

Resolutions demanding the same as above have been passed by other associations of this Institute as well as from other Institutes affected by this administrative changeover and forwarded to the authorities concerned.

It may be pointed out in this connection that in the Resolution passed by the Department of Agriculture on the 17th February, 1966, reconstituting the Indian Council of Agricultural Research Society, directive was given that 'the affairs of the Indian Council of Agricultural Research Society shall be managed, administered, directed and controlled, subject to rules, bye-laws and orders of the Society, by the Governing Body". The Hon'ble C. Subramaniam in his address to the reconstituted Governing Body of the ICAR on the 29th March 1966 suggested "that an agricultural policy resolution embodying all the decisions of Government for strenthening agricultural research and declaring that the Indian Agricultural Research Institute, the Indian Veterinary Research Institute and the National Dairy Research nstitute are considered as Institutes of National importance be drafted immediately and placed in Parliament and that "this would provide the much needed psychological impetus to our research workers". It is unfortunate that the Governing body has so far neither framed the Council's rules and bye-laws and given them publicity among the employees nor taken any steps to place the necessary bill before Parliament. The Ministry of Health, on the other hand, rushed through a like bill in the last session of the Parliament and made the necessary enactment declaring the Chandigarh Medical Institute as an Institute of National Importance within the course of but a few days.

It would really be a great solace to the Agricultural Research Community of the Country if the Honourable Minister takes immediate steps, as the employees have been pleading all through to declare the Indian Agricultural Research Institute as a NATIONAL AGRICULTURAL UNIVERSITY through an Act of Parliament and secure its rightful place among the Agricultural Universities of the Country, especially when it is already authorised by the Universities Act to offer post-graduate degrees. He may also take immediate steps to see that the memorandum of February 1966, which is adversely affecting the minds of the employees is withdrawn by the Department of Agriculture forthwith and of the recognition of IVRI and NDRI also as Institutes of National importance. Agricultural Research Programmes could then only be run smoothly towards an "Agricultural Revolution" in the country and self-sufficiency in Food as envisaged by the Hon'ble Minister.

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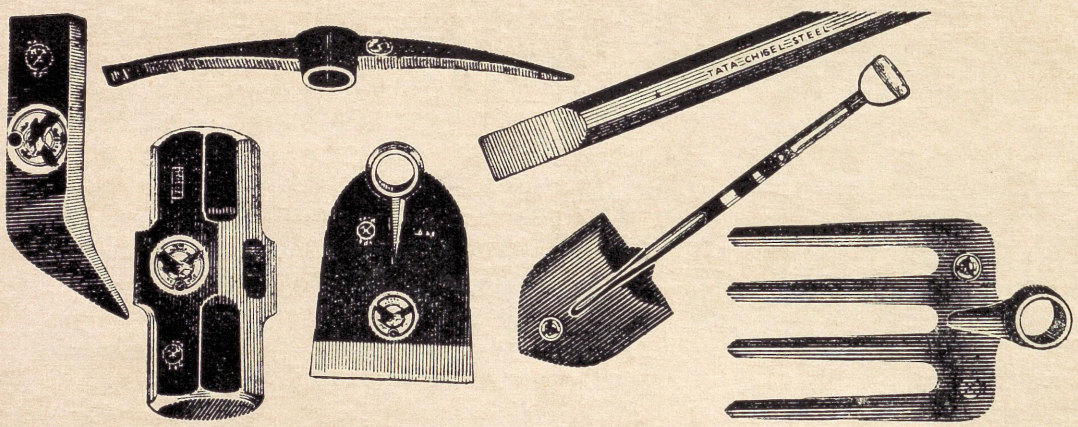

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