VIJNAN-KARMEE

विज्ञानकर्मी

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ASSOCIATION OF SCIENTIFIC WORKERS OF INDIA

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THE OBJECTS OF THE ASSOCIATION

ARE

To improve and safeguard the economic interests, the conditions of life and the professional and social status of all Scientific Workers in India

AND

To work for the most effective use of science and the scientific method for the uplift and welfare of the society as a whole.

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MEDICAL EDUCATION IN INDIA

The Planning Commission in the First Five Year Plan have referred to the inadequacy of the medical and preventive organization in the country as judged by a comparison of the existing strength of the health personnel with the standards recommended by the Health Survey and Development Committee. The Committee suggested as a long-term objective one doctor for a population of 2000, one nurse for 500, one mid-wife for 4000. The corresponding proportions in India at present are one doctor for a population of 6,300, one nurse for 43,000 and one mid-wife for 60,000. In all directions the gaps are large.

The Planning Commission have stated that training of health personnel has to receive continuous attention both for the purposes of improving the quality of the Health Services and to provide for future stages in development when a much larger proportion of resources should be available for health measures. New medical colleges should be established in those places where large hospitals are already in existence. It is believed that the double-shift system introduced in certain institutions is not conducive to the maintenance of proper standards. Certain selected hospitals in the States may be upgraded so that they can be utilised for the purpose of introducing a system of compulsory internship in the medical course leading to the degree of M.B.B.S. It is eminently desirable that, in regard to every medical college there must be provision for giving the students an opportunity to do rural health work. The Five Year Plan provides for the establishment by the Central Government of an All-India Medical Institute and for upgrading existing institutions so that adequate post-graduate medical training should be available within the country. The main object of the proposed institute will be to train teachers for the various medical colleges in India. To promote medical research, various departments in medical colleges should be encouraged to take up research work. Larger funds are being provided for expanding research programmes initiated by the Indian Council of Medical Research.

We appreciate the recommendations of the Planning Commission which show their anxiety to do something in the way of getting more doctors for the population. We, however, are unable to connect the above recommendations of the Planning Commission, specially the recommendation that new medical colleges should be established, with the decision taken by the Government of India and the State Government of West Bengal to close down a medical college and a hospital which have been in existence for some years in Calcutta. The Lake Hospital, which was started for American military personnel during World War II, was purchased by the Government of India and later a medical college was established in 1947 to give facilities to ex-Army Medical Licenciates from all over India for condensed M.B.B.S. course. The college has shown a high standard of efficiency and the hospital offered services to ailing people of South Calcutta and Southern Suburbs, there being no hospital nearby. In a statement made in Parliament on November, 22, 1950 Hon'ble Rajkumari Amrit Kaur, Minister for Health, referred to the decision taken to stop the college in 1952. Admission of students to the college has been stopped from 1950. A deputation on behalf of the Indian Medical Association waited on the Hon'ble Minister on 25th March, 1951. The Hon'ble Minister stated that she would move the Government of India to continue the Institution on an All India basis if the West Bengal Government supported the co-operative scheme. A public committee with Dr. Amal Roy Chowdhury was also formed to plead for the continuation of the college. Mrs. Bibhabati Bose and Mr. Hemanta Kumar Bose, members of the West Bengal Assembly, have also moved in the matter. The hospital is going to be dissolved by June, 1952,

The Association of Scientific Workers of India, Calcutta Branch, recorded its deep concern and alarm at the decision to close down the Lake Medical College and Hospital from 1952. In the present conditions of our country when such institutions are to be multiplied all over India such a decision was extremely deplorable. The Association appealed to the Government of India and also the Government of West Bengal to reconsider the matter. An appeal was also made to the goodwill of our wealthy countrymen and other national funds like the Kasturbai Memorial Fund to come forward and help in the maintenance of such an essential national institution which will be very difficult to rebuild once destroyed.

The case of the Lake Medical College and Hospital bears similarity to the case of the Central College of Agriculture at Delhi. The Government of India had taken a decision to close down this college. The Association of Scientific Workers of India took up the question and pleaded for reconsideration of the decision as agricultural education is a vital necessity in the country. Fortunately the Hon'ble Minister

for Food and Agriculture listened to the arguments put forward by the Association and the Government of India revised their policy and decided to continue the Central College of Agriculture by amalgamation with the Indian Agricultural Research Institute. We appeal to the Government of India and the Government of West Bengal to give due consideration to the necessity of at least continuing the institutions which we have for imparting medical education in the country and find out ways and means to continue the Lake Medical College and Hospital. This would show a manifestation of the ardent desire to improve the health services in the country.

OUR INSTITUTES

Central Research Institute, Kasauli

(By the courtesy of the Director of the Institute — Lt. Col. M.L. Ahuja, M.D., Ch.B., D.P.H.)

1. The Institute is financed by the Government of India and is administered by the Director General of Health Services on behalf of the Ministry of Health.

2. History

In the early years of the present century a scheme for the establishment of a Bacteriological Department and a Central Institute for Medical Research in India was initiated by the Sanitary Commissioner with the Government of India. This scheme met with the approval of the Government of India and in 1904 work was commenced on what is now the Central Research Institute, Kasauli.

The Institute is located at Kasauli, in the Simla Hills, about 6000 feet above sea level. The original site was presented by the Maharaja of Patiala and the then existing residential buildings were modified, extended and suitably adapted for laboratory use. In 1933 further extensive alterations were made and laboratories constructed on modern lines provided. These laboratories were further added to when, in 1939, the functions of the Pasteur Institute of India were incorporated with those of the Central Research Institute. In 1946 a scheme for the expansion of the Institute was accepted in principle by the Government of India. This necessitated re-modelling of the main building, the acquisition of neighbouring sites and the erection of new buildings. Building operations in connection with this scheme were commenced in 1947 but owing to unsettled conditions, transport and other difficulties, these were not completed, according to schedule, within the year but were nearly completed in 1949.

The Central Research Institute was opened in 1906 under the Directorship of Lt. Col., later, Sir David Semple (1906-13) who was succeeded by Lt. Col. W. F. Harvey (1913-25), Col. Sir Samuel Richard Christophers (1925-32), Major General Sir John Taylor (1932-44) and Lt. Col. H. W. Mulligan (1944-47). The present Director is Lt. Col. M. L. Ahuja.

3. Functions and Achievements

The functions of the Institute are numerous and varied but it is intended chiefly to provide facilities for (i) research work on problems of medical and public health interests, (ii) manufacture of vaccines and sera, (iii) training of selected medical officers and technicians in medical research and laboratory technique, and (iv) to act as a centre on which enquiries in the field can be based. Originally sections were formed for bacteriology, helminthology and manufacture of biological products, but the activities have varied from time to time, depending on the experience and specialized knowledge of members of the staff. Immunological problems have always been the main subject of research, but other problems, both in the laboratory and the field, have not been neglected and much attention has been paid to such subjects as medical

entomology, malaria, kala-azar, snake venoms, cholera, rabies etc. For 45 years the name 'Kasauli' has suggested all that is best in medical research and laboratory work in India. Among the general public the association of Kasauli with dog bite and as a final court of appeal for bacteriological diagnosis has been particularly notable. It is the work of this Institute that has put Kasauli on the map of the world. One of the aims of this laboratory has been to make India self-sufficient in vaccines and other products and to set up a model in research and in production of biologicals. The products manufactured in the Institute are distributed throughout India but during World Wars I and II, they were also sent to many other theatres of war including Malaya, Burma, Egypt, East Africa, Italy, Iraq, Iran and Syria.

An important feature is the large scale preparation of antisnake venom serum. Kasauli antivenin is a bivalent, purified and concentrated globulin solution specific against the venoms of Cobra and Russell's Viper which are responsible for the vast majority of deaths from snake bite in India.

During World War I supplies of prophylactic vaccines to the Army in India, Mesopotamia etc. were about one lakh doses per month, which at that time constituted a record in production. During World War II manufacture of vaccines and sera reached the unprecedented total of one million doses monthly. The Institute met all demands in full for the biological products from the Defence Services in India, Burma and other theatres of war, civil authorities and Indian States. In addition, valuable research work was carried out in connection with the production of essential commodities not available from abroad, owing to war-time difficulties in transport e.g, surgical ligatures, laboratory stains, etc.

Besides preparation of biological products, another function of this Institute is the stocking of imported products e.g. Antidiphtheric Serum, Tetanus Antitoxin, Tenanus Toxiod, Gas Gangrene Antitoxin, Typhus Vaccine, etc. for the Armed Forces in India and to carry out frequent assays to determine their potency.

Testing of disinfectants by means of Rideal Walker test in connection with contracts between manufacturing concerns and the Government of India is also a duty of this Institute.

Routine diagnostic work, Wassermann and Widal tests for syphilis and enteric group of fevers respectively, histopathological examinations for diagnosis of tumours and morbid tissues, bacteriological examination for T. B., Swabs for diphtheria, etc. exert a heavy strain on the overtaxed resources of the Institute. Supply of stains, agglutinable suspension, high titre diagnostic sera, preparation of antigens and a large variety of minor curative vaccines are some of the miscellaneous duties.

The Institute acts as an Information Bureau and has to answer hundreds of enquiries in the course of a year from Medical Officers, lay-public, Civil and Military Establishments on all sorts of scientific and non-scientific points relating to the use of vaccines, sera, diagnostic reagents, snakes and their identification, treatment of snake bite cases, rabies and antirabic treatment etc.

The Director has the responsibility for the inspection and licensing of firms engaged in the manufacture of biological

products and for the testing of samples before recommending the acceptance by the Government of their supplies.

The Institute also acts as the Government of India assay centre under the Drugs Act (1940) for the control of biological products imported or manufactured in India.

In addition the Director is the Editor of the Indian Journal of Medical Research, four issues of which are published annually. This journal is the principal medium for publishing the results of original medical research work carried out in India.

The Director acts as a consultant on scientific matters to the Director General of Health Services, Director of Medical Services in India, and Secretary, Indian Council of Medical Research. He is a member of several expert committees of the Indian Council of Medical Research, such as advisory committees on Cholera, Rabies, Smallpox, etc. He is also a member of the Scientific Advisory Board and Governing Body of the Indian Council of Medical Research, Indian Pharmacopoeia Committee, Drugs Technical Advisory Sub-Committees of the Combined Inter-Services Historical Section (India and Pakistan) and several other important committees.

The heavy duties outlined above are being carried out despite very great difficulties connected with staff, equipment, supplies and the present day financial struggle. Since India attained Independence the Institute has for the first time in its history an Indian Director and a wholly Indian staff. Changes occurred early in 1947 when European Officers of the I. M. S. proceeded on leave prior to their retirement. With the exception of Col. Mulligan, whose place was taken by the present Director, all these posts have more or less remained unfilled till now. This and the sudden depletion of the subordinate staff owing to 'partition' threw an unexpected strain on the Institute. Disturbed conditions, threatening epidemics, exceptional demands for vaccine for refugee camps, transport difficulties, heavy rains resulting in floods, inability to get sheep for the preparation of antirabic and other vaccines, all added to the mental and physical strain on the members of the staff. Nevertheless, over one and a quarter million doses of vaccines were issued in the month of October, 1947, constituting an all time record in the history of the Institute. This was in spite of the fact that owing to re-modelling work going on at the Institute, manufacture for several preceding months had been greatly reduced and reserves of vaccines were, therefore, low. Had it not been for this factor the Institute might well have doubled this figure during the emergency. It is not, however, suggested that output on such a scale could have been maintained for any great length of time for boilers and sterilizers cannot be kept in continuous use without damage to their fabric, even if human efforts were equal to the strain.

4. Research Work in 1948-51

In the circumstances, when every available hand was required for the manufacture of cholera, T.A.B. and other prophylactic and curative vaccines to fight disease and epidemics amongst the refugees it was inevitable that research activities should be relegated to the background. Nevertheless immediately the conditions improved, investigations into various problems of public health importance were commenced. An enquiry into

the comparative values of antirabic vaccines was instituted, the results of which have been published in the annual reports of the Scientific Advisory Board of the Indian Research Fund Association for the years 1947, 1948 and 1949. A consolidated report of the findings is in the press and first part of the findings has appeared in January, 1950 issue of the Indian Journal of Medical Research. Work on snake venoms has been carried out with particular reference to the mode of action of Russell's Viper (daboia) venom, in vivo neutralization of Krait and Cobra venoms by soap solutions, treatment of viperine poisoning by intravenous injection of heparin, improved methods of preparation of antivenin etc. Basic studies have been carried out on the immunochemical properties of cholera vibrio, on the serological variations of cholera and El Tor vibrios under the stimulus of type specific serum and on the isolation of polysaccharide fractions from strain of vibrios. Preparation of monospecific cholera 'O' sera of types Inaba and Ogawa was undertaken on behalf of the World Health Organisation-and 400 cc. of those type sera have been supplied to the State Serum Institute, Copenhagen for distribution to research organisations in the world. Studies on chromogenic strains of acid fast bacilli isolated from convalescent cases of pulmonary tuberculosis were undertaken. Studies on antitubercular drugs, both indigenous and imported, have been in progress and valuable data have been obtained on the comparative curative values of streptomycin, P.A.S.T.B.I., garlic, atomized mica and many other organic compounds related to salicylic acid. The views expressed by certain authorities in France and America regarding the plurality of types of cholera vibrio responsible for the disease have been disproved by workers at this Institute and it has been shown that there exists only one type of cholera vibrio with its particular antigenic pattern which is responsible for cholera. This observation has a fundamental bearing on the preparation of diagnostic sera and anticholera vaccines. This work has been published in the Indian Journal of Medical Research (1950). Work on antirabic serum has been in progress since 1947 and it has been shown that the serum prepared at Kasauli compares more than favourably with that prepared in laboratories abroad for which great claims have been made in the last two or three years. In addition, experimental studies on supernatant fluid vaccines in distilled water have shown that such vaccines are just as effective as the more crude products in general use throughout the world. These experiments may have far reaching effects in modifying antirabic treatment rendering it safer but much work will have to be done in this connection before these early hopes are substantiated or proved to be wrong. The results of these studies are in the press and will be published in the Indian Journal of Medical Research. The first aid treatment of Cobra and Krait bite by soap solution done at this Institute in 1945 has been confirmed by workers in South Africa who now report that soap solution is equally effective in the treatment of South African cobra, ringalls and scorpion venom poisoning in their country.

The preparation of Diphtheria antitoxin and Diphtheria toxiod had been undertaken for the first time in the history of the Institute and serum as potent as that received from foreign countries is now in

regular production at the Institute. For details of research work the annual reports of the Institute should be consulted. The following papers have been published by the staff of the Institute during the year 1948-51 :—

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Goyal, R. R.—Estimation of the immunizing potency of antirabic vaccine, I.J.M.R., Vol. 36, 1948.

Ahuja, M. L. and Brooks, A. G.—Mode of action of Russell's Viper venom, I.J.M.R. Vol. 36, 1948.

Ahuja, M.L. and Brooks, A. G.—Detoxification of Kriat venom in vivo by means of carbolic soap solution, I.J.M.R. Vol. 36, 1948.

Goyal, R. K.—Mode of circulation and excretion of toxins, antitoxins, venoms and bacteria in animal body, I.J.M.R. Vol. 36, 1948.

Shrivastava, D. L., Gurkirpal Singh and Ahuja, M. L.—Immunochemical studies of V. cholerae, I.J.M.R. Vol. 36, 1948.

Brooks, A. G,—Rationale of Malaria Therapy in late localised syphilis, I.M.G. Vol. 82, 1947.

Brooks, A. G.—Leishmaniasis and the Sandfly, I.M.G. Vol. 84, 1949.

Ahuja, M. L.—Snakebite in India, Editorial I.M.G. Vol. 84, 1949.

Brooks, A. G.—Kala Azar and the Sandfly, I.M.G. August, 1950.

Gurkirpal Singh, Malik K. S., Lahiri, M. N. and Ahuja, M. L.—Immunochemical studies of V. cholerae, part II, I.J.M.R. Vol. 38, 1950.

Brooks, A. G. Lahiri, B. N. D'Silva, C.B. and Ahuja, M. L.—Studies on Rabies, I.J.M.R. Vol. 38, 1950.

