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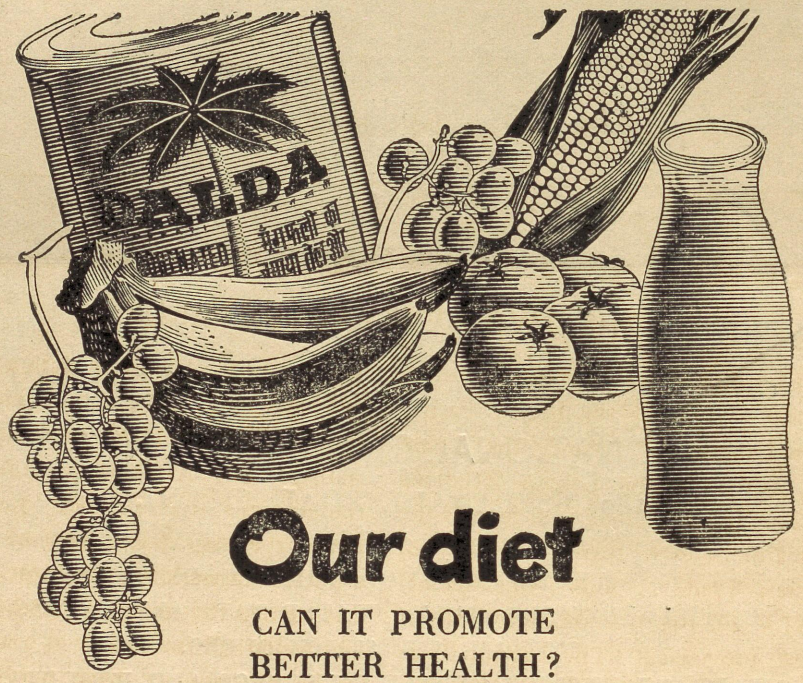

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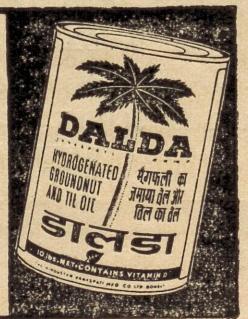

HVM. 129-172

VIJNAN-KARMEE

VOL. II October, 1950 No 10

THE TWO NEW LABOUR BILLS

The Ministry of Labour propose to introduce in the next session of the Indian Parliament two new Labour Bills, namely the Trade Unions Bill, 1950 and the Labour Relations Act, 1950. The Trade Unions Bill repeals the Indian Trade Unions Act, 1926 (XVI of 1926) and the Indian Trade ions (Amendment) Act. 1947 (XLV of 1947), and consolidates it with a few new provisions. The Labour Relations Act supersedes the Industrial Disputes Act, 1947 and similar legislations and it is stated that it breaks new ground as the first attempt at providing the country with a comprehensive law on the subject.

The Association of Scientific Workers of India is registered as a Trade Union under the Indian Trade Unions Act, 1926. The conditions which entitle a Trade Union to registration have been enlarged and the rules have been laid down for recognition of Trade Unions so registered. The composition of the membership of the Association of Scientific Workers of India differs in many respects from that of other trade-unions in the country. The Association of Scientific Workers of India consists of members who are gazetted or non-gazetted servants in the Central or State Governments in different positions and in different departments semi-government servants, such as those working in the laboratories of the Council of Scientific & Industrial Research and other similar bodies, University workers, scientific workers in the industry and other private bodies. The object of the Association is to bring together all the scientific workers in this country with a view to improve and safeguard their economic interests, the conditions of life and the professional and social status. The Association differs from other trade-unions in one respect and that is that the aim of the Association, besides its trade-union aspect, is to work for the most effective use of science and the scientific methods for the uplift and welfare of the society as a whole.

In this issue we have published an article received from the Calcutta Branch of the Association. The Calcutta Branch have at their General Body meeting held on 29th July 1950 passed a resolution viewing with great concern the unusual haste with which the two new Labour Bills, viz. the Trade Unions Bill and the Labour Relations Bill were being ushered in the Indian Parliament and asking for the immediate withdrawal of the two Bills, as in their opinion the aim of the Bills is to impose new restrictions upon the right of employees to form Association and thereby impeding the healthy growth of the Trade Union Movement in the country. The Delhi Branch have set up a Sub-Committee to report on the effect of the two new Labour Bills on the Association of Scientific Workers of India. A note prepared by the Sub-Committee is also published in this issue for the information of the members of the Association. It will be seen from the details given in the note regarding the two new Labour Bills that they vitally affect the interests of the Association of being recognised as a trade union of scientific workers all over India, irrespective of their special field of

work and their position in life. The two Labour Bills would, therefore, nip in the bud the dreams of the unity of purpose of scientific workers as regards their own well-being and their collective efforts for the uplift and welfare of the society as a whole.

Opposition to the new Bills has come forth from many quarters and from different labour organisations. The Ministry of Labour have recently issued a press note explaining the necessity for the various clauses in the Bills which have received severe criticism from the Labour. It is hoped that the Ministry of Labour would review the objections raised and make such provisions in the Bills that genuine trade union movement is not only note impeded in its growth but properly encouraged.

The Trade Union Bill and the Fate of the Association of Scientific Workers of India

(Received from the Secretary, Calcutta Branch, A.S.W.I.)

The Association of the Scientific Workers of India was formed in the year 1947 with Pandit Jawaharlal Nehru as the President during the 34th Session of the Indian Science Congress held at Delhi. The Association is pledged to improve and safeguard the economic interests and conditions of life and the professional and social status of all scientific workers of India. In pursuance of the above objects, the Association has endeavoured to develop a professional organisation of scientific workers registered under the Trade Union Act of 1926. It is, therefore, in the fitness of things that the two Labour Bills, namely the Trade Union Bill and Labour Relations Bill, now ushered in the Parliament for legislation deserve serious consideration from this trade union platform of scientific workers.

The Trade Union Bill aims to regulate the conditions relating to the formation, registration and recognition of trade-unions and specify their rights and privileges and the Labour Relations Bill to control the relation between the employee and employer with special reference to the (i) methods of negotiations for the settlement of trade-union disputes as well as (ii) the formulation of necessary conditions that may justify a strike or a lock-out in case the negotiations fail.

In the present article, however, the discussion will be restricted to the Trade Union Bill which will be studied in relation to the new modifications introduced therein that may vitally affect this Association and in general the healthy growth of the trade union movement in the country.

The modification relating to the composition of the executive committee of a trade union, the pivot of the organisation, is given in Section 24 Sub-Section 1 :—

> " In any recognised trade union the number of persons who without being employees in any establishment or class of establishments with which the trade union is connected are entitled to be officers of that trade union, shall not exceed four or one-fourth of the total number of members of the executive of that trade union, whichever is less."
>
> " Provided that all such persons are citizens of India."
>
> " Provided further that where a trade union consists, wholly or partly, of civil servants, no such person who is not an employee in any establishment with which the trade union is connected shall be entitled to be an officer of that trade union."

The above conditions restrict the freedom of choice. The executive committee of a trade

union of one class of establishment is thereby denied the valuable counsel of an experienced scientific worker who may happen to be connected with a different class of establishment.

It has been stated in Section 33, Sub-Section 2 that :—

> " A trade union of civil servants shall not be entitled to recognition by appropriate Government if it does not consist wholly of civil servants or if such union is affiliated to a federation of trade unions to which a trade union consisting of members other than civil servants is affiliated."

The term civil servant has been used in a wider sense. It includes not only government servants but all servants employed in any organisation owned or managed by the Government and relating to communication, transport, mines etc. and drawing a minimum salary of Rs. 200 a month.

The above sub-section imposes further restrictions for recognition and for the formation of a federated union of scientific workers employed in different organisations, government, non-government or semi-government. In considering this clause it must be remembered that the Association of Scientific Workers is an organisation of all categories of scientific workers, be he a civil servant or not, and that any organisation with kindred objects may be affiliated to this organisation. In other words it encourages the formation of a federated union of scientific workers. In order that the Association may conform to the conditions laid down by the authority for recognition by appropriate Government, it must fragment itself into different associations e.g., association of scientific workers (civil servants), association of scientific workers (non-civil servants), etc. It must be noted in this connection that the Association of Scientific Workers of the Ordnance Establishments at Kirkee which has been affiliated to this Association has again to be disaffiliated. The Association can no longer affiliate a government or semi-government institution. In short, the unity which has been achieved in the ranks of scientific workers has to be abandoned in the interests of the bill.