Gurkirpal Singh and Ahuja M. L.—A note on the antigenic relationship to V. cholerae of the so called 'A' type of vibrio (Burrows) and 'B' type of Vibrio (Gallut), I.J.M.R. Vol. 38, 1950.

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Brooks, A. G.—Studies on Rabies, IV. Some personal observations, I.J.M.R. Vol. 38, 1950.

Ahuja, M. L. and Brooks, A. G.—Hydrophobia in India, I.M.G. Vol. 85, 1950.

Ahuja, M. L., Krishnan, K. V., Pandit, S. R. and Venkatraman, K. V.—Laboratory Diagnosis of Cholera. A note on Bacteriological Procedures, I.J.M.R. Vol. 39, 1951.

Suri, J. C.—Anti-tubercular activity of Garlic (Allium sativum), I.J.M.R. Vol. 39, No. 3, 1951.

D'Silva, C. B., Brooks, A. G., Thomas, A. K., Ahuja, M. L.—Studies on Rabies, Part V (In Press).

Gurkirpal Singh and Ahuja, M. L.—A new test for the identification of roughness in vibrio cholerae (in press).

Ahuja, M. L. and Brooks, A. G.—Rabies and Antirabic Treatment in India (A Pamphlet published on behalf of Pasteur Association of India).

Missionaries for the Application of Applied Science

P. Kodanda Rao, Servants of India Society, Bangalore 4

An eminent scientist was asked whether his main interest was Pure or Applied Science. Whimsically he replied that there was no more Pure Science as all science had become impure! It is obvious that he was thinking of the anti-social, rather anti-human, application of science, which is highly regrettable. If it were only so, there would be a better case for Prohibition of science than of liquor or opium. Happily it is not the case. Science has had beneficent application also, and on the whole, more of it than the opposite. The right policy is to minimise the evil, and maximise the good, applications of science.

The debate regarding the relative merits of Pure and Applied Science, which sometimes flares up even among scientists, is somewhat superfluous, for without Pure Science there can be no Applied Science. But the debate in India today turns on the relative importance of the two aspects, which should have priority, considering the present limitations of money, equipment and personnel, and the needs of the country in such essentials as food, clothing, shelter and health.

A brilliant Indian food technologist claimed that he had perfected a process, simple and inexpensive, which would increase food production in India and make her self sufficient. When he was asked whether and to what extent his discovery in applied science was applied, he did not know, and did not care, for it was not his job but the Government's. He groused a bit that he did not get the promotion he expected. It is evident that he was so engrossed in his research work and the prospects of his own promotion that he was somewhat oblivious to the prospects of his process and the obligations of citizenship and of patriotism, when the country was faced with a food crisis, and was driven to seeking the generosity and charity of the nations of the world, and incidentally, dissipating its foreign exchange badly needed for development purposes. If a simple and inexpensive process can really save the situation, pride of discovery, if no other consideration, would have promoted our friend to publicise his process extensively, persistently, and even importunately. Our friend may be an exception. If he be typical, it is a great misfortune. *Pure science is important, Applied science is more important: the application of Applied Science is even more important.* Piling up of new knowledge in libraries and laboratories is less valuable than its prompt utllization for human welfare. It would be most valuable if an inventory be made of the applications of science already accumulated in the scientific archives of India, and if an estimate be made of their actual and potential application. It might reveal that a very small fraction of accumulated knowledge has been made use of and the rest has been left to rust on the shelves. Whatever be the position of other countries like England and America, the non-utilization of known knowledge seems a phenomenal waste in India while comparatively large sums of money are

being spent on discovering new knowledge only to add to the dusty files. It is a luxury which India can ill afford in present circumstances.

There seems to be enough known knowledge to stamp out malaria in India. During the war, the areas, where foreign troops particularly the Americans, were stationed, were effectively cleared of mosquitoes and malaria. Soon after they left, mosquitoes and malaria returned. It was not because knowledge lapsed, but it was not utilised any longer. There are large tracts of fertile and virgin soil, with adequate rainfall, eminently fit for the raising of food crops and for colonisation of refugees from Pakistan and for relief to congested areas. They are not used, largely because of mosquitoes and malaria. There is enough knowledge to stamp out both, though research may possibly reveal more effective and economical methods for doing so. India is importing food at great cost, while these lands lie unused in spite of the requisite knowledge being available.

At a recent conference of food and population, most of the assembled scientists and statesmen propounded solutions which were long-term projects, while the problem of feeding the existing population during the next twelve months faced the people and the Governments, and called for immediate solution. Tapioca, by itself or if fortified with other nutritional materials, was offered as a short term solution. If this be true, one cannot help wishing that substantial proportion of money spent all over India in discovering new knowledge was diverted immediately to the large-scale production of the tapioca product. Indeed, it would be a very good thing if research institutions added a manufacturing side to produce and market their inventions, thereby adding to their own financial resources, and also proving to the satisfaction of the investing public that the inventions are worthwhile propositions. Perhaps it is too much to suggest that in the present somewhat difficult circumstances of India there is a case of temporary moratorium on the discovery of new knowledge, and the diversion of all available resources to the application of known knowledge.

There is a strong case for the scientific study of the traditional customs and processes in India regarding food, clothing, housing and health, which were based largely on indigenous products and circumstances. The processing and preserving of food was an art and a science, not unknown to mothers and grand-mothers. They need examination and improvement wherever possible and necessary, in the light of modern knowledge. India t da y needs far more research to discover better methods of cooking rice and dal than on the discovery of the structure of the atom and the distance of the farthest star.

Propaganda of known scientific knowledge is better done by expert scientists than by laymen who may have more zeal than knowledge. Scientists have thus to play a double role, discover knowledge and also propagate it. The existing personnel is inadequate for it. There is no money and personnel to expand it adequately. Can anything be done to help the situation? Would it be possible to utilise the services of retired scientists in a more organised and efficient manner? An increasing number of scientists retire from Government or other services every year as they cross the retiring age, to make room for the legitimate promotion of their juniors. Assured of their pensions, would it not

be possible for them to give further service on a volunatry basis, as missionaries of science? Like honorary surgeons in hospitals, they may continue as honorary researchers in the institution which they had served and promoted. Even more urgent and important, they may help to propagate and popularise applied science and promote the application of the Applied Science in farm ann factory. By the time they retired, they had acquired a vast amount of knowledge and administrative experience, which would be of great value to the people. One of the very convincing reasons urged for Indianisation of the Services in the old days of British rule was that the experience acquired by officers in the long course of their service would remain in India and not migrate to England. Now that Indianisation is complete this objective must become operative. *Let retired scientists become national missionaries of science in India to apply Applied Science.*

They have to serve *voluntarily*. For one thing, as was stated above, India has not the financial resources to pay them adequately. Secondly, they owe a moral debt to the people of India. While they rendered service in return for their salaries while in in office, they were educated for the office very largely by the public and only to a small extent by their own parents. Scientific education is very expensive. The cost of it was not wholly borne by the student's parents; it was largely subsidised from public revenues, to which the people contributed through taxation, all of which was not equitable and much of which did not return in service to the tax-payers. *After retirement, let the scientists seek to repay this moral debt by honorary service.*

Above all, scientists must demonstrate their faith in science before preaching it to others. It would seem that it is not always so. For instance, while a seientist insists on bright lighting, raised furniture, efficient fittings and sanitary conveniences in the laboratory, he is content with a cow-dung floor in his kitchen at home which is often dark and smoky, insanitary and forbidding. He leaves his scientific conscience and techniques in the laboratory, and lives another standard in the home. He gives the scientific explanation of eclipses at school and goes to the rescue of sun and moon by prayers at home. A kind of diarchy in civilization; *science in offlce and superstition at home; soap in the laboratory and cow-dung at home.* The so-called kitchen is as much a laboratory as the one in the research institute. The kitchen is but a bio-chemical laboratory to process certain organic products called rice and dal, curry and kolambu, puri and tarkari. Science will not abrogate itself in the kitchen and assert itself only in the laboratory. Science is one whether at home or in the laboratory. A higher standard of approximation to scientific standards is expected of scientists than of laymen.

The weakest link in our ways of living is sanitation, as anybody who has been abroad to England and America can testify. Many an Indian who accepted hospitality in the homes of his American or English friends, feels greatly embarrassed to return the hospitality in his own home to his friends from abroad, largely because of our low sanitary standards. In this particular instance what is needed is not more research, but the more wide-spread and efficient application of known knowledge.

Let the retired scientists organise

themselves as national missionaries for the application of Applied Science in India, and serve India as no other group can. They can discharge a higher mission than most others, a mission more needed than most others for the health, wealth and welfare of India and the promotion of research itself.

Research in American Industries and Universities

Mr. R. K. Gupta, The Kesar Distillery, Baheri (U.P.)

I—Importance of Research

We are living in an age of science in which research is regarded as a modern oracle. It is a much-used and much-abused word. It conveys different meaning to different people. To a fundamental scientist, "research" generally means the investigation of unexplored portions of scientific fields in search of new information. To a market analyst, "research" may mean the review and correlation of statistics while to a sales promotion manager the word "research" often is merely a superlative for use as window dressing in advertising copy.

The term "effective research" likewise means different things to different people.

A fundamental scientist may consider that his research is satisfactorily effective if the results are published in a scientific journal. Sometimes a medical research worker considers his project effective only if it results in a generally acceptable new treatment for a disease. An industrial scientist usually considers his work effective only when it results in an income greater than the cost, and a market research analyst may value his efforts in terms of increased sales.

At times the word "research" is used to cover broadly all the activities necessary to improve existing processes, products, markets, and services to develop new ones. However, it is more or less common usage today to distinguish between "research" and "development", limiting the former to the functions associated with an experimental laboratory, and using the latter to describe the various phases of engineering, pilot plant, and market development activities.

The types of establishments conducting organised research and development may be classified broadly as follows: (1) Industrial laboratories, (2) colleges and universities, (3) research institutions and foundations, and (4) government laboratories.

Industry has always recognised the function of development in achieving its goals, but industrial research as a specialized and organized activity is a product of the 20th century. Only during the past 50 years has it been realized how effectively new industries can be created by the proper control and direction of research.

Colleges and universities are the main stronghold of free inquiry into the unknown sectors of human knowledge apart from economic incentives. Academic institutions now generally recognize that attention must be paid to development work as well as research in order to train students properly for their future work. One way that industry has aided in broadening the scope of academic development work and in establishing educational contact between universities and industries is through the support of fellowships.

Research foundations and institutes usually have some of the characteristics of both industrial laboratories and colleges and universities. They conduct industrial research and development under the direct sponsorship of industrial concerns. They are usually more or less associated directly with some university or college, drawing to some extent upon the services of the faculty and students and upon university facilities.

Research and development are now major activities of government. The need for government to engage in research and development is in fields where there is little or no incentive for others or where there is little likelihood that the problems whose solutions are obviously needed for the future welfare of the people will otherwise be adequately investigated. In recent years the highly technical nature of war has made it desirable for government to carry on many kinds of research and development pertaining to national security.

Industrial organizations grow and prosper by inventing new products, improving existing ones, and by devising ways and means to make these products available at the lowest possible cost so that they come within the buying power of the greatest number of persons. To be able to survive, every business must operate with a margin of profit sufficient to pay its taxes, replace its worn out and obsolete equipment, acquire new equipment for expansion, and pay a reasonable return on investment. If a business does not pay a reasonable return on invested capital, it will not be able to attract investors or to borrow money at an interest rate which will permit it to expand or to continue its operations, and as a result will eventually be doomed to failure.

Industrial research and development has as its final goal the multiplication and improvement of all the people's comforts and enjoyments of life. From an industrial viewpoint this goal is, as has been stated by one of the leading industrial research men of the U.S.A., "to find out what you are going to do when you can't keep on doing what you are doing now". Research and development is a means of protection against the loss of business - the loss of profits - the loss of assets, and it is effective only when it succeeds in maintaining or increasing assets and profits. Research and development is not a fire department. It is an insurance policy. It is not a means of keeping losses at a minimum after the fire breaks out, but insurance that the means of continuing in business will be available regardless of the magnitude of the fire loss.

Recovery and Progress of the French Steel Industry

The year 1949 marked an important stage in the post-war recovery of the French steel industry. As it became easier to secure supplies of raw materials, especially fuel, production increased considerably. There was no longer a steel shortage on the home market. In February, 1949 trade in steel was decontrolled and the last vestiges of "dirigisme" (managed economy) disappeared in October when tin-plate and leaded and galvanized sheets went on sale on the free market.

Legal restrictions on exports were lifted and, after a long absence, French steel reappeared in ever larger quantities on the world market. Business relations that had been interrupted during the war and the German occupation were reestablished, the traditional trade currents were restored and new ones initiated.

Production Increase

During 1949, France produced a monthly average of 760,000 tons of crude steel (ingots and castings) and 513,000 tons of finished rolled products. These figures represent increases of 26 per cent and 20 per cent respectively as compared with the monthly average of 1948, and increases of 46 per cent and 49 per cent respectively as compared with the monthly average of 1938. In the course of the year, France had at her disposal almost 11 million tons of steel, including the output of the Saar factories, which are now integrated into the French economy. France now ranks fourth in steel production, after the United States, the U.S.S.R. and Great Britain: she has thus regained her position among the great industrial powers of the world.

These results were achieved at the cost of great efforts that can be realized only if we recall the condition of the French steel mills after Liberation. Some factories which are now for the most part restored, were completely destroyed. Others had been flooded or partially destroyed. Transportation was completely disorganized, manpower scattered, stocks of raw materials exhausted. In September 1944, *French steel production was almost zero.*

The means of production were restored comparatively quickly, but for a long time steel production was held back by Europe's severe fuel shortage,

Improvement in the Supply of Raw Materials

French steel factories must import about two thirds of their small coal and coke (one third from Germany) inasmuch as France's fuel resources are inadequate in quantity as well as quality. In normal times exports of iron ore and steel products can be exchanged for needed fuel, but during the European coal crisis this dependence on foreign countries was a great handicap. The larger tonnages available at present, despite consistently high market prices, open up more favourable prospects. In time, the studies now in progress for obtaining coking coal from mixtures of Lorraine and Saar coals, will probably enable France to decrease her imports.

While the French steel industry is comparatively short of coke, it enjoys a privileged position with regard to iron

supplies. The reserves in French iron ore deposits are estimated at more than 8 billion tons and are among the most extensive in the world. Three quarters are concentrated in Lorraine, in the basins of MetzThionville, Briey, Longwy and Nancy. Not only are these deposits the natural basis of the largest concentration of French metallurgical industries-Eastern France normally produces 80 per cent of France's total iron output and 60 per cent of her steel output—but they also supply part of Europe's steel industry. France has sufficient iron to cover nearly all her domestic reqnirements and to export very large tonnages to neighbouring countries, Belgium, Luxemburg, Great Britain, the Netheriands and Germany. Imports are limited to a comparatively small quantity of high grade ores which are imported from Sweden, Spain and Brazil for the manufacture of special products.

Main Production Centres

Two production centres of approximately equal size are connected with the iron ore deposits; that of Moselle, with the Moyeuvre, Hayange and Hagondange steel mills, and that of Meurthe-et-Moselle, with the factories of Longwy, Micheville, Homecourt, etc. The secondary centres of Caen and Saint-Nazaire also depend on iron ore deposits.

A very important centre has been organized near the coal mines of Northern France, including the steel mills of Denain and Anzin, Velenciennes, Maubeuge, etc. Near the coal mines of Central France are the factories of Le Creusot, Saint-Etienne and Montlucon-Commentry, which specialise in the manufacture of high-grade steel, as well as the electro-metallurgical factories of the Alps which depend upon the power of local waterfalls.

On the whole, the French steel industry constitutes a quite well-balanced structure, adequate to meet almost all domestic requirements. Located at the crossroads of the great international trade currents, it is in a favourable position to export. Before the war, it sold about one quarter of its output to foreign countries.

Modernization Programme

The purpose of the modernization programme is not so much to increase productive capacity as to take full advantage of technical progress and to adapt manufacturing of finished products to the probable development of requirements. A steel capacity of 12,500,000 tons is the goal for 1952-53. This figure was adopted in order to avoid the drain of a production potential out of all proportion to probable average consumption over a five or six-year period, and, at the same time, to enable the French steel industry to meet the peak demand on the internal and world markets.

During 1949 a certain number of new installations went into production. Two blast furnaces, provided with the most modern improvements, started operating, a third was completed and two others were reconstructed. Progress was made on works designed to improve the preparation of charges of blast furnaces and two installations will soon start operations. Construction of two Martin furnaces was completed and an electric furnace went into productlon. Several sheet mills were mechanized and two new roll trains were put into service. Many technical improvements were made on existing installations. The Iron and Steel Research Institute went forward with the construction of a huge iron and steel laboratory at Saint-Germain-en-Laye, near Paris, while rese-

arch and testing were carried on in factory laboratories.

Finally, the construction of two continuous rolling mills with wide bands will really revolutionize the technique of manufacturing steel plate in France. A first continuous hot mill is being set up at the Usinor factories at Denain (Nord) ; it will feed a cold mill that has just gone into operation at Montataire (Oise) and that will temporarily be supplied with the aid of coils purchased abroad. Work has been begun on a second continuous hot rolling mill and cold mills in Lorraine, at Eblange and Seremange.

Development of Exports

All these projects are designed to reduce production costs and to improve the quality of French steel products so as to meet the ever higher standards of consumers. They will help to adapt the structure of the French steel industry to the increased demand for flat products such as steel plate, strip and tin-plate) which has developed during the last few years in France as well as in foreign markets.

During the latter part of 1949 French steel exports increased rapidly. From a monthly average of 56,000 tons in 1948 (of which 39,000 tons went to foreign countries and the rest to the territories of France Overseas), the volume rose during the first ten months of 1949 to an average of 156,500 tons per month (of which 115,900 went to foreign countries and 40,600 to the French overseas territories). In October it reached 251,000 tons (of which 199,000 went to foreign countries), a higher figure than the monthly average for 1929.

Flat products account for a much large share of this total than before the war, while heavy items (such as rails and girders), crude products (such as pig iron and ingots), and semi-finished products represent a relatively smaller share. By concentrating on the sale of finished products, requiring more technique and labour, the French steel industry is contributing to the improvement of the French trade balance and the establishment of new industries in France.

The achievements of the French steel industry and the modernization programme it is now carrying out give proof of its capacity to recover in a difficult period and of its ability to adapt itself to the new trends of the post-war market.

(Reproduced from News from France, 14th August, 1951).

PARLIAMENTARY NOTES

1. Geological Surveys

A statement was laid on the table in Parliament on 18th September, 1951 giving a list of recommendations of the Estimates Committee which the Government of India had decided to accept. One of the recommendations of the Committee is that private enterprise should be encouraged to take up work of discovering and developing the mineral resources to supplement the work done by the Geological Survey of India. Royalties should be fixed at adequate rates in granting mining licences to private agencies.

2. Television Service in India

It was stated in Parliament on 20th September, 1951 that the Government of India was examining the possibilities of introducing television in India. The prospects of a television service, however, depended on availability of funds, equipment and technical personnel.

3. Prefab Housing Factory

Hon'ble Mr. S. N. Buragohian in replying to a question stated in Parliament on 21st September, 1951 that the administrative control of the factory had been transferred to the Ministry of Works, Production and Supply from the Ministry of Health. He added that it had been decided to enter into an agreement with a private Swedish firm to run a part of the factory as a joint concern with Government. The remaining part of the factory would be worked as a Government concern.

The National Physical Laboratory, New Delhi under the guidance of its Director, Dr. K. S. Krishnan and Dr. S. S. Bhatnagar conducted certain experiments for a better utilisation of the factory and they recommended that by adoption of certain changes the factory could produce housing materials at competitive and commercial prices.

4. Automatic Vacuum Brake for the Railways

Hon'ble Mr. K. Santhanam stated in Parliament on 24th September, 1951 while replying to a question by Dr. Subramaniam that a Railway Workshop employee at Golden Rock, Tiruchirapalli had invented a device for application of vacuum brakes automatically when the wheels of an engine go off the rails. The device was tested on December 15, 1950 by the Deputy Chief Mechanical Engineer and the test was successful.

5. Solar Energy

Under the News and Views' of Vijnan-Karmee of April, 1951 a reference was made to the appointment of a small committee consisting of Dr. H. J. Bhabha, Dr. S. S. Bhatnagar, Dr. K. S. Krishnan and Professor J. W. McBain to explore the possibilities of utilising solar energy in the country. Hon'ble Mr. Sri Prakasa revealed in Parliament on 25th September, 1951 that the National Physical Laboratory of the Council of Scientific and Industrial Research was now conducting experiments to utilise solar power to evolve simple and inexpensive methods for carrying out air conditioning of buildings and running refrigeration equipment, to utilise solar energy for generation of power by means of heat engines, thermoelectric generators and to determine the possibility of cooking

food and drying of fruits with the solar heat.

6. The Kosi Project

Hon'ble Mr. Sri Prakasa, Minister for Natural Resources and Scientific Research, announced in Parliament on 25th September, 1951 that the Planning Commission was giving its very close attention to the question of inclusion of the Kosi Project in the Five Year Plan. The Expert Committee's recommendation has been accepted by the Ministry and was forwarded to the Planning Commission. The Expert Committee has suggested a modified scheme in respect of the first stage of the project. It is estimated to cost Rs. 55 crores and would require four years for completion.

7. University Grants Board

Hon'ble Maulana Abul-Kalam Azad, Minister for Education, while initiating the debate on the Banaras Hindu University (Amendment Bill on 26th September 1951, announced the setting up of the University Grants Board). The Select Committee had inserted a new clause providing for a Quinquennial Review of the working and progress of the University and its needs by a committee appointed by the Visitor. This clause was not accepted by the Hon'ble Minister for Education who explained that the new clause was not necessary with the setting up of a University Grants Board. Pandit Hriday Nath Kunzru was warmly in favour of setting up a University Grants Board as a permanent body like this would be far better placed to consider the needs and requirements of the Universities with sympathy and understanding. Dr. Zakir Hussain considered that the appointment of a review committee would detract from the high status and economy of the Universities and would not permit them to develop in an atmosphere of freedom.

8. Hirakud Dam Project

During the debate in Parliament on supplementary demands on 29th September, 1951 Mr. Shiva Rao criticised the method of selection of personnel to the Central Water and Power Commission and recommended that the Ministry of Natutural Resources and Scientific Research should be advised by a high powered Board of Indian Engineer-Consultants. Hon'ble Mr. Sri Prakasa, Minister for Natural Resources and Scientific Research, stated that an Enquiry Committee comprising an Accountant-General and an Engineer was to be appointed shortly to investigate the alleged irregularities that had come to light regarding the Hirakud scheme. A Control Board under the chairmanship of the Chief Minister of Orissa was also to be set up to reduce chances of delay and promote efficiency of execution of the project.

9. Oil in Assam

Hon'ble Mr. Sri Prakasa, Minister of Natural Resources and Scientific Research, in replying to Mr. Sonavane stated in Parliament on 4th October, 1951 that an oily substance was struck about 120 feet below the surface at Katakhal Railway Junction platform when a tube well pipe was being driven in. The matter was referred to the Geological Survey of India and their report was awaited.

10. Raw Materials for Industry

Hon'ble Mr. Harekrishna Mehtab, Minister for Commerce and Industry, who led the Indian delegation to the Commonwealth Conference on Raw Materials held in London in September, 1951 told Parliament on 5th October, 1951 that the Conference only exchanged views and information. He stated that raw materials,

especially non-ferrous metals and chemicals, wree in scarcity throughout the world and India could get proportionate quota of these raw materials by arrangement with the Commonwealth countries.

Hon'ble Mr. D. P. Karmarkar, Deputy Minister for Commerce and Industry, told Parliament on 5th October, 1951 that negotitations were being carried on at present by Japan for import of coal and iron from India. Iron ore was being exported to countries llke Czechoslovakia, Japan, the Netherlands, Rumania, Germany and Belgium. He gave a list of the countries to which India was at present exporting coal. This list included United Kingdom.

11. Artificial Rain

Hon'ble Mr. Jawaharlal Nehru, the Prime Minister, stated in Parliament on 9th October, 1951 that he had asked the State Governments to consider the question of scientifically creating artificial rain by inducing the clouds to rain in the drought area. Mr. Nehru added that it was fairly easy to get rain from the clouds where they existed but, though scientifically possible, it was not practical to produce clouds so easily.

The Indian Meteorological Department has prepared a report, compiled from experiments on artificial rain-making in the U. S. A. and Australia, for the benefit of the State Governments and the public. Experiments have been in progress for a few years in the U. S. A. and Australia to produce rain artificially from clouds by "seeding" them. Seeding consists in dropping solid carbon dioxide, known as dry ice, or introducing tiny crystals of silver iodide into the portions of the cloud which are at sub-freezing temperature. The report has finally recommended that in line with other advanced countries a well-coordinated research organization should be set up in India for carrying out full scale experiments and detailed studies on the cloud physics so that vagaries of the monsoon may be mitigated by artificial rain-making, if possible.

12. Control of Industries

Parliament passed the Industries (Development and Regulations) Bill on 12th October, 1951. According to this Bill a specified number of industries would come under the regulatory power of Government. A Central Advisory Council consisting of not more than thirty-one members is to be set up for the purpose of advising the Government of India on matters concerning the development and regulation of the scheduled industries which is on lines similar to those envisaged in the British Industrial Organization and Development Act. Development Councils for each industry or a group of industries are also to be appointed primarily to advise Government on matters relating to increase in efficiency or productivity of the industries concerned. A development cess is to be levied at two annas per cent. on the value of goods produced by scheduled industries for the purpose of obtaining at least a part of the necessary funds for administration of the Act. Hon'ble Mr. Gulzarilal Nanda, Minister for Planning, stated the nationalisation of industry had its disadvantages. The Bill passed by Parliament would give the country the benefits of nationalisation without the corresponding disadvantages. He argued that the approach of Government was a pragmatic approach and it was necessary to maintain the political structure as a democracy and to avoid any serious economic dislocation. The Bill was in

agreement with the industrial policy recommended by the Planning Commission

13. Planning Commission's Report

The First Five Year Plan as drafted by the Planning Commission was taken up for consideration by Parliament on 15th October, 1951 on a motion moved by the Prime Minister who described the Planning Commission's report as a very practical, realistic, and even if prosaic, approach to a tremendous adventure. The recommendations of the Planning Commission were discussed in Parliament on 16th October, 1951 and the debate was wound up by a speech from Hon'ble Mr. Nanda, Minister for Planning. He said that the purpose of the debate was not to defend the Plan but to evoke thought and he was gratified by the result. The criticism on the Plan was variegated. The speeches ranged from welcoming the Plan as a realistic one to virulent criticism condemning the Plan as totally useless.

Geologists *Versus* Water – Diviners

Prof. N. L. Sharma

Recently news are being flashed in Indian dailies regarding the various Governments consulting water-diviners in connection with the problem of water-supply in India. I quote the following two passages :—

"A unique story of a "water-diviner" of Rajasthan who could locate underground water was heard in Parliament during the question hour today.

"The Food Minister, Shri K.M. Munshi, told Parliament replying to a question by Lala Raj Kanwar that the services of Shri Jeevram Vyas, who was known as "Pani Maharaj" had been utilised by the Central Government. He was tried in 27 cases so far and was successful in locating water underground in all cases except four."

(New Delhi, August 10. '50, A. B. Patrika)

"Dr. Gopichand Bhargava, Chief Minister, Punjab, spent a few hours at Chandigarh yesterday to inspect the progress made in connection with the construction of the State's capital there.

"The expert diviner, Mr. Madhusudan Patnaik of Orissa, gave a demonstration of locating water spots.

The Chief Minister, Capt. Ranjit Singh and the Chief Engineer were convinced there would be adequate supply of water in the capital."

(Ambala, May 25, '50, Hindustan Times)

We expect that the Superintending Geologist in charge of the Engineering Geology and Ground water Section of the Geological Survey of India will enlighten the members of this Institute whether his Department is being consulted in the matter and if so, whether they also subscribe to the view (as the various Governments have done) that one can locate the underground reservoirs of water by divine methods.

Very few geologists have faith in these methods. I was, however, surprised to see in 1937 the famous geologist, Dr. A.L. Du Toit of South Africa, exhibiting the method of forked Y-shaped twig, near the faulted horst of Metamor-

at Dumra in Jharia Coalfield which he visited in December, 1937, when he came to India as a delegate to the Indian Science Congress Jubilee Session. Prof. H.H. Read, Prof. M. N. Saha and Dr. S.K. Roy were also in the party. We all took this demonstration very lightly, but he told us that he had traced several dykes below the alluvium in South Africa, by this method.

Another example of a Geologist (Indian), who not only believes but probably practises the art of water-divining, is Shri N.G. Apte, B. Ag. M. Sc., of Poona. I quote below the following extracts from his article on water-divining published in one of the Indian dailies, several years ago :—

"Water-diviners, *i.e.* persons who can locate water irrespective of any knowledge of the modern science of water-finding, have played an important part in locating water sources. The records available in this respect are, however, mostly of foreign origin. Europe had many of these water-diviners and there is information about them from the sixteenth century onwards. In Europe, the art of divining was well developed and discussed from time to time in several books in various languages. One important publication gives the theories underlying divining. This is "The Physics of the Divining Rod", recently published by Maby and Franklin. Diviners in India, do not, however, seem to have recorded observations. Nevertheless, the profession of water-divining is common and is counted as one of the important agencies for locating underground water. Water-divining commands, perhaps, the most extensive field in the business of water-finding, even in this twentieth century.

"The writer (Shri Apte) experiences a feeling in the calf when passing over a spring or a slight pain when passing through river beds. He gets this feeling on rainy days also. It was not known that it had any relation with the underground water content till 1933. In 1926 the writer first tried to operate the automatic water-finding machine at a village named Katarkhatav in the Satara district. Five different plots and 30 different sites were tested. In one field he felt a pain in the calf. Later on a report of the readings on the water-finding machine was made to the officer who interpreted the readings and decided that the field (where the writer got the pain in the calf) contained the best water supply. Such cases multiplied but the author did not realise (till 1933) that he possessed this capacity and that the peculiar kind of pain was an indication of underground water. Being a believer in modern science and engaged in chemical and geological research, the occurrence of this pain was taken to be an effect of the weather or of indifferent health.

"All this, however, goes to prove that divining powers do exist and that it is possible that some may feel and others may hear or get a movement of the rod or other material they use indicating the presence of water. Naturally, there cannot be any exact measurement of these powers and so there is the possiblity of quacks and impostors getting in and posing as real diviners. The need, therefore, arises for choosing the right man, and the only criterion is the result of his advice. The stray results of diviners that are available are not, however, very encouraging. Besides, the human factor is affected by various circumstances. The one of remuneration is naturally of very great

consequence. This factor causes nervous disturbances and upsets the tone of the whole body and makes it unsuitable for any good work."

In this connection, it may be mentioned that a parallel situation seems to have arisen in 1942, in U. K. The following extract is quoted from an article in Nature of Jan. 30, 1943 on 'Geology, Geologists and the War Effort':—

".....Further, in *Nature* of March 14, 1942, the role of geologists in war-time was considered in a leading article the concluding sentence of which was: "There must be more enlightened direction from above, to ensure that wherever geology impinges on human activity, in war or peace, the contribution it can make is recognised without delay and appropriate action.

"This advice, wherever else it may have borne fruit, appears to have fallen on stony ground, if we are to believe a press report, at a "northern school of Military Engineers" where it is stated that a squad of water-diviners has been formed in the Royal Engineers. The information has most likely aroused nothing but a little pleasurable excitement among the general public who, as Prof. Boswell and Prof. Read both emphaised, are deplorably ignorant of geological matters. Unfortunately, however, this interesting item of British news was reproduced in the New York Times under the caption, "Dowser Squad in Army—British to use water-diviners in the Middle East". Certain of the Americans, like most of the Russians, are more aware of the part to be played by geological knowledge in war, and this small news item will not tend to increase their estimate of British Military efficiency.

"The present position was summed up in a revealing reply given by Sir J. Grigg in the House of Commons on January 19, in answer to a question by Capt. Studholme as to what extent the War Office relies upon dowsers for advice on water supply. The answer is worth quoting in full: "The War Office does not rely on dowsers for advice of water supply in the United Kingdom, and so far as I know the only place where they have been tried is the Middle East. A report of their performance there showed a very small percentage of successes and orders were to be issued that scientific geological methods only were to be used".