It is of interest to note that in formulating a trade union bill the authority did not even fail to show its responsibility towards educational institutions and hospitals. The clause relating to these institutions (Section 33, Sub-Section 3) is all the more ridiculous. It runs thus :—

> " A trade union shall not be entitled to recognition by the employer in relation to any hospital or educational institution by order of a Labour Court if it does not consist wholly of employees of any hospital or any educational institution as the case may be."

This clause too restricts the idea of broadly based membership of the Association and closes its door for scientific employees of hospitals and educational institutions. The Association is trying to bring within its fold all scientific workers, be he an employee in a hospital or educational institution or commercial concern or otherwise, and seeks to develop the organisation as the democratic movement of scientific workers all over India. But according to this clause the Association cannot expect to get recognition by the authority unless it debars scientific workers of educational institutions and hospitals from being its members.

Another modification introduced in the new Trade Union Bill which may vitally affect our organisation is Section 33 Sub-Section 4.

> " A trade union consisting partly of supervisors and partly of other employees or partly of the watch and ward staff and partly of other employees shall not be entitled to recognition by employer by order of a Labour Court."

This clause discourages the formation of the union embracing different categories of workers namely uuskilled labour, semi-skilled labour, skilled labour, supervisors etc. It rather advocates that each category of workers should form a trade union of their own so that the all-out

movement for unity may be smashed to the ground.

In considering this clause relating to our organisation it may be pointed out that our Association is trying to embrace all scientific workers irrespective of their technical skill. The graduate degree or equivalent diploma has been accepted as the minimum qualification for its ordinary members. But at the same time it does not exclude others who do not possess these requisite qualifications. In fact the organisation has arranged for Associate membership to keep its door wide open to all scientific workers. graduates or not. It may be noted further that by our constitution an Association member shall enjoy equal rights and privileges of a full-fledged member. According to this clause, the Association will be further fragmented provided it seeks any recognition from the employer.

The rights and privileges of recognised trade unions as defined in Section 35 are too meagre to meet the situation. In view of the strained relations which happen to exist today between the employers and employees, the unions should have been given more facilities to meet the exacting demands of the day. Recognised unions are given the right of conducting negotiations for the settlement of a trade-union dispute, but in the practical field it has got no utility value due to some inherent defects in the Bill. A specific instance may be cited. Let us suppose that a union is conducting negotiation relating to pay, dearness allowance etc. with an employer. In order that the case may well be presented before an Arbitration Board, the union should be given the opportunity of getting all the relevant documents from the employer. No such provision has, however, been made in the Bill. This is in short the fate of a " recognised " union.

The modifications as outlined above relate to different aspects of a trade union organisation, viz., its formation, registration, recognition and finally its rights and privileges but in spite of these apparent differences there is unity of purpose in the midst of these diversities i.e. each modification has got a common theme viz. it tends to divide and rule the organisation at each and every step. Taking collectively or in other words the cumulative effect of these modifications is to fragment the organisation till a few individuals are left whose rights to form associations for trade union purposes are virtually denied by the Bill. If this Bill is ultimately passed by the Parliament those of us who are united to-day on the platform of this organisation will be divided to-morrow by the impact of this new legislation.

From the above discussion it would appear, therefore, that the new Trade Union Bill sounds the death knell of the organisation. It is high time that all scientific opinion is mobilised against this reactionary Bill which strikes at the very root of trade union movement of the country.

THE TWO LABOUR BILLS AND THE A.S.W.I.

(A note prepared by the Sub-Committee of the Delhi Branch Executive Committee)

1. The two Labour Bills namely the Trade Unions Bill and the Labour Relations Act are pending before the Parliament and may come up for discussion at the next session of the Parliament. Extracts from these Bills which are of interest to the scientific workers are given in the Appendix.

Trade Unions Bill, 1950.

2. It will be seen that on the basis of the definition of " Civil Servant " as given in Article 2 para 2 a good number of A.S.W.I. members are civil servants.

3. Article 33 para 2 states that a trade union of civil servants shall not be entitled to

recognition if it does not consist wholly of civil servants or if such union is affiliated to a federation of trade unions to which a trade union consisting of members other than civil servants is affiliated. This will affect the affiliation of bodies like the Kirkee Association. Thus by virtue of the present composition of the Association, the A.S.W.I. cannot become a recognized trade union under the provisions of the new Bill.

4. Article 33 para 3 puts similar restrictions on employees of hospitals and educational institutions whose trade unions will not be entitled to recognition by order of a Labour Court if it does not consist wholly of the employees of the hospital or the educational institution concerned. Para 4 excludes trade unions consisting partly of supervisors and partly of other employees from recognition. The A.S.W.I. includes members in hospitals and educational institutions. The A.S.W.I. does not make any distinction between members employed at different places-Government (gazetted and non-gazetted), non-Government, Industrial and private workers nor between different branches of scientific profession nor between members in different positions. The A.S.W.I. is an All India Union. The A.S.W.I., therefore, loses all rights enjoyed by the Recognized Trade Unions as listed in Article 35 paras 1, 2, 3, 4.

Labour Relations Act, 1950

5. Article 2 para 14 of the Labour Relations Act defines an "employee." It is important to note specially that the definition of an employee excludes "civil servants"—as defined in Article 2 para 8 (which is the same as Article 2 para 2 of the Trade Unions Bill) of the Labour Relations Bill—and members of the Defence Forces.

In the statement on "Objects and Reasons" on the Labour Relations Bill, the exclusion of civil servants and members of Defence Forces, from the provisions of the Bill is explained in the following words :

" The Bill is extensive in scope and applies to all categories of employees except civil servants, persons employed in the Defence Force and domestic servants." In the statement on Objects and Reasons " given in the Trade Unions Bill it is stated that civil servants hold a key position in the administration and these very positions entitle them to every safeguard necessary for their well-being and progress and they should not be exposed to the temptation of resorting to methods which are available to industrial labour."

Thus scientific workers who are civil servants or are in the Defence Forces are prevented from enjoying the benefits of a trade union of their profession.

Retrenchment.

6. Article 2 para 19 of the Labour Relations Bill defines the word " Labour dispute." After giving the various possible types of disputes as listed in the Second Schedule, the following proviso is added :—

" Provided that the dismissal of any employee from service for a good cause shown shall not be deemed to be a labour dispute."

The words " good cause shown ' get clarified in Article 46 para 1 of the Labour Relations Bill under the head "Reference of disputes to Boards and Tribunals," where the following proviso has been added :—

" Provided that no dispute relating to the termination of service of an employee who is surplus to the requirements of the employer shall be referred to a Tribunal."

Thus the A. S. W. I. will not be in a position to protest against the retrenchment of scientific workers. The A. S. W. I. have already pointed out how the employers invariably put forward the above excuse when they want to retrench the staff.

7. In Article 6 of the Trade Unions Bill containing various conditions for the recognition of Trade Unions, para (k) asks for provision of

rules for the following purpose in the constitution of a trade union :

"Where the trade union consists, whether wholly or partly, of civil servants, prohibition of its members from participating directly or indirectly in any form of political activity and the removal of the name of any member who takes part in any form of political activity from the list of its members."

It is no where clarified in these two Bills as to what " indirect political activity " implies. A. S. W. I. as an organization of intellectuals may on many occasions be called upon to express its opinions on subjects concerning the most effective use of science for the welfare of society because it is embodied in object no. B of the A.S.W.I. constitution. Expression of such opinions as a protest against the misuse of science for destructive purposes or the best method of land tenure system necessary for the maximum utilization of scientific knowledge in agriculture etc., can be very easily stretched to mean indirect political activity.

8. The A.S.W.I. members are, therefore, requested to study these two Bills thoroughly and understand their vital implications on the objects, activities and organization of the A.S.W.I.

"APPENDIX"

Extracts from the Trade Unions Bill and the Labour Relations Act pending before the Parliament.