In my opinion, as one of the main bodies looking after the interests of geologists, the Mining, Geological and Metallurgical Institute of India should take up the matter and request the Government to appoint a Committee consisting of the Superintending Geologist of the Engineering Geology and Ground-water Section and the Geophysicist of the Geological Survey of India, together with one or two non-official geologists and mining engineers to visit the sites suggested already by the various water-diviners to the different State Governments and also to put the formers' divining power to test in those regions where prospecting for water actually requires considerable knowledge of geology.

(This letter from Prof. N. L. Sharma of the Indian School of Mines and Applied Geology, Dhanbad was published in 'Notes and News' in No. 5 September 1950 by the Mining, Geological and Metallurgical Institute of India. We had referred to "Paniwala Maharaja" in the July 1951 issue of the Vijnan-Karmee under "Parliamentary Notes".—Editors.)

NEWS AND VIEWS

1. Technical Bulletin of the Food Institute

The Central Food Technological Research Institute of the Council of Scientific and Industrial Research Institute was opened at Mysore in October last year. It is, therefore, encouraging to find that the Institute has before the end of its first year of existence, started a Technical Bulletin, the first issue of which was published in September, 1951. The Bulletin is to be issued monthly. The Editor in his note has stated that the Bulletin is started in response to a wide felt demand from Indian Food Industries for technical information. It is hoped that the Bulletin will serve as a vital link between Food Industries in the country and the Institute.

2. Pay, Allowances and Status of Medical Men

The Indian Medical Association at their meeting held at Hyderabad on 7th and 8th July, 1951 appointed a sub-committee consisting of Dr. T. N. Banerjee, Dr. S. C. Sen, Dr. M. R. Dawar, Dr. P. A. S. Raghavan, Dr. A. P. Mitra—the convenor, with powers to co-opt, to formulate a comprehensive scheme regarding the pay, allowances and status of medical men employed under the Central and State services and to submit the same to their Working Committee.

3. National Institute of Sciences of India

The National Institute of Sciences of India entered their new building when Hon'ble Mr. Sri Prakasa, Minister for Natural Resources and Scientific Research, opened the building on 6-10-1951. It is reported that in his opening speech the Hon'ble Minister asked the members of the National Institute of Sciences of India to stand on their own feet and and not to look to the Government for help in each and every respect. He said that the Government would call on the services of the Fellows of the Institute whenever they felt in need of scientific advice. In his Presidential address Dr. S. L. Hora regretted that the Institute was not able to discharge the objects effectively except one regarding the publications of the Institute. He stated that their achievements in the main object of the Institute—'to effect co-ordination between scientific academies, societies, institutions and Government scientific departments and services' were limited. As regards the popularization of science, it was limited to making a number of nature study paintings. He also stated that the Council of the Institute had not given thought to the fact that as a body of scientists of eminence it was one of their objects to promote and safe-guard the interests of scientists in India. A need was felt among scientific workers for having a unified State Scientific Civil Service so that the scientists can carry on their researches uninterruptedly. The nation will have to consider whether the existing conditions of service for scientific workers are commensurate or even adequate for initial training they have to undergo as compared with the administrative services. Unless the best scientific men have equal prospects of pay and promotion, it will be difficult to secure men of more than usual ability for purely scientific

jobs. Any national plan that leaves the man of science in a position inferior to that of his administrative or executive colleague is not going to be helpful in the least in creating a proper scientific atmosphere in the country.

4. Hundred Years of British Science

The 113th Annual meeting of the British Association for the Advancement of Science was held in Edinburgh in August, 1951. His Royal Highness, the Duke of Edinburgh, K.G., F.R.S., gave the presidential address on 8th August, 1951. The President sketched the main influences on the course of scientific and technical achievements since 1851 and their relation to one another. He then made a brief survey of the British contribution to natural knowledge and technology and paid a tribute to some of the great men of the last hundred years. He stated that a civilisation was evolved based on the material benefits which science and technology could prove. The present shortages were a timely reminder of the slender material foundation on which the civilisation rested and its dependence upon science and technology. The pursuit of truth in itself cannot produce anything evil. It was in the later stage, when the facts dug up entered the process of application, that the choice between the beneficent and destructive development had to be made. It was fortunate that the beneficent exploitation of scientific knowledge had kept pace with its destructive application. He concluded "to my mind it is vital that the two sides of scientific development are fully and clearly understood, not only by the research scientists, inventors, designers and the whole scientific team, but also by all laymen. The instrument of scientific knowledge in our hands is growing more powerful everyday, indeed it has reached a point when we can either set the world free from drudgery, fear, hunger, and pestilence or obliterate life itself. It is clearly our duty as citizens to see that science is used for the benefit of mankind, for of what use is science if man does not survive ?"

5. Science in Newspapers

The South Asia Science Co-operation Office, University Buildings, Delhi-8, in the course of its work became interested in the efforts in the various media of mass communication towards popularisation of science. No medium other than the press exerts a greater influence on the minds of the people. A request was issued to the different newspapers and periodicals in India to find how the science teachers and the reporting of scientific matters including proceedings of the meetings are managed and if the newspapers have regular staff science-writers. An appeal was made to send at least one specimen copy of a recent issue for collection in the Office Library. Some of the important newspapers of the country were prompt with their answers but it was revealed that no systemetic efforts existed for reporting scientific matters emphasizing science as key to better living. The absence of replies from a vast number from the press, about 85% in the list, underlines the paucity of enthusiasm. The Office will welcome any information on the subject from the readers. (UNESCO Ocasional Bulletin No. 41 dated 26-9-51).

6. Golden Jubilee of Kodaikanal Observatory

The India Meteorological Department celebrated the Golden Jubilee of Kodaikanal Obsesvatory on the 18th September this year in a befitting manner. His

Excellency the Maharaja of Bhavnagar presided over the function at which distinguished persons—like Hon'ble Mr. Raj Bahadur, Deputy Minister for Commnications, Mr. V. V. Sohoni, Director General of Observatories, Dr. A. L. Narayan, Principal of the Maharaja's College, Vizianagram and Ex-Director of the Kodaikanal Observatory and others—were present. A booklet describing how the observatory originated and how it has, for the past 50 years, served the cause of science was published on the occasion.

Mr. V. V. Sohoni in his address of welcome gave a short review of the foundation, past work and future aim of the observatory. He gave an account of the splendid scientific researches carried out in the various branches of astrophysics, astronomy, atomic physics, and the like. He also gave account of the present endeavour of the Department in modernising the equipments of the Observatory for magnetic and ionospheric observations. He also hoped to obtain some modern equipments (like a 100-ft spectrograph) for some fundamental investigation on solar physics, for photographic study of solar corona, etc.

The Hon'ble Minister for Communications, in a message on the occasion, appreciated the observational work and the original contribution made by the Observatory in solar physics which has earned international prestige for India. The Hon'ble Mr. Raj Bahadur in his address announced the approval of the Government of India of the Astronomical Planning Committee's recommendations in establishing Central Astronomical Observatory in Northern India, modernization and development of Kodaikanal observatory and encouragement for setting up of moderate size Astronomical stations in the principal observatories. He assured the assistance of the Government of India within its financial resources to Astronomical Planning Committee for the development of Astronomical Institutions in this country. He hoped that the people of the country would also come forward with benefication for founding in India a few modern Astronomical Observatories.

His Excellency the Maharaja of Bhavnagar in his presidential address described the contributions made by the people of this country right from the ancient times. He dwelt on the keen interest taken by the public including some Princes and Maharajas in this branch of science. He hoped that it could be possible for the Observatory to fullfil its ambition in bringing up its solar physics equipment in line with that of the best observatories in the West. He appreciated the devotion of the scientific workers of the institute for uplifting the prestige of the institution. He declared open the 20-inch grubb telescope for work in stellar spectroscopy and the ionospheric recorder for ionospheric observations. Dr. A. K. Das, the present Director, in offering a vote of thanks mentioned the difficult conditions under which the previous scientific workers of the observatory had to work and who earned international reputation for this observatory in the Astronomical world.

ACTIVITIES OF THE BRANCHES

Delhi Branch

A film show was arranged on 18-9-1951 at the India Meteorological Department Unit by courtesy of the British Information Services. The films shown were: (1) Civil Engineering, (2) History of Printing.

A symposium on the " Social Relations of Science " was held on the 20th and 21st October, 1951 at the Lady Hardinge Medical College, Convocation Hall, New Delhi under the auspices of the Delhi Branch of the Association. The symposium was inaugurated on 20th October by the Hon'ble Mr. N. V. Gadgil, Minister for Works, Production and Supply. Lt. Col. Jaswant Singh, President of the Delhi Branch, presided. The speakers on that day were :—Mr. A. Rahman who spoke on ' Social Relations of Science', Dr. B. Vishwanath on 'Science and Human affairs in India,' Dr. Rajinder Pal on ' Impact of Science on Society', Dr. Amarjit Singh on 'Opportunity and the Responsibility of the Indian Scientist', Dr. Charles Fabri on 'Science and Art'. The speeches were followed by discussion and at the end Dr. J. D. Versluys who has recently joined the South Asia Science office of the Unesco as a representative of the Department of Social Sciences also spoke. On 21st October, 1951 Dr. B. Vishwanath presided. The speakers were:— Dr. L. C. Verman on 'Standardization— A Social Service by Science,' Dr. J. J. Chinoy on Science and Agriculture in India', Mr. S. C. Sen on Technical Education in India', Dr. M. K. Halder on 'Science Teaching in India' and Mr. O. P. Garg on 'Science and Religion'. A detailed account of the symposium would appear later.

HYDERABAD BRANCH

Study Circle

The second meeting of the Study Circle was held on 1st October, 1951 at Y. W. C. A. Hall, Hyderabad. Dr. M. G. Krishna read out his paper on " Science in Industry—Part I." Mr. Mehdi Ali, President, Hyderabad Branch, was in the Chair.

Dr. Krishna dealt with the historical development of science and technology starting with the origination of stone and wood implements for use as weapons and in agriculture. Gradually village communities developed and then due to increasing pressure on land on the one hand and progress of technology on the other, people started migrating to cities. By 17th century capitalism had developed with the corresponding progress of Science and Technology. This gave rise to industrial labour. The speaker dealt with the role of patent system and how it had led to suppression of research and discovery. With the emergence of Socialism, planning of Science and Technology in the betterment of living conditions of human beings had been achieved, while in capitalist countries, use of Science for destructive purpose continued.

A discussion ensued in which Dr. Zaheer, Messrs. A. Rahman, Rajagopal, Bharat Bhushan, Satyanarayan Rao and Baldev Singh partook.

Mr. Mehdi Ali wound up the discussion and Mr. Kacker thanked the

management of the Y.W.C.A. for permission to use the Hall.

The third meeting of the Study Circle was held at Nizam College, Hyderabad on 8th October, 1951. Dr. M. G. Krishna read out the second part of his paper on "Science In Industry". Mr. Mehd. Ali was in the chair.

Dr. Krishna dealt with the growth and development of Science and Industry in Soviet Union at length. With the onset of Socialist system of planning, production and distribution, Science had come to play a positive role in the development of National Industry. Science and Scientific Research in such society was considered a responsibility of the State and not left to private bodies, resulting in a rapid and planned industrial development.

In India, which was subject to imperialistic exploitation during the period of Industrial Revolution in Europe, the development of science had been incoherent and the growth of industry was stunted. After the attainment of Independence, some of the national leaders had shown interest in making use of science for industrial and material development of the country. However, the speaker stated, in the present social set up, science and scientific talent could not be fully utilised.

The speaker answered a question from Mr. Bharat Bhushan as to why the speaker would prefer socialist system of planning to American system for application to Indian conditions. The speaker stated that due to the problems like thick population, agricultural nature of the country's development and imperialist exploitation, the condition of the country was analogous to China and the prosperity of the country would lie in adoption of socialist system of planning.

Dr. Zaheer emphasised the necessity of putting Indian Research on a realistic basis. Mr. G. S. N. Rao dealt with the backward nature of scientific and industrial development of the country. Mr. Baldev Singh, Dr. K. T. Achaya, Mr. Bharat Bhushan, and Mr. Mehdi Ali partook in the discussion.

With a vote of thanks to Dr. Quereshi for lending the use of the Hall, the meeting came to a close.

FILM SHOWS:

Title of Film	*Borrowed From*
1. Steel (In two parts-Technicolor)	1,2-British Council, Madras.
2. Let us see (Manufacture of Optical Glass in Technicolor)	,,
3. Velocity of Chemical Reaction.	3-Central Laboratories (CLSIR)

Date	*Place*	*Auspices*
4th Oct.	Y.W.C.A.	A.S.W.I.
,,	Nizam College	Joint auspices.
5th Oct.	Osmania Tech. College.	Joint auspices.
6th Oct.	Womens' College	,, ,,
8th Oct.	Chemical Tech. Dept.	A.S.W.I.

LUCKNOW BRANCH

At the last Annual General Meeting of the Branch held on 26th September 1951, the following persons were elected office-bearers for the current year:—

President. ... Dr. S.N. Das Gupta
Vice-President ... Dr. M. B. Lal.
Mr. S. C. Roy.

Secretary	... Dr. N. P. Gupta	mittee	... 1. Dr. V. S. Mangalik
Joint Secretary	... Dr. G. S. Verma		2. Dr. R. V. Sitholey
Treasurer	... Dr. P. N. Sharma		3. Dr. R. C. Misra
Members of the			4. Mr. S. Bhattacharya
Executive Com-			5. Dr. Nitya Nand

NOTICES

1. ASSOCIATION OF SCIENTIFIC WORKERS OF INDIA.

The Head Office of the Association (22, Havelock Square, New Delhi) has sent the following Circular Letter to the Branches/Units in connection with the forthcoming meetings of the Council and General Body.

"The next meeting of the Council of the Association will be held at Calcutta sometime during the first week of January, 1952 at the time of the Science Congress Session. Provisionally. 4th January, 1952 has been fixed for the Council meeting. This letter is being sent to the Branches/Units for information and guidance on the various points connected with the Council meeting. The Branches/Units should take the appropriate action and try to send the material in time to the General Secretary at the above address.

1. According to Rule No. 7 the Council may elect as Honorary Members persons of distinction whose public acts have contributed to the advancement of science and the welfare of the scientific workers. Suggestions for the election of Honorary Members, if any, would be welcome.
2. According to Rule No. 45 each Branch has to elect to the Council a number of delegates in the proportion of 1 to every 25 members. According to Rule No. 46 each Branch has to submit to the Head Office the list of members of the Branch and delegates elected to the Council not less than eight weeks before each Annual Council meeting. Substitute delegates may be elected and the list submitted to the Head Office.
3. According to Rule No. 52 any motion to alter the Rules of the Association cannot be placed on the agenda unless three Branches or 15 Units submit in writing not less than three weeks before the date of the Council Meeting that they support a motion for altering the rules.
4. Any motion, according to Rule No. 49, must be submitted in writing not later than eight weeks before the date of the Council Meeting. Members of the Association wishing to move resolutions at the Annual General Meeting shall ordinarily send them to the General Secretary with the opinion of the Branch concerned at least eight weeks before the Annual General Meeting (Rule No. 71). The provisional date for the General Meeting is 5th January, 1952.
5. According to Rule No. 65 all Branches shall be invited to submit to the Head Office, eight weeks prior to the Annual Council Meeting, nominations to fill the vacancies in the

Central Executive Committee. Such nominations shall reach the General Secretary not less than 6 weeks before the Council meeting. The nominations should be duly proposed and scconded with the written consent of the person proposed.

2. INDIAN SCIENCE CONGRESS ASSOCIATION.

The 39th Annual Meeting of the Indian Science Congress Association will be held in Calcutta from January 2, to January 8,1952. His Excellency Dr. Kailas Nath Katju Governor of West Bengal, has kindly agreed to be the Patron of the meeting. Dr. J. N. Mukherjee, F. N. I. will preside over the meeting. All enquiries about accommodation and other local arrangments should be addressed to the Local Secretaries, 39th Indian Science Congress, University College of Science and Technology, 92, Upper Circular Road, Calcutta. Members intending to attend the Session are requested to apply to the Office of the General Secretary, Indian Science Congress Association, 1, Park Street, Calcutta-16 on or before 20th November, 1951 for receiving the Railway Concession Certificate.