Trade Unions Bill :

Article 2 para 2 : "civil servant" means a person who is a member of a civil service of the Union or an All-India service or a civil service of a State or holds any civil post under the Union or a State, but does not include a person wh is paid from contigencies or is employed as a non-gazetted servant or as a gazetted servant drawing a basic pay (excluding allowances) of not more than two hundred rupees per mensem, in any of the following establishments owned or managed by or under the Central Government or a State Government, namely .—

(i) Railways and all other forms of transport, but excluding any person employed in the offices of the Railway Board and of the General Managers of Railways and other forms of transport ;

(ii) Ports, docks, wharves or jetties ;

(iii) telegraphs, telephone, wireless telegraphs or other broadcasting systems but excluding any person employed, as a telegraphist, telephone operator or wireless operator or, in the offices of the Director-General of Posts and Telegraphs or any Postmaster-General or the Director-General of Broadcasting ;

(iv) mints ;

(v) printing presses ;

(vi) ordnance factories, depots of other installations, but excluding any person employed in the offices of the Director-General of Ordnance Factories ;

(vii) work-charged staff of public works ; irrigation and electric power systems but excluding any person employed in the offices of any Chief Engineer or any Superintending Engineer or any other office notified in this behalf by the appropriate Government in the Official Gazette;

(viii) plantations ;

(ix) mines, as defined in section 3 (f) of the Indian Mines Act, 1923 (IV of 1923) or factories, as defined in section 2 (m) of the Factories Act. 1948 (LXIII of 1948) but excluding any person solely employed in a clerical capacity in a room or place where neither any process connected with mining operations nor any manufacturing process, as defined in section 2 (k) of the Factories Act, 1948, is being carried on :

Provided that the appropriate Government may, if satisfied that the public interests so require, by notification in the Official Gazette,

add to, alter or omit from, the entries specified in items (i) to (ix) any establishment or any class of employees employed in any establishment ;

Provided further that the power to omit any class of employees from any of the entries specified in items (i) to (ix) shall not be exercised so as to include that class of employees within the definition of "civil servant" unless the appropriate Government is satisfied that the conditions of service applicable to such employees are not less satisfactory than those applicable to civil servants ;

Article 2 para 3 : "employee" means any person employed in any establishment to do any work for hire or reward, whether the employment be express or implied, and includes any person who has been dismissed or discharged or whose work has ceased in connection with, or as a consequence of, a labour dispute or from whose dismissal or discharge a labour dispute has arisen, but does not include any person employed in any domestic establishment ;

Article 2 para 7 : "Government employee" means a person who holds any civil post in connection with the affairs of the Union or a State ;

Article 2 para 16 : "Strike" means a total or partial cessation of work by employees acting in combination, or a concerted refusal or a refusal under a common understanding of any group of persons to accept employment where such cessation or refusal occurs in consequence of a labour dispute or is intended for the purpose of compelling any employer to accept terms or conditions of, or affecting, employment; "illegal strike" means a strike which by virtue of any law for the time being in force is illegal ; and "irregular strike" means an illegal strike or a strike declared by a trade union in contravention of its rules referred to in clause (e) of sub-section (1) of section 33 ;

Article 2 para 17 : "supervisor" means any person who, on behalf of the employer, has the authority to supervise the work of other employees, to direct them in the work to be done, to remedy their grievances, to recommend any action to be taken by the employer, or to transfer an employee from one department to another or to promote or reward an employee, or to discharge, suspend or otherwise punish an employee ;

Article 6 para (k): where the trade union consists, whether wholly or partly, of civil servants, the prohibition of its members from participating directly or indirectly in any form of political activity, and removal of the name of any member who takes part in any form of political activity form the list of its members;

Article 24 para (1): In any registered trade union the number of persons who, without being employees in any establishment or class of establishments with which the trade union is connected, are entitled to be officers of that trade union, shall not exceed four or one-fourth of the total number of members of the executive of that trade union, whichever is less;

Provided that all such persons are citizens of India:

Provided further that where a trade union consists, wholly or partly, of civil servants, no such person who is not an employee in any establishment with which the trade union is connected shall be entitled to be an officer of that trade union.

Article 33 para (1): Subject to the provisions of this section, a trade union shall be entitled to recognition by order of a Labour Court under section 34 if it fulfils the following conditions, namely :—

(a) that it is a registered trade union, and that it has complied with all the provisions of this Act;

(b) that all its ordinary members are employees in the same establishment or class of establishments;

(c) that it is representative of all the employees employed by the employer in

that establishment or class of establishments;

(d) that its rules do not provide for the exclusion from membership of any employee on grounds of sex, religion or caste, or of any class of employees, employed in that establishment or class of establishments;

(e) that its rules provide for the procedure for declaring a strike;

(f) that its rules provide that a meeting of its executive shall be held at least once in every six months;

Provided that the reference in clause (c) to the employer shall, as respects recognition by an association of employers, be construed as a reference to all the employers who are members of the association;

Provided further that the provisions of clause (e) shall not apply to a trade union consisting wholly of civil servants.

(2) A trade union of civil servants shall not be entitled to recognition by the appropriate Government if it does not consist wholly of civil servants, or if such union is affiliated to a federation of trade unions to which a trade union consisting of members other than civil servants is affiliated.

(3) A trade union shall not be entitled to recognition by an employer in relation to any hospital or educational institution by order of a Labour Court if it does not consist wholly of employees of any hospital or educational institution, as the case may be.

(4) A trade union consisting partly of supervisors and partly of other employees, or partly of the watch and ward staff and partly of other employees shall not be entitled to recogition by an employer by order of a Labour Court.

Article 35: Rights of recognised trade unions.

(1) The executive of a recognised trade union shall be entitled to negotiate with employers in respect of matters connected with the employment or non-employment or the terms of employment or the conditions of labour of all or any of its members, and the employer shall receive and send replies to letters sent by the executive on, and grant interviews to that body regarding such matters.

(2) Nothing in sub-section (1) shall be construed as requiring an employer to send replies to letters on, or grant interviews regarding, matters on which, as a result of previous discussion with the executive of the trade union, the employer has arrived at a conclusion, whether in agreement with the executive or not, unless a period of at least three months in the case of an agreed conclusion or of one month in any other case has elapsed, since the said conclusion was intimated to the executive, or unless there has been a change in the circumstances.

(3) Any dispute between the employer and the executive of a recognised trade union as to whether a conclusion has been arrived at, or whether there has been a change in the circumstances, within the meaning of sub-section (2), shall be referred to the Registrar whose decision shall be final.

(4) The executive of a recognised trade union shall be entitled to display notices of the trade union in any premises where its members are employed, and the employer shall afford the executive reasonable facilities for that purpose.

Labour Relations Act.

Article 2 para 14: "employee" means any person employed in any establishment to do any work for hire or reward, whether the employment be express or implied, and for the purpose of any proceeding under this Act in relation to a labour dispute, includes any person who has been dismissed or discharged in connection with, or as a consequence of, that dispute, or from whose dismissal or discharge that dispute has arisen, but does not include—

(a) any civil servant, or

(b) any person employed in the Defence Forces of the Union, or

(c) any person employed in any domestic establishment;

Article 2 para 19 " labour dispute " means any dispute or difference or apprehended dispute or difference between an employer on the one hand and one or more of his employees, or a certified bargaining agent on the other, or between employees and employees, concerning—

(a) the terms or conditions of employment, or

(b) the duties and liabilaties of the employer, or the work done, or to be done, by any employee or the employees generally or any class of them, or

(c) the privileges, rights or duties of the employer or of any employee or the employees generally or any class of them, whether or not there is a subsisting agreement between the employer and the employees regarding all or any such matters, and includes any dispute or difference regarding dismissal or reinstatement of an employee: Provided that the dismissal of any employee from service for good cause shown shall not be deemed to be a labour dispute;

Article 46 para 1-reference of disputes to Boards or Tribunals: Where the appropriate Government is satisfied that any labour dispute exists or is apprehended, it may at any time, by order in writing, refer the dispute or any matter appearing to it to be connected with, or relevant to, such dispute—

(a) to a Board for promoting the settlement thereof; or

(b) to a Tribunal for adjudication:

Provided that no dispute relating to the termination of service of an employee who is surplus to the requirements of the employer shall be referred to a Tribunal:

Article 59 Jurisdiction of Labour Courts—Explanation—For the purposes of this section "labour dispute" means any labour dispute relating to any matter which is not specified in the Second Schedule but does not include the termination of service of an employee who is surplus to the requirements of the employer.

Article 121 Dismissal of an employee:—No employee who has been in continuous employment under any employer for not less than three months shall be dismissed from service by that employer for any misconduct until such employee has been given, in the prescribed manner, a reasonable opportunity of showing cause against the action proposed to be taken in regard to him

Article 122 Termination of service of an employee.—Without predudice to the power under section 121, no employer shall terminate the service of any employee who is surplus to his requirements, if such employee has been in continuous employment under him for not less than three months unless—

(a) the employee has been given one month's notice in writing and the period of notice has expired, or has been paid, in lieu of such notice, wages for one month; and

(b) the employee has been paid the gratuity payable to him in the termination of his service.

Explanation.—For the purposes of this section. "gratuity" means the amount calculated at the rate of fifteen days' average pay for every completed year of service or any part of a year.

The second schedule.

1. Wages
2. Bonus
3. Contribution paid or payable by the employer to any provident fund or pension fund.
4. Compensatory and other allowances.
5. Hours of work.
6. Leave with pay.
7. Working in two or three shifts.
8. Classification by grades.

9. Rationalisation of labour and plant.
10. Whether an employee has been wrongfully dismissed; reinstatement of, or damages to, a person wrongfully dismissed.
11. Whether termination of services of an employee is due to victimization; gratuity payable to an employee on the termination of his service.
12. Whether a go-slow policy has been adopted by employers or employees.
13. Whether an employer or employee or a trade union or a certified bargaining agent has failed to comply with terms of any settlement or collective agreement or order of a Labour Court or award, as the case may be.
14. Whether a strike or lock-out is illegal.
15. Any other matter which may be prescribed.

"OUR SMILE IS YOUR REWARD"

By

N. N. Narayana Rao, K. Krishnamurthy and A. R. Vasudeva Murthy.
(*Indian Institute of Science, Bangalore*).

The Honourable (then H. E.) Mr. C. Rajagopalachari visited the Indian Institute of Science in August, 1948 and honoured the students with an address in which he stressed the need for hard work and said, "Our smile is your reward". Translated into reality, this smile has meant scholarships ranging from Rs. Nil to Rs 125 per month and salaries ranging from Rs. 60 to Rs. 350 per month for the younger scientific workers in the Institute. It has meant privation, hardship and debts. It has meant the withering away of a scientific worker exactly during the period when he ought to be carefully nurtured.

Much has been written and said about the question of minimum salaries and scholarships of scientific workers but most of it is based on vague assumptions and personal idiosyncrasies.

The analysis presented below attempts to base itself on quantitative data and interpret the data in terms of the existing social conditions. It would be relevant in this connection to quote the words of Babbage:— "Nor let it be feared that erroneous deductions may be made from such facts; the errors which arise from the absence of fact are far more numerous and more durable than those which result from unsound reasoning respecting true facts".

The analysis has been made in two different cases: (a) a young scientific worker, employed in the Indian Institute of Science, Bangalore, living in or near the Institute with his wife, one dependant and one child, (b) an unmarried research student, living in the hostel attached to the Institute. The assumption is made that the workers live fairly decently, though frugally and not very comfortably and that they do not go in for any luxuries like a motor car, radio, costly hobbies, pets, etc. Even items which cannot be considered as luxuries like cigarettes, tobacco, cycle, table-cloths, window curtains, etc. are omitted. The minimum expenditure, under such conditions, is calculated in each case on the basis of price levels existing in Bangalore in September 1950 and critically compared with the corresponding incomes.

Let us first consider the case of a young scientific worker employed in the Indian Institute of Science and living with his wife, one dependant and one child.

The following table shows the monthly expenditure:

Table I

Item	*Amount* Rs. as. ps.
Establishment:	
House Rent, Water and Light	... 60 0 0
Servants and Dhobi	... 12 0 0
*Food**:	
Milk	... 30 0 0
Ghee and Oil	... 20 0 0
Fuel (wood and charcoal)	... 15 0 0
Rice, Wheat and Sugar (Rationed)	15 4 0
Jaggery	... 1 12 0
Pulses	... 8 0 0
Spices	... 6 4 0
Coffee and tea	... 6 0 0
Vegetables	... 15 0 0
Toilet:	
Hair oil, soap, washing soap, soapnut powder, tooth-powder, boot-polish, blades, haircut.	... 11 12 0
Recreation:	
Newspaper, pictures, games, sweets and toys, stationery, postage.	... 18 8 0
Schooling for children:	... 10 0 0
Birthcontrol appliances:	... 5 0 0
Savings:	... 15 0 0
Miscellaneous and unaccountable	... 12 8 0
Total	262 0 0

Note:

Every scientific worker in Bangalore whom the authors met in connection with the preparation of this article has agreed that the costs and and quantities given here are, if at all, on the conservative side.

The food budgetted in this table has a calorific value of 1900 calories per head per day compared to scientifically prescribed minimum of 2500 calories for a sedentary type of worker. This shows that the estimates given are very low compared to the necessities. In other words our budget is an under-estimate. The saving of Rs. 15/- is actually less than the Government rate of 10% of the salary. Savings are not meant for the inevitable annual expenses which are shown in Table II but are expected to meet unpredictable items like accident, childbirth, etc.

Under the head Miscellaneous and Unaccountable are included expenses, like, for instance, the buying of rice and sugar in the black-market. [It is well-known that rationed rice is enough for 21 days in a month.]

In addition to the monthly expenditure, the inevitable annual expenditure is as follows:

Table II

Item	*Amount* Rs. as. ps.
Clothes (including bedclothes, towels, etc.)	... 300 0 0
Footwear ...	... 60 0 0
Railway fares ...	... 150 0 0
Medical Charges	... 50 0 0
Insurance	... 300 0 0
Books	... 50 0 0
Subscriptions (to Institute Gymkhana Staff Common Room, One Technical Society and the A.Sc.W.I.)	... 30 0 0
Donations, charities, dinners etc.	... 20 0 0
Total per year Rs.	960 0 0
or per month Rs.	80 0 0

* This is for vegetarian food. For non-vegetarian food add approximately 10% to the total cost.

Thus the total monthly expenditure, in the case considered, is Rs. 262/- plus Rs. 80/- or Rs. 342/-.

On the other hand, let us consider the incomes of the workers. The following table shows the nett salaries including dearness allowance (and deducting provident fund contribution and income-tax) of Laboratory Assistants, Research Assistants and Lecturers in the Institute. The table shows the salaries a worker gets at the end of every year of service.

Table III

Period of Service	Laboratory Assistant.			Research Assistant			Lecturer		
	Rs.	As.	Ps.	Rs.	As.	Ps.	Rs.	As.	Ps.
Starting	85	0	0	149	0	0	217	15	0
1 year	89	9	0	158	5	0	240	1	0
2 „	94	3	0	167	8	0	262	7	0
3 „	98	12	0	184	3	0	284	11	0
4 „	103	5	0	193	5	0	306	0	0
5 „	107	15	0	202	8	0	328	3	0
6 „	112	8	0	211	11	0	350	8	0
7 „	117	1	0	221	13	0	350	8	0
8 „	121	11	0	231	0	0	384	2	0
9 „	126	4	0	240	3	0	384	2	0
10 „	130	13	0	248	5	0	418	0	0
11 „	135	7	0	258	8	0	418	0	0
12 „	140	0	0	267	11	0	451	2	0

Comparing these figures with those of expenditure in Tables I and II, one is led to the conclusion that, even at the end of 12 years' service, a Laboratory Assistant or a Research Assistant will not be in a position financially to meet the needs of himself and his own small family while a Lecturer can do so only after 6 years of service, unless an extra source of income exists.

None can deny that sources of income other than their own salaries are practically non-existent for young scientific workers unless there is another earning member in the family in which case there are likely to be more dependants and commitments. Part-time work undertaken even without prejudice to work at the Institute is practically not allowed. A handful of workers may be lucky enough to make a small amount sporadically by analysis of commercial samples, etc., but the majority have to be satisfied with their pay. There is no bonus declared at the end of year, no cash rewards for work done and no opportunity for graft. Trials are made at crossword puzzles, horse-races, cards, football pools, etc., but in most cases, unsuccessfully.

Let us then examine the position of the worker, stage by stage. The following table shows the minimum qualifications of different grades of workers and the average age at which they would join service with those qualifications.

It can be assumed that the average age of marriage of an average scientific worker is around 23 or 24 and he may be expected to have his first child an year or two later. At this age, i. e., about 24, a Laboratory Assistant would be getting around Rs. 100/- per month and a Research Assistant around Rs. 150/- per month, while a Lecturer would be started on Rs. 220/- per month only three years later. Men with higher qualifications would no doubt be started on more but it should not be forgotten that such men are correspondingly older. For instance, a holder of the Diploma or Associateship of the Institute gets a higher initial pay but it takes on the average about three years to get either qualification. We, therefore, find that a Laboratory Assistant cannot be independent even at the age of 32 and a Research Assistant at the age of 36 while a Lecturer is able to take care of his family only at the age of 33.

Table IV

Grade	Minimum Qualifications	Age
Laboratory Assistant	B.Sc. or Tech. Dip.	20
Research Assistant	B.Sc. (Hons.) or B. E. with some experience	24
Lecturer	B.E. or M.Sc. with experience and or additional degrees	27

This continued stagnation in the same grade may surprise many but is possible because there is no system of promotions and every worker has to apply independently for a higher post as and when it falls vacant. Even if we assume that a Research Assistant becomes a Lecturer after 4 or 5 years of service, one can see from Table II that the immediate financial gain is practically nothing and that he must still wait for six more years to become independent.