3. BROODBANK FELLOWSHIP.

The following notice has been received from the Ministry of Natural Resources and Scientific Research for information of the members of the Association of Scientific Workers of India :—

The Managers of the Brodbank Fund for the furtherance of research in Biochemistry or Biophysics with special reference to the principles and practice of Food Preservation give notice of their intention to proceed to the election of a Broodbank Fellow in the Lent Term 1952 with tenure from 1 October 1952. A Fellow will be required to devote himself to fulltime research in a subject approved by the Managers.

Candidature is open; but a Fellow must become a member of the University if he is not already a member of it, and of the superannuation scheme. The tenure of a Fellowship, which will not normally exceed three years, will be determined by the Managers. The research work will be carried out in Cambridge (or elsewhere with the Managers' consent) and will be subject to such conditions as the Managers may impose.

The annual pensionable stipend of a Fellow will normally be not less than £600, nor more than £1000, according to the Fellow's experience and qualifications. In addition grants may be made by the Managers to cover expenses incurred by a Fellow in his work. A Fellow must inform the Managers of the award to him of any other emolument or of his intention to undertake work other than work approved by the Managers, and he may in consequence suffer a reduction in his stipend. He may, with the permission of the Managers, undertake not more than six hours' teaching a week for remuneration without suffering any deduction from his stipend.

Applications (in duplicate) must be sent so as to reach the Registrar at the University Registry, The Old Schools, Cambridge not later than 1 January, 1952. They must contain an outline of the candidate's proposed research and must be accompanied by a statement of his career and his date of birth, by copies of any papers he may have published or references thereto, and by the names of at least two referees. Not more than two testimonials may also be sent.

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VIJNAN-KARMEE

विज्ञानकर्मी

official organ of the

ASSOCIATION OF SCIENTIFIC WORKERS OF INDIA

Vol III.] DECEMBER, 1951 [No 12

Tasty DUM GOBHI

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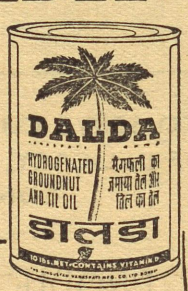

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CONTENTS

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THE OBJECTS OF THE ASSOCIATION

ARE

To improve and safeguard the economic interests, the conditions of life and the professional and social status of all Scientific Workers in India

AND

To work for the most effective use of science and the scientific method for the uplift and welfare of the society as a whole.

VIJNAN-KARMEE

विज्ञानकर्मी

VOL. III] December, 1951 [No. 12

SIXTH ANNUAL GENERAL MEETING OF THE ASSOCIATION

The Sixth Annual General Meeting of the Association of Scientic Workers of India is to be held at Calcutta in the first week of anuary, 1952. The Council of the Association will also hold its meeting at Calcutta prior to the Annual General Meeting. The Association has been in existence for the last 5 years and it would be a proper occasion for the Council to take a full account of what the As ociation has achieved during these years and to consider how its wo k could be consolidated and enlarged in the years to come.

In this issue we have given an account of what happened in the Second Assembly of the World Federation of Scientific Workers which was held in Paris from 10th to 12th April, 1951. The very fact that the French Government objected to grant visas to the members of the Federation coming to Paris from the Eastern countries created in the minds of some members an impression that there might have been some political reasons which made the French Government to take this action. There was certain criticism on the General Secretary's report indicating that the work of the Federation was inclined to some extent towards particular political leanings. The President, Prof. F. Joliot-Curie made it plain that the Federation did not belong to any political regime. It stood for the objects as defined in the preamble to the Constitution and aimed at unity between men of all races and of all opinions, working for science in countries having identical or different regimes. The duties of scientific workers towards society were to utilise science correctly in order to reduce and even to banish poverty, disease and ignorance, which are some of the permanent causes of war. The International Organisations which are combating these evils will receive the whole-hearted support of the World Federation of Scientific Workers. In the Council meeting of the British Association of Scientific Workers, an account of which is also given in this issue, a resolution was passed expressing concern with statements suggesting communist control over the Association and declaring that there was no foundation for such statements since the policy of the Association is formulated at

a democratically elected Annual Council in accordance with British Trade Union practice. A reference to the recommendations made by the three Commissions appointed by the Second Assembly will show that they include items in which the Association of Scientific Workers of India is vitally interested, such as the questions of salaries, facilities for education and research, the problem of food production, scientific assistance to undeveloped countries and the uses of science. The Association of Scientific Workers of India is affiliated to the World Federation of Scientific Workers and the General Body of the Association will no doubt consider the question of continuing the affiliation to derive mutual benefits.

We have also given in this issue summaries of the annual reports from some of the bodies affiliated to the World Federation of Scientific Workers. It will be observed that the Association of Scientific Workers, Great Britain has been concerned with the economic position of the scientific worker, the education in science and the application of atomic energy and the question of bacteriological warfare. The Association of Scientific Workers, United States have devoted themselves mainly to the maintenance of civil liberties for scientists in U.S.A. They have also prepared a draft " Background for Policy". We have reproduced in this issue elsewhere a draft approved by one of the branches of the Association in U.S.A. The Danish Society for the Protection of Scientific Work deals with the economic interests of its members. In New Zealand the Association of Scientific Workers has given its main attention to the fostering of public relations. In India science is at present in its infancy and we require all the help we could receive for its growth from all available sources. The composition of our Association is also well-spread out. We have got scientific workers who are employees of the Central and State Governments and other public bodies under the control of Government, members working in Universities and other semi-government bodies and workers in industry. The Association has not only to cater to the economic interests of all these members but at the same time it has taken upon itself the heavy but noble duties for popularisation of science and its effective use in all activities of the nation. There is, therefore, a considerable amount of work to be done by the Association before it could specialise itself in any one line of action. For this purpose we must muster together all the resources, irrespective of race and creed and in an atmosphere of peace. Perhaps there is considerable force in the advice given by Lord Haden-Guest to the Association of Scientific Workers, Great Britain when he said that anti-war propaganda was little good and we could not pursuade people, East or West, who were afraid of war, to lay down their arms but a plan showing what could be done in medicine, agriculture and so on would turn men's minds away from war and lead to the establishment of a world civilisation in which science would be the servant of mankind. The Association has a great responsibility to the scientists and to the country as a whole.

OUR INSTITUTE

Pasteur Institute of Southern India, Coonoor

The death from hydrophobia in 1902 of a young English girl strikingly emphasized the need for a Pasteur Institute in South India. A sum of rupees one lakh was placed at the disposal of the Government of Madras in 1903 by the Governor General of India out of funds donated for charitable purposes in the country by Mr. Phipps of the United States of America. A plot of land about 6 acres in extent was purchased and the present main building of the Institute was erected and formally declared open on 25th April, 1907 by His Excellency Sir Arthur Lawley, Governor of Madras, though the first patient received treatment on 1st April 1907. Captain J. C. Cornwall, I.M.S. was appointed as Director and continued to occupy the post till his retirement on 28th January, 1926 with the exception of brief periods of leave and study in England, on the Continent and in Japan. It would be no exaggeration to say that much of the credit for the facilities for work available at the Institute today should go to the scientific ability, administrative capacity and above all, the vision of its founder Director.

2. The Association of the Pasteur Institute of Southern India was founded in 1906 as a private body registered under the Societies Act, 1860. The objects of the Association are to make available effective means of preventing the occurrence of rabies, to spread the knowledge of such means among the public and to undertake research work on rabies or any other diseases in so far as the funds of the Association permit and the staff of the Institute is qualified to undertake such investigations. The affairs of the Association are governed by a Central Committee composed partly of ex-officio and partly of elected members. Any person who subscribes not less than Rs. 5/- annually is entitled to membership of the Association, subject to acceptance by the Central Committee. The ex-officio members of the Association represent varied interests such as the medical and public health representatives of the different Governments in South India and the Railway, the Military and local fund administrations. Individuals or firms paying a lump sum contribution of Rs. 250/- are eligible to become life members of the Association. The income of the Association is derived chiefly from the proceeds of the sale of antirabic vaccine aud partly from voluntary contributions, endowments and occasional grants.

3. From 1907 till 1922, antirabic treatment was given to patients from all over South India at the Institute only. The difficulty experienced by patients in coming to Coonoor led to many individuals at risk not getting treatment. With the adoption of Sample's killed AR vaccine, it was felt safe to decentralise the treatment and the Pasteur Institute, Coonoor, was the first in India to adopt the practice of sending AR vaccine to treatment centres all over the area. The phenomenal rise in the number of patients treated with vaccine supplied from Coonoor from 4,623 in 1922 to 7,719 in 1930, 16,710 in 1940 and 21,835 in 1950 bears evidence to the success of the measure. 2,71,866 patients have been treated at the Institute and its numerous subsidiary centres during the period of the 43 years of its existence. The Institute has also taken a lead in popularising antirabic treatment, specially prophylactic, among the animals. The number of animals treated has steadily increased from 19 in 1923 to 1,471 in 1949. It also serves as the diagnostic centre for rabies for South India, the brains of suspected animals being sent by the Veterinary Assistant Surgeons for opinion. In the case of positive findings, the sender is informed

about the result telegraphically. The medical officers of Government hospitals were for several years given training in the details of administration of antirabic treatment at the Institute.

4. It was felt that the facilities available in the Institute for bacteriological and pathological work should be utilised for diagnostic purposes. A clinical laboratory was accordingly started as early as 1924 to which a biochemical section was added in 1948. 4,946 tests were done last year, a large percentage of them being carried out free of charge for the benefit of the hospitals in the District. During World War II, the organisation of an extensive blood bank service in the Presidency made it necessary to have plasma processing laboratories and the Institute opened in 1942 a section for this purpose which is being continued.

5. The Institute has played an important part in public health work by serving as a depot for the distribution of prophylactic vaccines e.g. T.A.B. and Cholera by helping in the prompt diagnosis of infectious diseases like cholera, plague, enteric fever etc., and occasionally by helping directly in prophylactic mass inoculation when epidemics were threatening to get out of control. A handsome ornamental street light was presented to the Institute by the Coonoor Municipal Council as a token of their appreciation of its services to the public during an epidemic of plague in 1937.

6. In 1947 a sum of Rs. 60,000/- was donated by the Pasteur Institute Association of India, Kasauli for the purpose of putting up additional buildings for animal experiments. Three buildings were erected and formally opened by His Excellency the Maharaja of Bhavanagar, Governor of Madras in June, 1949 and named 'The Iyengar Block after Lt.-Col. K. R. K. Iyengar, I.M.S. who occupied the post of Director of the Institute for a period of 15 years. One of the buildings has been set apart as a self contained laboratory for the study of viruses other than that of rabies and has been recently fitted up with the latest types of equipment. The laboratory has been recognised as the W.H.O. Influenza Centre in India by the World Health Organisation and presented with equipment costing $4500/- and including among others a high speed refrigerated centrifuge capable of 19,000 RPM and an egg incubator with a capacity of 1440 eggs. Work on influenza, vaccinia and smallpox is now in progress at the laboratory as a result of which the influenza virus has been isolated in India for the first time.

7. From its inception, the Institute has played a significant part in the development of medical research in the country by the contributions made by its Directors and other scientific workers on varied problems. The decentralisation of antirabic treatment was pioneered in 1922 by Lt. Col. J. W. Cornwall, the first Director and its success led to its adoption by other institutes in India and elsewhere. His painstaking follow-up over a period of 12 years of the history of thousands of patients bitten by proved rabid animals but remaining untreated, led to a critical assessment of the risk of hydrophobia under such conditions. Though rabies always claimed the chief attention of the workers, as evidenced by the large number of papers on the subject by Cornwall, Iyengar, Veeraraghavan and others, the Institute has to its credit original work on a wide variety of subjects e.g. studies on Kala Azar by Cornwall and Kesava Menon, entomological studies by Patton, Law Frenais and Sunder Rao, and problems of infection and immunity in malaria by Mulligan. In recent years, Ahuja, Veeraraghavan and Menon established the effect of heparin in neutralising Russell's viper venom in vitro and to some extent in vivo while Veeraraghavan in addition of rabies has evolved a new medium for the rapid growth of V. cholerae for vaccine purposes. Menon has described the association of severe gastroenteritis and diarrhoea in patients showing T. vincenti and B. fusiformis in their faeces and responding readily to arsenical

treatment as also the unusual finding of a strong positive Wassermann reaction along with a weak or negative Kahn in the sera from cases of tropical eosinophilia.

8. In addition to its own activities the Institute has housed and afforded facilities to other research organisations like the 'Beri-beri' and 'Deficiency diseases' Enquiries under Col. McCarrison, which later developed into the Nutrition Research Laboratories, the 'Protozoal Parasites Enquiry' of the I.R.F.A. and the 'Malaria Enquiry' of the Rockefeller Foundation which has now become the Southern India branch of the Malaria Institute of India.

9. The fine climate of the Nilgiris and the extensive grounds now amounting to 12·5 acres have been utilised for the building up of a good healthy stock of experimental animals like rabbits, guinea pigs, white mice, pigeons and poultry. The Institute library, though not very large, covers the specialised fields of bacteriology, pathology and related subjects adequately with over 1,589 books and about 4583 bound volumes of Journals. It subscribes for over 70 journals.

10. The scientific staff consists of a Director, an Assistant Director and two Medical Officers, ably assisted by a group of technicians and subordinate staff. Residential quarters within the Institute premises are available to 80 per cent of them. A small but efficient co-operative society caters to the needs of the members for provisions and textiles in addition to encouraging thrift and extending financial aid. The Staff Recreation Club has recently started a canteen for mid-day lunch for its members. The Institute garden, with its beautiful lawn and wealth of plants and flowers is one of the finest in the District, due largely to the interest of the late Lt. Col. Iyengar.

11. It will be evident from this brief report that there is a great scope for expansion and improvement of the activities of the Institute. The remarkable developments in the field of the study of viruses effected in other countries recently by electron microscopy, ultra centrifugation, electrophoresia and other means remain to be fully exploited by our workers. The wealth of clinical material available in the country has been utilised for research purposes to an insignificant degree only and it offers to us today alike an opportunity and a challenge. There can be no doubt in any quarter that we have in India at present young scientific workers possessing talents and capacity equalling, if not excelling, those of their counterparts anywhere else. The need of the hour is, however, to bring together the men, the problems and the tools. If funds are forthcoming for purchasing badly needed equipment and for subsidising keen and able young workers, the facilities at the Institute are capable of remarkable expansion and we can see nothing on the horizon that can prevent it from developing into one of the finest of research laboratories in the future.

(*By courtesy of Dr. I.G.K. Menon, the Officiating Director of the Institute.*)

WORLD FEDERATION OF SCIENTIFIC WORKERS

The Second Assembly of the World Federation of Scientific Workers was opened by the President, Professor F. Joliot-Curie, in the Institute of Astrophysics, Paris, on Tuesday, 10th April, 1951. Professor F. Joliot-Curie thanked all those who had worked to make the assembly possible. He announced with extreme regret that visas to enter France had been refused to delegates, visitors and observers from the Eastern Democracies and the Chinese People's Republic. It was decided to hold the Assembly in parallel in Paris and in Prague.

The Secretary General read messages of greetings from Professor Nesmeyanov, President of the Academy of Sciences of the Soviet Union, Professor I. Lebedev, Central Committee of the Workers in High Schools and Scientific Establishments, Professor Mauguin, French Academy of Sciences, Professor P.M.S. Blackett, F. R. S., England and Professor Aloisi, Italy.

The application for affiliation from the French Confederation of Workers in Atomic Energy was formally put to the Assembly and accepted. Dr. Cypres of the Federation of Advanced Scientific Workers of Belgium who had applied for affiliation was allowed to take part in the work of the Commissions of the Assembly as an Observer.

Professor F. Joliot-Curie in his Presidential address stated that since 1946, the year of foundation, the World Federation of Scientific Workers had attained a maturity which should facilitate the proper accomplishment of the task which lay before it. It was true that certain difficulties, certain mis-understandings had arisen between some of the members, which were doubtless the reflection of the strain and anxious international situation. The very character of the Federation itself which required that the scientists which it united should be conscious of their social responsibilities and should strive for the utilisation of science for the progress of humanity in peace and in international co-operation, could not do other than make this external influence more pressing upon each of their thoughts and deeds.

Professor F. Joliot-Curie said that scientific research imposed upon the scientists a discipline which has been tried by experience and the transposition of this discipline into the sphere of science in relation to social life could not be other than favourable to mutual understanding, and the pacification of internal conflicts and of conflicts between nations. It would be a grave fault, and would go against the objectives of the Federation to succumb to violent and sectarian influences of those who saw no other solution to the present day problems than the cold and hot wars. The President referred to the objects of the Federation as outlined in the preamble to the Constitution as regards the duties of the Federation towards society, " To utilise science correctly in order to reduce and even to banish poverty, disease, and ignorance, which are some of the permanent causes of war. The international organisations which are combating these evils will receive the whole hearted support of the World Federation of Scientific Workers." The President further stated that there was no question and there had never been a question of seeing the World Federation of Scientific Workers make itself the champion of any particular regime. The only thing of importance was that the members should act in the sense of the Constitution. In that presided the permanent basis for actions and the fundamental reasons for union. The Federation should give an example of unity between men of all races and of all opinions, working for science in countries having identical or different regimes, a unity

realised with the purpose of attaining objectives on the desirability of which the members had beforehand come to an agreement. The Federation should be a means whereby all its member associations could benefit by interchange of the experience and initiative of any one of them. It should, as it had tried to do in the past, serve as a link between the component associations and the large international organisations. The President ended his speech with the following words :—

" Science, the creator of unity and progress, will enable us to conquer difficulties and divergencies and will inspire in us the ardour and courage necessary to accomplish worthily the high social function with which we are charged."

The Secretary General's report was criticised by many members. Dr. McClean (U. K.) regretted that the Secretary General's report was not available to affiliated organisations in time for them to discuss it and mandate their delegates. Speaking in his personal capacity he said that he thought it unfortunate that the Secretary General's report should be so framed as to give the impression that the Federation was a communist organisation. Dr. Togeby (Denmark) stated that the political inhomogeneity of the World Federation and the international political situation were causing difficulty. They had been worried by Professor Bernal's speech in Moscow in 1949. Unless practical results of the Federation's work were made evident, his organisation might have to disaffiliate. Dr. Brian (U.K.) noted that a number of speakers had expressed dissatisfaction with the Secretary General's report. In the present difficult political situation the way forward was to bear firmly in mind the two principles of Professor F. Joliot Curie's address, namely, to look carefully for the points on which the members agreed and to separate activities which were appropriate to members as citizens from those which were appropriate to them as scientists. Professor Rosenfeld (visitor) felt that science and politics could not be separated. He remarked that the Secretary General had not referred to India in his report. He had found much goodwill in India for the World Federation and its aims.

The following amendments to the Constitution were passed.

1. " The Executive Council shall transmit to each member organisation not later than the 31st March in each year, a properly audited Balance Sheet and Income and Expenditure Account for the year ending on the previous 31st December this account to show, *inter alia* the sums received from each member organisation during the year."

2. " The worklng languages of the WFSW shall be English, French and Russian."

3. " The Executive Council shall have power to embark on any public action not explicitly or implicitly sanctioned by decisions of the Assembly, Constitution or Charter, if, and only if, it first obtains the consent of the majority of the affiliated organisations. Each affiliated organisation must be informed of the action proposed and given a date (ensuring not less than thirty days grace after the receipt of the notice) by which it shall reply signifying approval or disapproval. Failure to reply may be taken by the Executive Council to signify approval of the proposed action."

The following resolutions were passed :—

(1) "That in view of the changes in the situation in the world Trade Union movement since the time of the Prague Assembly in 1948, it is necessary to give the most careful consideration to relationships with the trade union internationals. This Assembly therefore resolves to discontinue the operations of the Agreement between the WFSW and the WFTU until such time as the matter has been reviewed in the light of the changed circumstances. Nevertheless, this Assembly regards it as the duty of the WFSW, according to its Constitution and Charter,

to give scientific assistance to any trade union organisation."

(2) "That this Assembly of the World Federation of Scientific Workers is aware that the use of the hydrogen bomb and other atomic weapons and methods of biological warfare would have incalculable effects on the civil populations of the countries involved and might endanger the whole future of civilisation. It therefore urges the governments of major powers to exercise a fresh initiative through the proper international channels for the re-opening of the question of the international control of atomic energy and the banning of all weapons of mass destruction".

(3) "That this Assembly recognises the difficulty of publication in the present situation. Nevertheless it considers it desirable that full information should reach members of the WFSW of the progress made in the organisation of scientists in other countries. It therefore requests the Executive Council to draw up a series of reports detailing the developments in various countries and to make these reports available to the constituent associations."

(4) "This Second Assembly of the World Federation of Scientific Workers wishes to draw attention to the grave damage to the freedom of science and scientists done by the French Government, in refusing visas to its delegates from Bulgaria, China, Czechoslovakia and Poland. It calls upon all men of goodwill to protest against this blow to culture and asks its affiliated bodies, and all those with whom it has relations, to take such steps as they consider appropriate to express their opinion of this act."

(5) "In view of the persecution of scientists, this Second Assembly, wishes to draw attention to Article 5·36 of its Charter and to the necessity to support by application of its principles, any case in the world where they may be violated."

The following members were elected to the Executive Committee :—

President :	Professor F. Joliot—Curie.
Vice-Presidents :	Professor J.D. Bernal.
	Professor C. F. Powell.
	Professor Li-Tze-Kwang.
	One place reserved for a nomination from USSR.
	One place reserved for a nomination from USA.
Treasurer :	Dr. W. A. Wooster.
Honorary Secretaries :	Dr. Edwards, Britain.
	Professor Malek, Czechoslovokia.
	Professor T'U Chang Wang, China.
Individual Members :	Dr. Tsien. Mr. T. Ainley. Two more to be elected.
Regional Members :	Dr. Ting, China.
	Dr. P. Biquard, W. Europe. Six more to be elected.

The Assembly appointed three Commissions- (1) Economic Position of Scientists, (2) International Contacts and (3) Planning. The reports of the three Commissions as approved by the Assembly are given below :—

Report of Commission 1. (*Economic Position of Scientists*).

To prepare a study on the economic situation of scientific workers in the different countries, with particular reference to the following points :—

1. Salaries.

Ascertain the salaries, from the young graduate to that of senior scientist; the relation between salaries and qualifications and experience as well as methods of determining qualification and experience.

Indicate the relationships between the salaries of scientific workers and those of members of other professions, i.e. doctors, lawyers, etc.

Methods of fixing changes in salaries in relation to the changes in the cost of living and the wage of the manual worker.

2. **Facilities for Education and Research.**

(a) Time available for fundamental research in :

(i) Scientific Research Institutes.

(ii) Universities.

(iii) Technical Colleges.

(b) Availability of opportunities for Higher Education. for scientific workers working in these Institutions and in industry and public services.

(c) Facilities for beginning courses of scientific education (including the granting of bonuses) and the opportunities for entering the scientific professions.

3. **Publications.**

Study conditions of publication for scientific workers in industrv and public service.

The Commission asked the Executive Council to give the affiliated organisations a time limit of one year for the publication of the Report.

Report of Commission 2. (International Contacts).

The Commission on International Scientific Contacts discussed the following subjects :

1. The holding of international conferences.

2. Co-operation of WFSW with students' organisations.

3. The improvement of the transmission of scientific publications.

4. International visits and exchanges of scientific workers.

It recommended :—

1. That the Executive Council organises or initiates the organisation of international conferences on subjects which are in conformity with the aims and policy of the Federation and which, in the domain of science, can promote mutual understanding, peace and the welfare of mankind.

The following subjects were suggested for immediate consideration :

(a) The uses to which science is being put and those to which it could be put.

(b) The control of atomic energy.

(c) The problem of food production and scientific assistance to undeveloped countries.

It is suggested that these conferences might consist of two parts, one purely technical and the other covering the social and economic aspects.

2. That the Executive Council should approach the appropriate international students' organisations with the view to increasing the participation of (a) scientists in student assemblies, and (b) students, particularly advanced students, in scientific meetings of all kinds.

3. That the Executive Council should confer with appropriate organisations with the object of providing an increased and more effective flow of scientific information throughout the world and that use should be made of the proposed international conferences for this end.

4. That the Executive Council should study ways and means of improving the possibilities of short and extended visits of senior and junior scientists in different countries and should make every effort to end the present restriction on their freedom of international travel.

Report of Commission 3. (Planning)

1. Apart from broadening the political complexion of the Executive Council it is important that this Council should not be drawn exclusively from Universiry circles but also from the ranks of scientific workers in industry.

2. It is also desirable that there should be representation of women scientific workers in industry.

3. It is recommended that the Executive Council should consult the affiliated bodies with a view to the formulation of more concrete rules governing voting powers in the General

Assemblies, in relation to the size and number of organisations from any country.

4. It was felt that the organisation of international scientific conferences for special purposes as discussed in Commission 2 will assist WFSW in its organisational problems.

5. It is recommended that the Executive Council consult the American Association of Scientific Workers as to the advisability of approaching the Society for Socal Responsibility in Science with a view to their affiliation with WFSW, and also any other suitable means by which American representation in the WFSW could be increased. The increase of organisation among American Scientists is a matter of great importance to scientists all over the world.

6. In view of the friendly interest which Soviet scientific workers have shown in our proceedings, it is hoped that their affiliation to WFSW will be possible in the near future.

7. All proposals for efficient administration and further activity were entirely dependent on adequate finance. The Commission wished to impress on all affiliated organisations the imperative necessity for providing adequate funds as otherwise all our plans would be Utopian.

8. While it is considered that the Head Office of the WFSW should be in Paris, it would be very helpful to the routine work of the Federation if the Executive Council could explore the possibility of a branch office in Prague with the Czech Association of Scientific Workers.

(Reports from some of the affiliated organisations are given below :—

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ASSOCIATION OF SCIENTIFIC WORKERS (GREAT BRITAN)

The Association has had a very busy year. Negotiations on behalf of members in all fields. Has been concerned with salary scales for engineers and the chemical industry with some success, although the Association not always given credit for this. Has negotiated for members in the nationalised industries and Health Service. Has undertaken survey of salaries of university teachers and published findings. The Association journal "SCIENTIFIC WORKER" is being published every two months. Apart from leaflets dealing with the sectional interests of the members, three pamphlets were published dealing with the "Economic Position of the Scientific Worker" and "Atomic Attack". Of the last 10,000 copies were sold and it was reviewed in hundreds of newspapers and periodicals all over the world. A new edition of a booklet originally published in 1944, "Science in the Universities", is being prepared and also a pamphlet on Consumer Research which it hopes will be of value to the labour and co-operative movement.

A committee was formed to arrange activities of the Association in connection with the Festival of Britain and a series of lectures was organised-Professor J. Needham on "Science and the Undeveloped Region"; Sir James Scott-Watson on "Science and Food"; Lord Halsbury on "Science an l Industry" and Dr. I. Bronowski on "Sciences and Power".

Contact has been maintained with the Campaign Committee for the Expansion of Higher Education on the question of the falling numbers, observable for the first time since the end of the war, of university students and on inequalities in grants made to students. It has a joint committee with the Institution of Professional Civil Servants which has sent a memorandum to every University in the United Kingdom of higher degrees of industrial scientists, which aroused much response.

The Association is still trying to deal with the question of bacteriological warfare. The difficulty is securing adequate information on which to base publicity material. Efforts are being made to publish articles on problems arising out of the shortage of raw materials due to re-armament and stockpiling.

The membership has continued to decline in recent years. At the end of 1950 the membership was about 13,000 of whom about 6,000 are qualified scientists and engineers.

Association of Scientific Workers, United States.

Activities have been reported in the Newsletters of the Association copies of which have been circularised to the affiliated organisations of WFSW. Much work has been devoted to the maintenance of civil liberties for scientists in U.S.A. Were instrumental in setting up the American Association for Advancement of Science's Committee on Civil Liberties of Scientists, whose report has been sent to W.F.S.W. Have protested against the indictment of Dr. W. E. B. DuBois as a 'foreign agent' and have acted in support of many other scientists. Have protested against the military drafting of scientists and college students. Internationally, we protested against the dismissal of Professor Joliot Curie from the French Atomic Energy Commission and against the non-election of Professor Bernal to the Council of the British Association. We are now preparing a paper on the limitation of scientific intercourse as a result of restrictions of passports and visas.

The preparation of a "background for policy" for scientists in U.S.A. has occupied most time and energy. It is hoped to submit a memorandum on this to the journal of W.F.S.W. in due course. It is proposed to try and get a symposium at the annual meeting of the American Association for the Advancement of Science in December on the increasing popular misconception of science which manifests itself in many anti-scientific and anti-intellectual books and articles now appearing in U.S.A. The branches of the American A. Sc. W. are very active in this matter.

The National Executive of the American A.Sc. W. sent greetings to the Second Assembly and urged that no differences be permitted to weaken the Federation.

Danish Society for the Protection of Scientific Work.

The main events since the previous report (Published in SCIENCE AND MANKIND, p.94, No. 2) have been the establishment of an association of nearly all the academic organisations, called the "Academicions" Board of Co-operation", and an agreement between the Danish Society and the Danish Publishers' Association. The aim of the former is to deal with the economic interests of its members. The aim of the second was the establishment of an agreement on tariffs for publications.

The Association publishes a review "Videnskabsmanden" which contains information and discussions concerning economic and social problems of Danish scientists and other intellectual workers.

Association of Scientific Workers, New Zealand.

The membership is 566, an increase of 28 over the previous year. This represents about 50% of the total available membership.

The main attention of the branches has been given to the fostering of public relations and providing assistance in the organising of Students Science Week.

The Association has continued to publish the New Zealand Science Review although printing difficulties have been acute. The journal is now financially stable, however.

A second edition of the New Zealand Directory of New Zealand Science has been produced. It is proposed to make an annual award of all aspects of New Zealand Science-historical,

economic and political-with a view to establishing deficiences. The final results will be published in book form.

The finances are quite healthy. The subscription rate was doubled during the past year. It is hoped as a result to increase activities considerably.

Association of Scientific Workers (Great Britain)

The Annual Council Meeting of the Association was held on 26th May, 1951. Lord Haden-Guest delivered his Presidential address. He said that he was conscious of the signal honour of appearing in the line of illustrious presidents which stretched from Gowland Hopkins to Boyd-Orr. The necessity of such an organisation as the Association of Scientific Workers to press the economic demands of scientists and to demand the fullest application of science, must appeal to all forward-looking scientists, and it behoved all scientists to support it. Looking back on the year's work, he declared, there was no reason to be ashamed of the record. There was, however, still much to be done. He spoke of the great advances for the past forty years especially in medicine, the defeat of tropical diseases in Africa, for example, where the population might, for the first time, be increasing. He was sure that the problems of large scale agriculture would soon be settled while, just as radio enabled nations to speak to one another, television would soon enable them to see each other. There were no limits to development, and the greatest step that the Association could make to world advancement was the drawing up of a plan indicating what the applications of science could make for mankind - if we were able to plan and execute in peace. Anti-war propaganda was little good and we could not persuade people, East or West, who were afraid of war, to lay down their arms; but such a plan, showing what could be done in medicine, agriculture, and so on, would turn men's minds away from war and lead to the establishment of a world civilisation in which science would be the servant of mankind. In conclusion, he hoped that we would apply ourselves to what was to be done, knowing that we had a great responsibility to the scientists and to the country as a whole.

2. The Council discussed various questions and passed resolutions. A motion regarding the question of income tax allowances in the case of scientists for books, membership of professional bodies etc. was debated and the Council voted in favour of a widely based campaign to get the law altered. The Council agreed that the Executive Committee should join in the campaign against increased fares, and that the Transport Commissions' Proposals should be referred to the Transport Consultative Committee in order that every possible means of improving the financial position of British Transport may be investigated. The Council also agreed that workers who are in grant aided research establishment schemes are at a great disadvantage compared with people doing similar job in the Civil Service which are pensionable at rates depending on the position attained before retiring. The Executive Committee was invited to investigate the matter. The Council approved of a motion calling for a campaign to bring about a general raising of salary levels and for the establishment of recognised salary scales, linking this with recruitment to the Association.