What is the position of the worker at the age of 35? He is now older and is likely to have more children, possibly more dependents and more commitments. His first child is probably ready for higher schooling. His health as well as that of his wife and children is shattered due to the bad and unbalanced food which alone he could afford and due to the mental worries that are inseparable from a hand-to-mouth existence. He might have contracted debts. A rough calculation shows that his expenditure would have gone up by at least 60% over that shown in Tables I and II. It is in this condition that he manages to reach an income level which would have been just sufficient for his elementary needs 12 years previously. This state of affairs is accentuated to a very large extent by the general rise in the prices of all commodities which is the inevitable result of the disastrous and confused socio-economic policies of our Government.

What does a scientific worker do at present to meet this situation? In the words of a very stale proverb, he cuts his coat according to the cloth; and generally, his coat is just a rag barely able to cover his naked tragedy. He cuts off insurance and savings from his budget so that he is left without a prop at critical moments. He reduces the cost of his food by reducing his consumption of milk, butter and vegetables, thus depleting the already low nutritive value of his diet. He moves into a dirtier but cheaper locality which leaves a permanent mark on the health and mental development of himself and his family and especially his children and which, in the long run, will merely increase the doctor's bills. He stops all types of recreation and

makes his wife a mere drudge in the kitchen, thus leading to constant domestic friction. In short, he steals from the future to satisfy the present.

Observation of these facts has made many scientific workers prefer not to marry at an early age. While this might temporarily take the sting out of the problem, and, according to some reactionary elements, will "help to solve the food crisis"(!), it is obvious that it is no rational answer to our analysis. It is well-known that suppression of the normal sexual instinct by postponement of marriage due to financial reasons leads to greater and greater indulgement in different types of sexual perversion. This in turn leads to unhealthy mental attitudes which are least conducive to scientific research.

The unmarried research student in the Institute is in no better position. Here is a typical budget of a research student who is unmarried and who lives in the hostel attached to the Institute:

Table V.

(a) *Monthly Expenditure*

Item		Amount Rs.	As.	Ps.
Mess, vegetarian	...	52	8	0
Mess, non-vegetarian	...	60	0	0
Guests, extras	...	5	0	0
Room rent and hot water	...	13	4	0
Dhobi and barber	...	6	8	0
Toilet	...	5	0	0
Recreation	...	10	0	0
Stationery, postage etc.	...	5	0	0
Medical charges	...	1	0	0
Total (vegetarian)		98	4	0
(Total non-vegetarian)		105	12	0

(b) *Annual Expenditure*

Clothes and footwear	...	150	0	0
Railway fares	...	100	0	0
Books	...	50	0	0
Subscriptions	...	16	0	0
Donations, charities, dinners	...	35	0	0
Total		351	0	0 per year
		or		
		29	4	0 per month.

We, therefore, get a total monthly expenditure of Rs. 128/8/- for a vegetarian student and Rs. 135/-for a non-vegetarian student, calculated on an ann s is.

On the other hand, one finds five grades of scholarships in the Institute, consisting of Rs. 125/-, Rs. 64/-, Rs. 56/-, Rs. 50/- and Rs. 40/- per month. Those who get Rs. 125/- are very few and the majority of students gets one of the other four grades or in some cases nothing. This means that a large percentage of the students have to get from their parents one to two and a half times the value of the scholarship they get from the Institute.

Since the minimum qualification with which a research student enters the Institute is usually B.Sc. (Hons.) or M.Sc., the average age of admission is of the order of 20-22 years. We, therefore, observe that even after a youth attains his majority he is dependent on his parents to the tune of 60 to 150 rupees every month. The authors have personal knowledge of a number of students who have foregone their tea and breakfast every day in their efforts to overcome this shameful condition. Can yon blame a student now if he feels uninterested in his work, cynical towards his future and frustrated in his life? Can you blame him if his sense of responsibility vanishes before his knowledge of dependency and if he puts heart and soul, not in scientific work, but in escapist recreation? No scientist, we are sure, will do so.

Meanwhile, what can we do? The authors are certain that the conditions outlined here are in no way peculiar to the Indian Institute of Science. A similar analysis made for other centres of Indian Scientific Research under the corresponding local conditions will surely yield rich dividends in the form of every important data. This data can be later co-ordinated at an All-India level and will serve as a powerful weapon in the hands of the scientific workers.

One must recognise that all the facts analysed here are but symptoms of a capitalist economy in an under-developed country. It is obvious that it is mainly the richer classes who can go in for science and who can live on the lower pay and false prestige that characterise the scientific worker in India to-day. Thus 95% of our population is denied even an opportunity to obtain higher scientific training or knowledge. A scientific aristocracy is being created, an aristocracy exhibiting every sign of other degenerate aristocracies, laziness, complacency, a definite going away from the life of the common people, a blind and unquestioning aping of foreign methods and over all these, a veil of imposing mansions and international conferences.

The Association of Scientific Workers has an important part to play in the transformation of this picture into a happier one. We are all already agreed on the need for fighting for a planned economy based on socialist principles. We must intensify this struggle by more and more propaganda and by greater co-operation with the organised, class-conscious workers of India who are fighting for the same end. Meanwhile we must fight for better pay, for housing accommodation or allowance, for a marriage allowance, and childern's allowance and for more amenities. Most important of all, the Government should take immediate drastic steps to bring down the prices of all essential commodities, to make them available more easily, and to root out all black-market. We must fight for more funds for science, for a more rational utilisation of those funds and for a greater and wider application of scientific methods in the "daily life of common people and if we win, the Smile of the Country" will be our Reward.

SCIENCE AND THE PEOPLE

WAYS AND MEANS TO POPULARISE IT

By

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Modern civilisation is to a large extent a product of science. The former is so intimately connected with the latter that to delete science from it would be almost equivalent to disrupting a major part of the structure on which it is founded.

In order that those who have come under the impact of this modern civilization, namely, the general public, should utilise the same constructively, it is necessary that they appreciate fully as to how science has applied itself to this task of building up our civilisation. Hence the popularisation of science is essential.

There are various mass 'media' by which this popularisation can and has been effected. Some of them are through books, press, films, radio, exhibitions, clubs and museums. We shall consider how these mass media operate in practice so that it will give a fresh stimulus towards implementing future work along the same lines in regions where such work has not progressed appreciably.

We are Lucky.

A classification of the popular books on science will give us a clue as to the background against which the popularisation can be effected. There has been quite a lot of these books dealiug with scientific theories and discoveries and interpreting the saying in a popular way that could be understood even by the layman.

Our generation is lucky to have had writers like Jeans, Eddington, Huxley, Wells, Hogben and others, who have in the main originated this type of literature.

They can be classified as belonging to one or the other of the following three groups: 1. Philosophical and fundamental (like those of Jeans, Eddington and others); 2. Semi Technical and scientific (Wells, Huxley and others); and 3. Historical, civilisational and social (Hogben and others).

The classification has been roughly done and the names of the writers chosen at random but it is obvious that 1 and 2 are dependent on 3, though this is not strictly so in certain cases.

No doubt 1 and 2 satisfy the most aesthetic minds of the scientists; but no one can deny that the progress of science is to a great extent dependent on the historical, civilisational and social background of which it is but a product. Besides, it is against this background that science can be easily brought home to the masses who are too practical to worry about 1 and 2.

Scientific journalists have done much to stimulate this interest in the social background of science. In this connection J. G. Crowther, in his book entitled "Social functions of science" gives the evolution and the need for these journalists.

In Days of Old.

He says that before they appeared on the scene the articles on science in the press were written mostly by those who derived their income from other sources. He classifies these articles into two groups, namely, those that provided entertainment and those that provided religious reflection. The third type of article whose systematic production started about 15 years ago, says Crowther, writing in 1941, were written by those who made the service of this social motive their chief aim.

They saw that science was a distinguishing teacher of modern civilisation, that its principles and progress were not systematically expounded,

and followed by the people and that scientific journalism was an essential binder in the structure of modern civilisation.

It demanded the steady exposition of simpler and more important facts as they are discovered but giving still more importance to the exposition of the atmosphere of science. Thus it describes laboratories, interviews discoverers and thus presents some idea of the atmosphere and processes of creative scientific discoveries. In this way, the scientific journalists try their best to remove the conflicts between science and society.

These scientific journalists have formed associations of science writers. A resolution agreed to at the North American Expert Panel, meeting for the popularisation of science and its social implications recommended that UNESCO should stimulate national and international organisations of journalists, similar to the National Association of Science Writers now existing in the U.S.A. in order to raise the standards of scientific reporting.

> There already exist two organisations of science writers : the National Association of Science Writers in the U.S.A., and the Association of British Science Writers in the U.K. Though these are both young they have assisted the public to follow and understand contemporary scientific achievements and to raise the level of science writing.

These associations were formed because of the need felt for an organisation whose professional standing was such that it would ensure that scientists would talk freely with journalists whom they knew to understand their scientific methods in approaching a problem, their special language, and their aspirations.

Yearly Award.

The technical problems of these science writers have also been dealt with by the association. Both the European Panel of Experts on Popularisation of Science and its Social Implications which met in Paris and the North American Panel of Experts which met in New York recommended to UNESCO the 'stimulation of yearly awards for scientific journalism."

A survey made by UNESCO seems to indicate that such awards exist only in the U.S.A. The American Association for the Advancement of Science (A.A.A.S) announced the establishment of the George Westinghouse Science Writing Awards Fund (provided by the Westinghouse Educational Foundation which is supported by the Westinghouse Electrical Corporation "in commemoration of the hundredth anniversary" of the birth of George Westinghouse), created to give national recognition to newspapers making the biggest contribution to popular understanding of the achievement of science and technology.

Science Service.

Science Service is a regular news agency, selling services that reach about 10,000,000 through newspapers and other publications. Science Service publishes its own magazines : Science Newsletter (Weekly) and Chemistry (Monthly). It publishes books. It produces films and film strips. It has a weekly radio broadcast. It administers the science clubs of America and the yearly Talent-Search. It is selling Science or at any rate provides possibilities of making the public science-conscious.

> In 1941, the American Institute of the City of New York, which had been directin 700 science clubs mostly within the city of New York gave up its work which was immediately taken over by Science Service.

To give an impression of the work accomplished by Science Service for spreading science in this sphere, it may be mentioned that science service today directs about 13,000 Science Clubs in the U.S.A. and that Science Clubs in several countries outside the U.S. are affiliated with the Science Clubs of America (actually a synonym for Science Service).

It will be seen that the popularisation of science and its social implications is an impera-

tive necessity if the aims and achievements of science are to be brought home to the masses.

Scientific journalists, science writers, and their Associations, can in their own small way do their best towards implementing this programme of social service for the cause of Science and Society.

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DEVELOPMENT OF INDIAN INDUSTRIES

*BLEACHING OF PULP

By

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Introduction.

Digestion and Bleaching can be considered as two steps of the process of Chemical Purification for the manufacture of bleached pulp.

The final product should have maximum whiteness and purity, without a loss of the strength and natural properties of the fibres and without an excessive shrinkage in their weight and volume. The consumption of bleaching agents should also not be excessive.

Bleaching Processes :—Bleaching of rags, chemical, semi-chemical and mechanical pulps are different from each other in many respects. Further the behaviour of Sulphite, Sulphate and Soda pulps is different under similar conditions.

1. *Rags Pulp :* Due to the relative freedom of rags stock from coloured impurities such as are present in other pulps, the consumption of hypochlorite for bleaching is very small. The orthodox method of bleaching in the breakers or such like equipment still holds the field.

Lamer-A. Moss (1) has however, described a method for the accurate measurement of small dosages of Bleach Liquor by an automatic arrangement.

II. *Chemical Pulps :* Sulphite pulp bleaches more readily (2) than the Sulphate of Soda Pulps. Also the high magnesia content of the sulphite cooking liquor yields an easy bleaching pulp as compared to an acid prepared from pure lime stone.

Sulphate pulps contain (3) lignin and carbohydrates residues more or less polymerized by the action of alkali in the cooking liquor and these are slow to chlorinate and difficult to bleach. Materials like phlobotannins get converted into sulphur dyes in the presence of sodium sulphide in the cooking liquors and cannot be bleached completely by the straight bleaching.

(A) **Bleaching Agents :**

These may be (15) Oxidising type like the liquid chlorine, bleaching powder, hydrogen peroxide, sodium chlorite and sodium peroxide etc. or may be Reducing agents like sulphur dioxide, sodium sulphite, calcium bisulphite, zinc hydrosulphite etc. However due to economic consideration and its special reactivitity chlorine is by far the most popular bleaching agent.

(B) **Single stage and Multistage Bleaching.**

(a) Single stage bleaching—This consists of adding the bleaching liquor to the pulp in

*Summary of an address given at the Abdullapur Branch meeeting held on 19th July, 1950.

a suitable vessel, and agitation until reaction is complete and the pulp bleached. This is then washed to remove the soluble waste products and if the bleach had been added in excess, then the residual bleach also.

Whether hypochlorite bleaching forms the entire process or a stage in the multistage bleaching, the following factors control the bleaching process which is due to the generation of nascent oxygen as under:

$$Ca(OCL)_2 = CaCL_2 + 2O$$

(i) *Temperature:* Very high temperatures have a detrimental effect as the cellulose fibres are seriously weakened before the impurities can be removed. Also at temperatures above 30°C. some bleach is lost by conversion to Chlorates.

According to Cross and Beavan (2) and Sirnonsen, about 80% of the bleach required at high temperature is enough at lower temperatures. Suter Meister and Spence also obtained similar results but they found that 93 to 95% of the bleach was required at lower temperatures.

(ii) *Concentration of Hypochlorite:* High concentration has an effect similar to that of high temperature,

(iii) *pH of the Reaction:* To insure stability the pH of the Calcium hypochlorite is always greater than 11.0 and the excess alkali present in the liquor establishes a pH of not less than 8.0 in the bleaching mass. During the early part of the bleaching period there is a rapid drop in pH, probably due to the formation of CO_2 and organic acids. Thereafter the pH declines at a lower rate and reaches an approximate condition of equilibrium at 6.4 to 6.8, the brightness of the resulting pulp is greatly effected (3) due to the following reasons :—

(a) a portion of the available chlorine may react by chlorination.

(b) a portion of HOCL, which is present under these conditions, may be lost by volatilization or by decomposition, in which case the residual chlorine may not be sufficient to effect the desired brightness.

(c) the HOCL may react so rapidly that the cellulose will be attacked and fibres lose strength. For these reasons it is often the practice in case of the bleaching of sulphite pulp, to raise the pH of the bleaching mass by the addition of lime or caustic soda.

(iv) *Consistency of Pulp:* Due to high consistency of the pulp, the concentration of the bleaching reagent increases and since the rate of chemical reaction is directly proportional to the concentration of the reacting materials, it is greatly enhanced. To get the same rate of reaction with lower consistencies of the pulp, it shall be necessary to use high concentration of bleaching reagents and also high quantities so that the concentration of chemicals during the last part of bleaching also remains sufficient to be effective.

(iv) *Time:* This factor is controlled by the temperature and consistency of the pulp and the brightness.

(C) Two Stage Hypochlorite Bleaching (4).

This is based on the fact that during the process of bleaching certain of the colouring matters are first solubilized and these products on further oxidation reaction are converted to colourless products. If these products could be removed from the reaction mixture before the secondary reactions start, the consumption of bleaching agent for these secondary reactions can be avoided. Thus in a two stage hypochlorite bleaching process the maximum saving can be had where 40 to 60% of the total bleach demand is given in the first stage. It may be 10 to 20% (4) of the amount of chlorine. But the time required for bleaching is increased and the net economy is generally questionable (3) as the saving in bleach liquor is offset to a greater or less degree by the increased cost involved in the installation and operation of two stages.

D Multistage Bleaching with Chlorination as the First Stage.

In the multistage bleaching the most commonly accepted sequence of operation is chlorination followed by caustic extraction and hypochlorite bleaching and the pulp being washed in between these stages. Sometimes chlorination is spread into more than one stage with or without the intermediate alkali extraction. Multistage bleaching is more suited for the sulphate pulp as the sulphite and soda pulps are more easily bleachable. Oliver S. Sprout and Thomas W. Toovery (5) studied the splotting of the chlorination and alkali extraction into various combinations and their effect on the bleaching and strength properties of the fibres. They conclude that a pulp can be most effectively and economically bleached when chlorinated to an optimum degree depending upon the characteristics of the pulp and method of bleaching.

(i) *Chlorination.* The developments in the materials of construction for handling of chlorine and the technique regarding its utilisation has made it commercially possible to use the gas in ever increasing quantity.

Chlorine reacts to form substitution compounds with impurities and these compounds are easily soluble in alkali media and can be subsequently washed. If the pulp is not washed then HCL generated during this reaction will neutralize quite a substantial amount of alkali in the alkali extraction stage which follows.