3. The Council considered the case of the medical laboratory technicians, whose rewards were so slight that they were forced to act as telephone operators by night. This was impairing the efficiency of the National Health Services. The Executive Committee was asked to consider the whole question of D.S.I.R. grants with the general view that they should be bigger and that there should be more of them. The Council expressed that the A Sc.W.'s policy stressed the need for the application of recent fuel discoveries and an advisory service for consumers. The incidence and treatment of tuberculosis were discussed and demands for adequate facilities for treatment and greater Government expenditure on preventive measures were made.

4. There was discussion on the policy of the "Scientific Worker". It was explained that a trade union journal was needed and that the membership also did not want a popular science paper as their organ. The Council reaffirmed its adherence to the statement—"The A.Sc.W. and Politics" adopted in 1945 and asked the members to operate the policy outlined in it. A reference was made to the press and radio statements suggesting that the Association was under the control of the Communist Party. This matter was discussed at great length and a resolution was passed expressing concern with statements suggesting communist control and declaring that there was no foundation for such statements since policy is formulated at a democratically elected Annual Council in accordance with Brit sh Trade Union practice. The Council agreed to call a conference to consider all social causes of war and to disseminate the information widely. The Council adopted a motion calling upon the Government to take the initiative in trying to reconcile the view of the major powers on weapons of mass destruction through the United Nations. Practical steps in the solution of questions of international common concern are also to be discussed at a meeting of scientific organisations according to another resolution.

5. A resolution was passed calling for steps to remedy the tendency for the numbers of students to decline since the 'Further Education and Training Scheme' ended. It called for the introduction of a more uniform system of grants throughout the country and automatic award of grants to students accepted at the University or college. The Government was urged to expand University education without lowering educational standards. Another resolution asked for an investigation of the possibility of part-time release with pay for technical college students. A minimum basis of one and a half days week was quoted, based on precedents of actual practice by progressive firms.

6. A resolution expressed national concern at the housing situation and urged the need for more men and material for housing, together with extension of operational research in that industry. In another motion it was regretted that the East African Groundnuts scheme was a failure which was attributed to a faulty approach but the basic concept of such plans and schemes was supported. With concern for the local population and development through pilot-scale stages, they should succeed. A motion was adopted calling for public enquiry into the law relating to mental deficiency.

7. The Council deplored the absence of Polish, Czech, Hungarian etc., botanists from the 1950 International Botanical Congress, where Eastern Europe was represented only by the Russians. A motion deplored the situation revealed in the Report on the Supply and Demand of Biologists, which concluded that intending students should be discouraged. There were many jobs to be done in animal husbandry, cancer research, and food production. It was scandalous to consider the "surplus" as a pool for war-work. The Council instructed the Executive Committee to press for increased constructive use of biologists. A

resolution recognised the serious danger to the national economy arising from shortages due to lack of foresight and American stock-piling. It called on the government to keep a closer control over industrial planning and on United Nations to limit national purchases to current requirements. A reference was made to the postponement of the International Union of Astronomy Assembly originally planned for August, 1951 in Leningrad although Soviet organisers had made preparations. It was considered that such international scientific conferences reduce tension and should be encouraged. The chairman, Dr. Brian, closed the meeting with a call to activity. All resolutions were but pious hopes unless backed by Branch work to make them a reality.

(Based on the account given in the proceedings of the Annual Council, 1951 meeting in the Sciantific Worker, July, 1951)

The Duty of Scientists

(The American Association of Scientific Workers prepared a draft statement bearing on the 'Background for Policy' of the Association. This was circulated to different branches and their comments invited. The Philadelphia Committee revised the draft statement and it was edited by the N. Y. Branch Executive Body. This statement is reproduced below—Editors)

Roll of Science.

The spectacular advance of science in the past 200 years has made it inescapably clear that progressive betterment of the conditions of man's life can be greatly speeded up by full application and extension of scientific knowledge. Yet adequate food, shelter, and freedom from disease remain the severest problem for most of the human race. So long as this remains true, full contribution to its solution remains the top responsibility on the agenda of science. To develop and apply knowledge to specific areas of human need is the most constructive role for the scientist today.

2. In our own country, for instance, the condition of public health, housing, resources development, and community services is far short of the level that could readily be supported by our great national productive capacity. To bridge this gap—to improve the housing of our people, to husband and expand our natural resources, to control disease and rationalize community services—calls for a great effort of both basic research and scientific application.

3 The present American housing crisis is more than a transient emergency. It reflects a long-range need for rationalizing techniques, materials, and designs in building constructions. Only an all-out scientific approach, both basic and applied, can offer the least prospect of meeting the standing need for twenty million new homes while also handling the immediate needs for slum clearance and emergency housing.

4. The few major problems mentioned are in themselves enough to absorb all the forces of American science and technology. Yet research and application problems of far greater scope await solution if the underdeveloped areas of the world are to realize the objective possibilities that now exist for decent conditions of life. The people of the so-called "backward" lands are beginning to forcefullv demand their share in these objective possibilities, as they proceed

to recognize more clearly that their poverty and disease are technologically obsolete. The responsibility with which they rightly charge society is immense, but it can be met—by a great extension of science and its rational utilization.

What is Science Doing Today?

5. In the face of these pressing needs for constructive work by scientists and their technological allies, the public is rapidly coming to recognize that science is primarily directed to destructive ends. Scientists are more and more regarded, by public and govenment alike, first and foremost as essential war resources: as the specialized and talented creators of the means for mass annihilation. Public support for science now much greater in volume than ever before, is commonly justified by referring to its war utility—and, in fact, well over half of this country's current scientific effort is believed to be going into military work. Further substance is lent to this growing and understandable public myth—that science is centrally a destructive force—by campaigns urging warlike all-out mobilization measures over the signatures of certain prominent "executive-type" scientists.

6. But it is in the field of atomic weapons development that we find the most decisive contrast between the constructive spirit and the destructive perversion of science. The drive to perfect atomic means for mass annihilation brings a certain section of science unnaturally into conflict with the universal demand for their international control, and gives great support to the growing anti-scientific sentiment of those who understandably though erroneously confuse the current fruits of science with its inner spirit and historic purpose.

7. Barriers to scientific exchange, national and international, are springing up as seldom before—a serious derivative result of the diversion of science from its peacetime pursuits. Kirtley Mather has expressed the significance of this trend.

8. Secrecy barriers not only sap the vigor of science within a nation; governmental restrictions by the great powers on the travel of scientists and on international student exchange have gone far to disrupt the worldwide community of science. As a result, scientific progress in all countries suffers. As the arbitrary Governmental standards of intellectual as well as political conformity narrow down, the damage to progress mounts and will take progressively longer to undo.

9. The continued health of science, and therefore of the entire society, depends on the training of an adequate supply of new scientists and this too is currently endangered. Proposals now being made to reduce college enrolment would encourage recruitment for training in some scientific field, but at the expense of others; they would worsen the economic predicament. American colleges are already in, as well as seriously threaten the future of American science. That short-sighted proposals like this are responsibly made and even adopted, shows how little the constructive social role of science is recognized.

10. Under these converging trends of secrecy, curtailment of training, and diversion from normal scientific objectives, something has been happening to the morale of scientists. Their dominant tradition has been one of devotion to human progress—and whatever the scientist's individual political view may be, he has been forced to recognize that this tradition is now in sharp conflict with the new directions being given to science. Immediately after World War II, scientists showed their deep awareness of this conflict in their organized insistence on civilian control of atomic energy and in their campaign for a nonmilitary National Science Foundation devoted to basic research. Yet atomic energy remains primarily a military project; the Science Foundation, once realized, turned out to be something entirely different from what the scientists had in mind. By and large, scientists have given up active support of

these objectives, despite the fact that the constructive role of the national science establishment is a basic responsibility of all scientists. What seems to underlie this apathy, basically, is the growing tacit belief that war is inevitable.

What can the Scientist do ?

11. Conditions within science quickly reflect the external conditions of society, and thus the present international scene dominated by armed strength and devastating mass weapons has led to the wholesale diversion of science to destructive ends. International tension and the division of the world into hostile camps has limited scientific interchange and depressed all the most important and worthwhile phases of scientific progress.

12. The dominant necessity today for the preservation of science, as for all human values, is to find a peaceful way of life for the nations of the world. Science will find it impossible to go forward with its responsible job of social construction unless international tensions are alleviated and political differences between the United States and the Soviet Union begin to be settled peacefully. The two worlds must live together if they are not to die together ; concession to the idea of inevitable war is really surrender to the fatalistic idea that civilization is doomed.

13. Because of the markedly international character of science and its dependence on peaceful conditions, all scientists carry a broad responsibility for promoting international understanding. Beyond this, they are most particularly responsible because of their critical role in creating weapons of destruction. Far more than others, they are in a position to realize how indiscriminate and far-reaching these weapons are becoming, and how little hope there can be that our own country can be adequately protected in case of an atomic war. Far this reason, scientists can render a great service to science and to mankind by examining all peaceful alternatives in the present crisis.

14. Scientists cannot conscientiously allow themselves to become apathetic, indifferent, or uncritical about conditions which are of such crucial importance to them as well as to humanity at large, and to whose correction they can contribute so very much. To abandon science, or to work at it half-heartedly, is worse than no solution. But by taking an active part in the search for peaceful alternatives to war, scientists while continuing with their normal professional work, can most effectively meet their responsibility to their profession and to society.

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Atomic Energy and Human Society

Narendra Singh, Agricultural Institute, Jobner, Jaipur

The atomic energy and its future is no longer a subject of dreamy imagination. Everyone is aware of the fact that this new scientific discovery holds a very bright future for the mankind. The impact of the atomic energy on the society has now become glaringly clear. We know that the main non-military applications of the atomic energy are as follows :—

(a) to produce power and heat for industrial and domestic purposes;

(b) to produce radioactive elements for medical curative purposes;

(c) and to produce radioactive tracer elements and radiations for use in scientific research and industrial processes.

Conclusively, we can observe from the above mentioned applicabilities that they are bound to have immensely beneficial effects on the progress of mankind. But this new discovery and the benefits inherent in its development are not the ordinary types of scientific developments. The potentiality of atomic energy is so significant that its social aspect has to play a major role in its development and future prospects.

2. In the present-day-atmosphere when the world is full of tension and warpreparedness, whatever meagre information regarding this discovery is made available to the public, it is related only to the military applicability and the destructive potentiality of the atomic energy. This state of affairs is indeed deplorable and condemnable that the scientific achievements at this new stage of developments may be used for the destruction of the human civilization.

3. Atomic energy is evidently a symbol of immense productive forces at the disposal of the mankind. In relation to the development of atomic power, it is stated by a few interested experts that our society does not need atomic energy for that purpose. They keep on harping on the tune that there is enough power available, even surplus than what the society can use. But this argument loses its ground in the face of large sections of our people suffering from the lack of necessities. In the interest of the humanity, for its welfare and advance, much more productive capacity is always the goal and this needs immense power.

4. Theoretical potential of the atomic transmutations was well evident even before the success of the fission reactions. And this has been brought nearer to reality by the success of the Uranium-Fission and the development of a controlled Chain Reactor. This is well known that these very processes and materials which are being utilised, for the present, in the preparation of more potential atomic weapons, can be used for peaceful purposes, also.

5. The bye-products of the fission reaction - the radioactive isotopes and elements, find extensive use as research tools and in therapy. Their radiations have been proved to be of immense curative value and can also be successfully employed in improving various industrial processes.

6. These bye-products have their importance alright, still they are secondary to the main function of atomic energy which lies in its being the powerful energy source. The records which have been made available clearly sum up these beneficial aspects in these words - One pound of Plutonium or Uranium -235, during fission, should yield 2·5-3 million Kilowatt hours of electrical energy. Thus about 50 tons of this fissionable material is bound to be sufficient to provide that much energy which would meet the annual power requirements of the most industrialised state of the world-U.S A. At present this state consumes 115 million tons

of coal to satisfy two-thirds of its annual energy needs, the rest being met with the hydro-electric. This comparison in the two masses is self indicative of the power significance of the atomic energy.

7. It is correct that certain technical problems have to be solved before the heat can be successfully transferred from the atomic pile to the boiler for the generation of the electricity. But these problems would not prove to be complex, once the basic principles and the technique have been mastered.

8. Another cry raised against the economy of this power potential is related to its cost and efficiency, in comparision to other power sources. But this factor of high cost also becomes insignificant when we consider the extremely flexible nature of our new discovery and the future prospects of its cheap availability.

9. Most significant is the fact that we can have atomic power and we further know that not only Uranium and Thorium find use in making it available, but it can be had from more abundant materials. This knowledge is the most heartening sign. Naturally, when even at this initial stage we can practically get power from this brilliant discovery, why should we not be able to get it, in future, at a cheaper rate and with more efficiency.

10. Moreover, the atomic power is bound to prove immensely useful and beneficial in those regions which, though poor in fuel and water power, are rich in the raw materials of industrial importance. This is mostly the condition of the countries of Africa and S.E. Asia. In the development of these underdeveloped areas, now heading towards industrialisation, the atomic power will undoubtedly be a great asset. Such regions will find the atomic power cheaper than the coal, hydro and oil powers, on account of the inherent flexibility as energy source. This will facilitate the establishment of the industry near the sources of the raw materials, and thereby its use would be most economical.

11. It may be clearly stated that the birth and the development of the atomic industry does not envisage a revolution in the mode of production, but only the potential power resources for production are extensively multiplied.

12. Surveying the whole field of the direct relationship between the atomic power and the production, we can sum and conclusively state that the growth of productive forces can be greatly accelerated by the use of atomic energy as power source because of the following reasons :—

(a) the power would be cheapened and become more universal;

(b) the use of atomic power would lead to the conservation of minerals (coal and oil) for other uses, with a corresponding increase in the productivity of the labour in other beneficial phases of the industry;

(c) the introduction of new industrial processes and automatic controls would be easily feasible; and

(d) the industrialisation of the economically backward areas would be immensely facilitated.

13. In the face of the abovementioned clearcut deductions, can any honest and sincere economist deny the benefits inherent in the use of the atomic energy as power source? To all scientific thinkers and planners of the society the impact of atomic energy on the human civilisation becomes perspectively clear, if he genuinely analyses the whole background.

14. Even at present it can be surmised that radical changes in the technology lie inherent in the direct transformation of the atomic energy into the power. This is accounted for by the consideration that the useful power, at our disposal, would be vastly extended and the technology in the industry would be

considerably improved. Thereby, the society is bound to get more goods and leisure which are the potential necessities of the civilisation.

15. A competent evaluation of the atomic energy can be made only when the economic and social structures of the nations, and the state of their industrialisation are taken into consideration. With this understanding, if we survey the conditions existing in U.S.A., U.S. S.R., and India, and then try to evaluate the atomic energy in respective terms, we will come to the following conclusions:—

In India 70% of all the energy consumed comes from the human and animal exertion, while in U.S.A. only 4%. Present U.S. Industry consumes vast amounts of power. The U.S. energy consumption is six times that of U.S.S.R, and sixtv times that of India. It is clear from this that to bring herself up to the level of technical and industrial development already existing in U.S.A., India needs a sixty times increase in her power supply.

16. In case of India then, the atomic-power would be most beneficial, and we, in the long run, would gain most from any technological development which promises us an additional supply of power, as is inherent in the large scale production of power from atomic energy. With abundant natural resources, the lack of power is a great check on our industrial development. Our nation stands in much greater need of atomic power than the Soviet Union even. But it is too weak in technological capabilities to exploit the atomic energy for the present. We know that our land has abundant resources of Thorium, one of the essential fissionable materials, and probably also of Uranium.

17. ATOMIC ENERGY, when utilised in all its forms, primarily as power and secondarily in the form of its byeproducts, will doubtless benefit the humanity immensely and will lead to the advance of civilisation. Under the impact of the popular forces and the goodwill of the people, it can never be released for the evil; on the contrary this scientific achievement is bound to be used to provide light, heat and beauty to the world, just as the Stars do. Now it is for the people of every land and region to finish the reaction and move towards the path of progress. This path is bound to be much smoother and easier, under the impact of such a power potential as ATOMIC ENERGY.

BOOK REVIEW

Testament for Social Science—Mrs. Barbara Wooton, George Allen and Unwin Ltd, London. Pp. 192 Price 15sh.