In the washed pulp (4) one pound of quick lime per pound of chlorine employed is required but 0.9 of this amount can be saved due to washing of the pulp before alkali extraction. Chloro-lignin compounds take longer time to solubilize and hence enongh time should be given for alka'i extraction stage.

Chlorine can also be used as hypochlorous acid if the gas is first passed through a tower containing ground limestone. In this case addition compounds are found by chlorination and these may be soluble in either acid or alkali media. Consequently no solubilizing period is is required before washing the pulp after alkali extraction.

Caustic soda yields a more highly purified cellulose, but is expensive.

Mr. Schuber (6) explained the partition-ratio" beween various stages of multistage bleaching. According to him 50% of the total chlorine demand should be used in the chlorination stage. If higher amount of chlorine is used at this stage, some of it will be used up in some secondary reactions and hence the efficiency of the caustic extraction stage will be materially lowered. The colour of the liquor after caustic extraction stage should be like Black Liquor.

The consistency of the pulp during chlorination stage should be 3 to 3.5% (6). Excess chlorine can either be washed or converted into a hypochlorite by the addition of lime which raises the pH from 2.0 to 7.5 (3).

90% of the chlorination is finished in first five minutes (6), but 100 minutes are required for the consumption of the balance 10% chlorine.

(ii) *Caustic Extraction.* No matter how best the pulp is washed before the caustic extraction, the first stage is of neutralization of the residual acid. Then the chlorinated compounds are solubilized. Generally about 2% NaOH is used and of this 1% is neutralized and the balance is used for solubilizing.

(iii) *Water* :—According to Mr. Nobb (6) about 60,000 gallons of water per ton of pulp are used. Since at the chlorination and caustic extraction stage about 60-70% of the impurities are removed, the maximum quantity of water goes to sewer from these stages. Some of the effluent from these stages can be re-used, provided it does not increase the consumption of chemicals.

The development of over-sized washers is another way to cut down the water consumption. In these washers the pulp is not pumped at so low a consistency as 1% which is the usual

practice for other washes. On the other hand the amount of fresh water going on the top of the washers is increased to 200 G.P.M. to 300-400 G.P.M. so that the pulp is properly washed. Thus there is a saving possibly of 500 to 800 gallons of dilution water which is only used as a conveyor. By this means 20,000 gallons of water (6) could be saved by increasing the size of the washers by 50%.

The fresh water should be started at the tail end and should be re-used as much as possible for dilution and should be sent to sewer after chlorination and extraction stages.

(iv) *General :—* By multistage bleaching, using chlorine in its first stage, 20 to 40% of the chlorine demand can be saved (3) and if the chlorinated stock is washed while acid, the lime saving is even greater.

Pulp thus obtained is stronger and permits the attainment of higher degree of brightness. Removal of last traces of alkali remaining from hypochlorite stage can be facilitated by adjusting the pH to 6.0 to 6.5 during soaking period by using HCL, H_2SO_4, colorine water or SO_2. The last possesses two advantages over the other, i.e. it destroys any active chlorine remaining from hypochlorite stage, and it reduces a portion of the iron and renders it more readily removable from the pulp.

(E) Chlorite Bleaching :

Sodium chlorite is used as a finishing bleach, particularly in case of kraft pulp, to increase the brightness from 60-70 to 80-84 G. E. Brightness.

Sodium chlorite as such is not effective and has to be activated either by an acid (pH-5) (7) or by hypochlorite (pH-9). At room temperature bleaching is slow and for Kraft pulp 80°C. and for Sulphite pulp 60°C. are considered the best temperatures. Higher temperatures, greater concentration and longer times are advisable. Alpha Cellulose contents are slightly improved, the copper number is lowered and viscosity is increased. The acid activated chlorite increases viscosity more than the hypochlorite activated.

Chlorite bleaching of the Pine-Kraft puip was studied by W. P. Lawrence (8) by using it for increasing the G. E. Brightness from 60.70 to 80-84. The strength properties of the pulp were substantially retained. He found that alkaline chlorite under proper conditions gave quite favourable results whereas acid activated chlorite gave consistently good results.

Though the chlorite did not produce higher ultimate brightness than hypochlorite, it proved to be very effective in conserving strength upon bleaching to high brightness, which was more resistant to aging. Alkaline chlorite is preferable from the corrosion point of view.

For the preservation of strength properties it is necessary that the chlorite and hypochlorite should be consumed at the same rate, since hypochlorite reacts with chlorite to form chlorine dioxide in preference to reacting with and oxidizing the cellulose. If the conditions are such that chlorite goes out of reaction first, the pulp will then be exposed to the action of excess hypochlorite with its higher oxidation potential. Hence it is important to have the proper ratio of hypochlorite to chlorite and the pH. At pH 8.5 the ratio in terms of available chlorine should be something less than 2:1 and approaching 1:1. At pH 9.5 the reaction proceeds best at 2:1 ratio.

A buffer can be used to maintain the proper pH. Sodium silicate, borax, sodium carbonate can be used as buffers, but caustic soda has been found to be the most economical.

At 5% consistency the reactions are quicker whereas at 3% consistency the consumption of chlorite is retarded and the danger of exposing the pulp to the action of hypochlorite is minimised.

(F) Chlorine and Chlorine Dioxide Bleaching :

A mixture of chlorine and chlorine dioxide for increasing exceptionally high brightness of commercially bleached Kraft pulp is as effective as the chlorine dioxide alone. However it does

not require a very carefnl control since satisfactory results can be obtained over a fairly wide range of pH, temperature, % of total available chlorine applied and proportion of chlorine in the gas mixture. Also the rate of bleaching is very rapid which results in greater bleaching capacity for conventional equipment.

Investigations on the commercially bleached Kraft pulps were carried out by G. P. Vincent (9). The results obtained when 0.5% available CL_2 and 1% available CL_2 were applied, were found to be the same. The application of the mixture of gases gave essentially the same strength retention with better brightness and rate of bleaching as compared to chlorine dioxide alone. The conventional hypochlorite did not achieve the same brightness elevation. The chlorine dioxide : chlorine ratios of 2.5:1 and 1:1 on available chlorine basis yielded the same results. Thus there is a great flexibility of the mixed gas bleaching.

W. A. Stone and Associates (10) bleached high density sulphite pulp with a mixture of sodium hypochlorite and chlorine dioxide and obtained excellent whiteness with less degradation of pulp. But it is necessary that hypochlorite should be used up before CLO_2 goes out of reaction.

(G) **Nitrogen dioxide Bleaching (23).**

The pulp can be nitrated at 92 to 93°C. and the resulting compound thus formed with the lignin is readily soluble in Caustic soda. The residue is readily bleached by hypochlorite bleach liquor.

(H) **Reversion of Shade :**

It is due to the presence of residual lignin, its oxidation products and degraded cellulose (6). The use of chlorine dioxide, with or without chlorine, helps in getting cellulose without the loss in strength since the oxidation potential of chlorine dioxide is low enough for an attack. The reversion is also due to the use of calcium hypochlorite (6) and Mr. Schubber suggests that sodium hypochlorite is comparatively more safe. Though the oxidation potentials in both cases are the same, the pH cannot be well controlled in case of calcium due to the limited solubility of calcium hydroxide.

In case of Sulphite Pulp bleaching V. Oleske vich (11) recommends souring to pH 5 after bleaching and then washing.

The water re-used in the bleaching process for washing the pulp should have least possible organic residues and colouring matter.

III. Semi-Chemical Pulps.

Neutral Sulphite method of obtaining semi-chemical pulps received a great stimulus due to the development of various bleaching techniques giving a well bleached pulp. Previously the semi-chemical pulp was mostly used for (12) corrugated and liner board, insulating boards and wrapping papers.

The unbleached pulp should be able to pass through a screen with 7 Cwt Plate (13). It should have a high freeness, since it tends to form impact mats on vacuum washers which are appreciably more resistant to the flow of shower water than the mats formed by the conventional long or short fibred pulps.

A. One Stage Bleaching :

(1) *Peroxide Bleaching* : By this method lignin is merely bleached (6) and the pulp though high in yield and bright in shade, has all the inherent disadvantages of high lignin contents.

Kingsberry and Associates (24) studied the bleaching of Aspen Neutral Sulphite Pulp. They conclude that 4 per cent Sodium Peroxide is required to have an increase of 20 G. E. Brightness in the shade after bleaching. The yield of bleached pulp would be 96 to 98 per cent of the unbleaehed pulp (69 to 70 per cent on B. D. Wood).

F. A. Simmonds and R. M. Kingsbury (13) studied the degree of buffering resulting from proportions of Sodium Silicate and H_2SO_4 used in preparing the bleach solution and found that buffering has an appreciable influence.