"The contrast between man's amazing ability to manipulate his material environment and his pitiful incompetence in managing his own affairs is now as commonplace as it is tragic" writes Mrs. Barbara Wooton, author of 'Plan or no Plan' in her latest and stimulating book, 'Testament for Social Science', which is an essay in the application of scientific methods to human problems. In this book the author poses the very pertinent question as to why the scientific method which has been brilliantly successful in the material world has not been applied in the field of human affairs, where more often primitive impulses and vague rules of thumb based on varying standards of morality predominate. In a learned discussion of the problem, Mrs. Wooton advances the theory which forms the central theme of the book that

it is only by fully exploiting the potential contributions of social sciences as Political Economy, Psychology, Sociology etc., that the widening gap between material success and social failure could be bridged. To repeat, it is the consistent application of scientific methods to social problems that could bring about a rational reform of society as Auguste Comte had said even a century ago.

2. The scientific method is simply defined as the attempt to acquire knowledge of general laws (Laws of Association) directly or indirectly by experience, by sense perception. It consists of accurate observation of data, framing of hypotheses on the basis of observed data, and careful verification of these against further observations. Unfortunately in this respect the social scientists are far behind their colleagues in Physics or Chemistry or Medicine. To an extent this has been due to the nature of data of human behaviour which it seems does not lend to precise measurement as also the absence of adequate technical vocabulary which has added further weight to existing difficulties. Again the social scientist has to deal in a variety of complex situations which make any 'effectively controlled experiment' a matter of increasing difficulty. Nevertheless the differences are often exaggerated and the task of generalising on private observations need not present greater impediments in the comparatively infant social sciences than in the sphere of natural science. Essentially the process of reaching the various hypotheses which govern the general laws is the same i.e., that the hypotheses are derived from deductive reasoning or inductive observation or a mixture of both. The observations of a social scientist are only statements of association of varying degrees of probability in much the same way as the laws of natural science, although decidedly, the degree of probability is far greater in the latter case. In both the fields there are measurable quantities and others which are as yet inaccessible. Consider for instance the growing appreciation of the practical uses of methods of social measurement like the social surveys, gallup poll, price mechanism etc., which within common limitations provide adequate basis for valid generalisations. These among others which the author so well discusses tend to undermine the belief that there is 'an indeterminancy inherent in human behaviour which precludes the formulation of any valid laws of association'.

3. On the contrary very often, it is our mistakes that have held up the progress of social sciences. An educational system that denies these new sciences places of equality with others, the existence of pre-scientific mental habits and dogmatic religious and philosophical systems, all these have imposed restrictions on commonsense and clear thinking. In three elaborately discussed chapters on science and its relation to metaphysics, morals and art the author vigorously condemns some of the commonly held beliefs which have done more harm than good to the cause of scientific advance. Thus the Theologian, for instance, asserts that Truth is often revealed to the ehosen few and no scientific process is adequate to reach such profound conclusions. But the discoveries of natural science have often conflicted with such religious dogma and in the battle science has triumphed with the result that the province of religion where empirical proof is not possible has receded further and further. Again such revelations which lack the characteristic features of scientific formulations (consistency, universality and irresistability) make one sceptic and at best enable to treat them as unproven hypotheses.

4. Coming to the subject of morals, the scientist is inclined to look to concepts derived from biology for his ultimate moral principle, since man is a biological organism. Such a principle he discovers in the concept that for man the normal biological goal of self-maintenance, development and reproduction includes mental as well as physical elements and that

moral actions merely help to reach this goal. It is necessary to evolve a moral code with such rational basis rather than accept one which contains a set of negative principles supposedly having divine sanction. Finally, in the world of art, the artist vehemently expresses that an inspired work of art could not be scientifically analysed, nor is it possible to 'engineer' a master piece on the basis of observation and experiment. Yet the technique of art as distinct from its effect is amenable to scientific formulation and perhaps it is not so difficult either to evolve a standard of aesthetic values or for that purpose moral to measure the respective qualities of works in these fields. Moreover, the artist like the scientist is an acute observer of social phenomena and even if his purpose be different, yet his observations could be utilised for drawing significant inferences.

5. It is thus necessary to recognise the use of observation - cum - hypothesis - cum - empirical confirmation method of science, if we wish to learn anything, whether about art or literature or oceanography or alcoholism. In such a context, there is no scope for speculation, dogma and emotion. Yet, odd as it may seem, the author suddenly ends on the much too familiar note that it is not wit that is lacking as love! It is indeed hard to question the importance of human approach to social problems. On the contrary, if a change of heart was all that was required of humanity, a spiritual revival or a Mahatma could very well accomplish the task. But from the foregoing it would appear that it is only by cultivating rational attitudes to varied problems of mankind that the creation of a suitable social machinery which would eliminate all possibilities of conflict is possible.

6. Elsewhere in the book Mrs. Wooton challenges the Marxian conceptions, questioning in particular his prophecy that with the development of capitalism the class heirarchy tends to be less differentiated. She says, that the rise of a complicated middle class and the emergence of a large force of non-manual labour with varying degrees of managerial skill proves that the class heirarchy has on the whole become more differentiated than that Marx had realised. But in defence of Marx it has to be acknowledged that he had never defined his classes as meaning different income groups. On the other hand the struggle is waged between the two broad groups, those who control the means of production and the vast many who are merely the 'means'. In her anxiety to explode the Marxian myth, she even affirms that chronic unemployment need not be the hall mark of capitalist society. For, have not recent wars, rearmament program etc.. shown that unemployment could be prevented without the Government taking over the ownership and management of the country's industry ?

7. Apart from a few such observations as pointed out above, the book is a remarkable contribution to the advance of social science. The searching analysis and the dynamic descriptions clothed in a refreshingly simple style all her own, merit the very closest study by the scientist and the layman alike. This is an appeal to reason and who would not respond to it ?

NEWS AND VIEWS

Permission for Scientific Workers to apply for posts advertised by Public Service Commissions

The Association of Scientific Workers of India at their meeting held in January, 1951 at Bangalore recommended that full opportunities should be given to all qualified scientific workers, whether in Government or private service, to apply for any posts for which they are qualified and which have been advertised by the Union or State Public Service Commissions or other bodies as the Association felt that such a free scope would lead to getting the best talent available in the country for specific work. The Ministry of Natural Resources and Scientific Research were approached to give effect to this resolution and they have now issued a letter to all Ministries of the Government of India accepting the request of the Association as reasonable and suggesting to the various Ministries that any qualified scientific workers employed under them might be allowed full opportunities to apply for posts advertised by the Union or State Public Service Commissions or other bodies for which they are qualified, provided their services can be spared without detriment to the work they are engaged on.

2. Scientific Apparatus for the Laboratories.

The *Unesco's* South Asia Co-operation Office made preliminary enquires to find the scope of production of apparatus for teaching and research work within the countries of the region. It has been revealed that some of the products of the Indian manufacture have found market in Burma and Ceylon. An exploratory survey in one of the centres of the apparatus industry gives the idea that for junior science level at least, indigenous products should be encouraged. For higher degrees of precision apparatus it is believed that with the co operation of the research workers certain types of apparatus may be assembled or fabricated. The scientific apparatus manufacture is a matter of triangular interest to be equally shared by the maker, the dealer and the user. The *Unesco's* South Asia Science Co-operation Office, University Buildings, Delhi will be interested to know the experiences of the users of Indian make instruments and also, their suggestions how best they can help the industry to serve them in a more efficient way.

(*Unesco Occassional Bulletin No. 40 dated 21st August, 1951*)

3. Sugar Technologists' Association.

The Hon'ble Mr. K. M. Munshi, Minister for Food and Agriculture, inaugurated the 20th Annual Convention of Sugar Technologists' Association in Kanpur. He said that a large section of the industrialists did not appreciate the role of the technicians for making industrial undertakings a complete success. He told the sugar industrialists that if they wanted the industry to thrive, the technicians must be made permanent and maintained in conditions of high efficiency, personal and technical. The Hon'ble Minister said that the sugar technicians in our country were in no way inferior to those in other countries. But the pace of improvement was not as quick as it should be. By evolving improved methods of manufacture, the cost of sugar production could be considerably reduced. The quality of sugar has to be brought up to the international standard. The Hon'ble Minister addressing the joint convocation of the Indian Institute of Sugar Technology and the Harcourt Butler Technological Institute appealed to Indian scientists to study possibilities for transformation of the land and urged the new graduates to cultivate the scientists' spirit of adventure. He announced that construction of a new Sugar Technological and

Sugarcane Research Institute at the Bhadruk farm in Lucknow would begin shortly.

3. Convention of Oil Technologists.

Dr. S. S. Bhatnagar, Secretary, Minstriy of Natural Resources and Scientific Research, inaugurated the 7th Annual Convention of the Oil Technologists' Association of India in Kanpur. He said that the production of vegetable oils constituted one of the major industries in the country in as much as there were about a thousand mills in the country employing about 60,000 workers. The available supply of oils in the country was much short of the demand and he called upon oil technologists to consider ways and means of reducing the deficit. In the context of world shortages of oils and fats the economic importance of oil bearing materials had increased considerably.

4. Sindri Fertilizer Factory.

The Sindri Fertilizer Factory went into production at mid-night of October 30, 1951 when the first quantity of ammonium sulphate was produced. The factory is expected to go into full production of 1,000 tons a day within the next six months. It would be recalled that the construction work of the factory began in 1946 and the delay in its completion was a subject for criticism in many quarters. It is hoped that the factory will now go at full speed without any further delay. It is understood that at present the Superintendents of Production, Maintenance and Power, and the Chief Technical Adviser are foreigners but it is hoped that gradually their places would be taken up by competent Indian workers as the Government of India has taken proper care to see that a competent Indian team is trained so that the personnel could be completely nationalised as early as possible. The fertilizer could now be used by the Indian farmer for increasing the yield of his crop.

5. Council of Agricultural Education.

The Hon'ble Mr. K. M. Munshi, Minister for Food and Agriculture, had convened a Conference on Agricultural Education to consider the modifications necessary in the present policy of Agricultural Education. The Conference was attended by the Ministers of Agriculture of various States and the Vice-Chancellors and the Deans of the Faculty of Agriculture of the Universities. The Conference agreed that there should be an All-India Council of Agricultural Education as part of the Indian Council of Agricultural Research to advise on agricultural education in the country. The Conference resolved that in view of the urgent necessity of effectively carrying out the programme of land transformation it was necessary to re-orient agricultural, veterinary and forestry education and that students of agricultural colleges should be required to undergo training in practical land transformation under actual village conditions. Lord Boyd-Orr, who was on a short visit to India, addressed the Conference. He said that he was profoundly interested in India's scheme of 'Land Army' because todayagriculture was of greatest importance for abolishing hunger and mal-nutrition.

6. Education Standards in Universities.

Dr. A. Lakshmanaswami Mudaliar Vice-Chancellor of the Madras University, delivered the convocation address of Agra University on 10th November, 1951. Dr. Mudaliar said that of late there had been criticism that the standards of university education had been lowered and this had gained wider publicity withthe remarks made by the Union Public Service Commission. He said that there was no controversy about such a statement and he attributed the lowering of standards to over-crowding in the colleges, lack of personal contact between teachers and students and to the fact that the teaching profession did not draw the type of scholar that used to be attracted to it in an earlier generation. He asked how could a profession which was as ill-paid as that of a teacher attract those who are most competent to join it.

Acharya Narendra Dev, Vice-Chancellor of the Lucknow University, presided over the 26th All India Educational Conference in the last week of October, 1951 at Bombay. He also touched upon the question of the economic conditions of the teachers. He justified the organisation of teachers into associations or trade unions but said that the teachers' organisations, besides looking into such questions as those of salaries and working conditions, should also have a code of honour for the conduct of teachers.

7. Brotherhood among Scientists.

We are very sorry to refer to the death in India of Dr. Phi ip A. Hawkins, a Fulbright research scholar from Amercia at Mukteshwar on 30th October, 1951. Dr. Hawkins was a Professor of Bacteriology at Michigan State College USA and had been engaged for the last eight months in research at the Indian Veterinary Research Institute on blood parasites responsible for cattle diseases. Dr. Hawkins died of poliomyelitis. His Indian colleagues and friends made heroic efforts to save his life. From the time Dr. Hawkin's breathing was impaired by paralysis to his death, friends kept a constant vigil at his bed side. They went without sleep and food for more than thirty hours as they relieved each other in the arduous task of giving artificial respiration. According to Mrs. Hawkins they worked without regard for their safety or health. The Hawkins family had lived in Mukteshwar since their arrival in India and had become a part of the community there.

Science and Newsprint

1. In all the talk about the atomic age or the age of steel, few people realize how much our civilization is based on that unromantic substance, paper. But a moment's pause will make you aware how much we depend on paper for our education, our information, and all the paraphernalia of modern living.

2. Over a period of time, the world has grown more and more short of this substance. Sources of supply have been unable to keep pace with the growing demand for paper all over the world.

3. The date usually given for the actual invention of paper is 105 A.D. It was at that time that Ts'ai Lun first reported to the Emperor of China that he had devised a method of making paper from the bark of trees, discarded cloth and hemp. For five hundred years the Chinese succeeded in keeping the making of paper a well guarded secret. Thereafter, it spread into Central Asia, Persia and Southern Russia.

4. In the early Middle Ages paper found its way into Arabia, Egypt and Morocco, and thence, after another lengthy interval, into the Western Mediterranean. It was only in the 13th century that it was introduced into northern Europe. Well over 1,000 years thus elapsed before the invention completed its travels from East to West.

5. From the time onward, there was a slow but ever increasing demand for paper in the West. With the expansion of printing, tremendous shortage began to develop. In both Europe and America advertisements began to appear, imploring the populace to save rags for use in paper. It was at this point that inventors began to look for new sources of paper

All sorts of materials were tried straw, hay, thistles, cabbage stalks and potatoes, to name but a few. By the middle of the 19th century, wood pulp had established its place as the primary source for paper.

6. Now scientists are casting their eyes back at some of the old experiments because there is not enough coniferous wood to meet the need. France has installed a factory near Abidjan on the Ivory Coast which is to begin work almost immediately, using tropical woods to make paper. A new factory is being built in Morocco which will use eucalyptus wood. There is a factory using bamboo in Indo China; another in Algeria is using alfa, a kind of grass. Belgium is experimenting with papyrus in the Congo-using the reeds on which the Egyptians wrote thousands of years ago. India is making paper from bamboo. All over the world this shortage is felt and all over the world men are trying to find the answer. Already, for example, daily newspapers in the United States of America have been printed entirely on sugar cane. Australia is now using eucalyptus for its newspapers. A pilot plant is experimenting with still other materials in Georgia, U.S.A. for the benefit of manufacturers from America, Africa, India, New Zealand, Finland and Mexico.

7. No one, however, has thought of trying to duplicate one of the strangest of all the attempted solutions for paper shortage, that of August Stanwood in the United States. Stanwood was pressed for raw material to keep his paper mill in operation during the American Civil War, and arrived at a novel solution. He imported shiploads of mummies from Egypt and used their cloth wrappings and papyrus to manufacture a paper which eventually found it way into the shops of grocers, butchers and other merchants to wrap their parcels.

8. Obviously, this out-of-the-ordinary approach has no wide application. But there may be others which offer better prospects. That is why governments as well as individuals and international gatherings are pressing their efforts to find an answer. Unesco is directly concerned, since the very great shortages of paper are likely to impede the work and development of information and education.

9. All present indications are that there will not be a single solution. Many answers will have to be found in response to varying local situations, and the scientists' role must be supplemented by efforts on many other levels.

(Reproduced from UNESCO Courier, July, August 1951).

SYMPOSIUM ON "UTILISATION OF INDUSTRIAL WASTES"

A symposium on 'Utilisation of Industrial Wastes' will be held under the auspices of the National Chemical Laboratory of India, Poona—7 on the 13th February, 1952 and the following days. The symposium is being organised by Dr. Ramanjaneyulu of the Survey and Information Division of the Laboratory who has just returned from U. S. after a tour of the country at the invitation of the American Chemical Society and the Ford Foundation. Important problems of utilisation of wastes from various industries are expected to be discussed in all their aspects by leading industri lists and scientists in the country. Enquiries in this regard may be addressed to Dr. J. V. S. Ramanjaneyulu, National Chemical Laboratory, Poona—7.

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