(2) *Hypochlorite Bleaching:* For good brightness (13) the alkalinity should be high. The

initial pH may be 10.5 to 11.0. Generally 10 per cent Cl_2 on pulp is sufficient to give a good shade and with high alkalinity it gives better shade than 2-3 per cent Na_2O_2. The yield is 92-98 per cent of unbleached pulp (66-79 per cent as B. D. Wood).

(3) *General :* 1. By single stage bleaching a brightness of 75 G. E. can be achieved economically.

2. Pulps bleached with hypochlorite are generally more yellow than those bleached with sodium peroxide.

3. Brightness stability is better with sodium peroxide than with hypochlorite.

4. Single stage bleaching increases pulp strength and freeness slightly as compared to groundwood. Folding endurance is effected to a greater extent.

5. There is not much difference in the strength properties developed by Na_3O_2 or hypochlorite.

B. Multi Stage Bleaching.

The multi stage bleaching with chlorination etc. as already discussed under chemical pulps can be adopted for semi-chemical pulps too. The lignin is removed, but the yield is compara tively higher than chemical pulps due to hemicellulose and pentosan contents. Mr. Schubebr (6) explains that 90-95 per cent of the total chlorine demand may be given in the chlorination stage. The pentosans under these conditions remain unaffected. The main purpose of caustic extraction stage is to neutralize and not to solubilize as in chemical pulps and hence the density of the pulp does not matter much. Hence the caustic used in this stage is about 50 per cent of the corresponding value in case of chemical pulps. If more caustic is used, it will dissolve the pentosans, which are about 22-23 per cent and thus the resultant yield will decrease.

To decrease the attack on pentosans Mr. Russell (6) suggests the use of chlorine dioxide with hypochlorite in final stage. However, Mr. Schubber (6) thinks that with 90-95 per cent of the total chlorine demand having been met with in the chlorination stage, 1 per cent hypochlorite flashes up brightness to 85. Under these conditions it may be unnecessary to use chlorine dioxide since it would not effect the economy and the time factor.

Messrs. S. R. Trivedi and Associates (16) studied the use of alcoholic monoethanolamine, sulphurous acid, lime, sodium sulphite, caustic soda and boiling water for the extraction stage after chlorination. They recommend 2.5 per cent sodium sulphite with 10 per cent pulp consistency and 60°C. for 1 hour or 1 to 2 per cent NaOH with 10 per cent pulp consistency at 25°C. for one hour.

The bleached yield of semi-chemical pulp by multi-stage bleaching is about 55 to 65 per cent on B.D. Wood. The strength properties are well-developed.

IV. **Mechanical Pulps :**

Percxide Bleaching: This is the most common method. The peroxide bleach liquor is mixed with the pulp and after the reaction is over, the pulp is reduced and neutralised to the desired pH.

The batch system or the continuous system can be adopted for the peroxide bleach. The continuous system has the following advantages :—

1. The decomposition of peroxide bleach solution in storage is avoided since the various chemicals can be added directly to the pulp.

2. The proportions of the chemicals can be altered instantaneously.

3. General over-all cost is less.

Previously it was supposed that the nascent oxygen obtained as a result of the decomposition of peroxide was responsible for the bleaching action, as under :—

$$H_2O_2 — H_2O \text{ plus } O \text{ (nascent)}.$$

But now it is believed (17) that the peroxide dissociates as under :—

H_2O_2—H plus H O_2 and it is HO_2 ions that do the bleaching.

The following factors have influence on the peroxide bleaching:

1. *Stability of Hydrogen Peroxide Solution :* Under adverse conditions the H_2O_2 decomposes to give nascent oxygen. Copper, iron, manganese etc. work as catalysts. Silicates, pyrophosphates and fluorides etc. are used as stablizers, the silicates being the most commonly used.

2. *Fresence of Reducing Agents.* Pulp itself can work as a reducing agent under certain conditions, but it can be avoided by its pretreatment (18) with 0.5 per cent chlorine at pH between 5 and 9, preferably between 6 and 7. The mixing should be very quick, since the quantity used is too little and can be easily absorbed. Pulp can also be conditioned with mineral acids at pH below 3.0. This is particularly effective for high density bleaching (19).

3. *pH of the Reaction and Alkalinity :* The optimum pH is between 10 and 10.5 (17). This can be adjusted by the use of H_2SO_4, sodium silicate or caustic soda.

4. *Temperature :* It depends on the consistency. The preferred temperature is 100-150°F.

5. *Peroxide Concentration ;* It is am important factor and can be expressed as H_2O_2 based on B.D. pulp, provided consistency is always kept constant. The commercial H_2O_2 is never 100 per cent and hence concentration of H_2O_2 solution should always be mentioned.

6. *Pulp Consistency* : H.O. Kauffmann (18) shown that with increassing the consistency of the pulp, if all other conditions are constant, the brightness increases about 300 per cent for the same chemical cost. This is because H_2O_2 concentration is increased without increase of H_2O_2 on B.D. Pulp. The high density bleaching is most efficient if preceded by a short hypochlorite treatment.

7. *Time* : depends on various factors (17).

8. *Reducing and Neutralizing* : It is done after the reaction with H_2O_2 . 3 to 5 per cent consistency is better at the stage and SO_2 is most commonly used. Filtered sulphite acid or sodium metabisulphite are also used. The pH- is lowered to 6 to 7 and thus the residual H_2O_2 is completely destroyed. For still lower pH values the minimum amount of reducing agent is used and further decrease in pH is effected by an alum or H_2SO_4.

9. *Action of microorganisms*: The mechanical pulps are very susceptible to bacteria, algae and fungi. They should be used soon after grinding. R. T. Mills and Associates (20) have studied the effect of bacteria and enzymes.

The quality of the wood used and the pulping procedure followed effect the quality of the bleached pulp obtained. The bulk, freeness, strength and opacity are not much changed as a result of bleaching.

B. **Hypochlorite Bleaching.**

Ralph M. Kingsbury and Associates (21) describe the comparison between 2 per cent sodium peroxide bleaching and 10 per cent available CL_2 as hypochlorite bleaching.

For hypochlorite bleaching the rate of reaction should be decreased during the first few minutes. This can be done by the adjustment of density, temperature, and pH. Pre or post treatment of the pulp also improves brightness. The use of sodium silicate as buffer is also very good.

The effect of variables is as under :—

1. *Density* : 6 per cent density is considered to be the best.

2. *Temperature :* Temperatures above 35°C. do not seem to be advantageous for retarding the initial reaction. A moderate temperature depending on its specific use, should be used.

3. *Alakalinity* : The increase of initial pH to 10 to 11 may cause an increase of 3 points in the brightness as the initial reaction is retarded. The final pH should always be on an alkaline side. Sodium silicate improves bleaching and

sodium metasilicate alone or with lime or caustic also has a good effect. Besides buffering, the silicate decreases the yellowness.

If sulphurous acid is added at the end of reaction with hypochlorite to destroy the residual alkali, it is not necessary to wash the pulp. If a pH of 5 or less is thus obtained, the brightness will increase by 1 to 5 points.

Generally mechanical pulps respond better to hypochlorite than to sodium peroxide, but the brightness is less stable.

C. Hydrosulphite Bleaching :

It is used for bleaching mechanical pulp. Ferguson (22) describes a new method for preparing the bleach liquor for hydrosulphite bleaching as practised in various mills at Ocean Falls in U.S.A.

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POPULARISATION OF SCIENCE

Science Clubs: Information has been obtained that there are a large number of persons interested or actually working in South Asia in some sort of science clubs on the models of the Science Clubs of America. The biggest handicap reported in organising these clubs in India is the meagreness of a regular school science course with the consequent lack of elementary equipment. Certain field studies, however, do not call for a heavy expenditure on equipment. With the assistance of *Unesco*, a science teacher published a brochure "Suggestions for Science teachers in war devastated areas" which suggests means for improvising smal' pieces of apparatus. This book may be available with *Unesco's* Sales Agents, Oxford Book and Stationery Co., Scindia House New Delhi. What is, however, most needed is infusion among young children a spirit of scientific enquiry. Hobbies of collecting specimens, field information, etc. are the primary methods. The sponsor or the leader of such clubs initiates the basic general knowledge of science which is later supplemented by class room lessons. The activities of the clubs will relate this knowledge to things seen around.

Science Writers' Association: On a higher level, an organisation of science writers is another factor in this movement for popularisation of science. There is no dearth of people who are contributing science columns to newspapers or popular scientific Journals. An organisation of science writers may try to do two things immediately - ensuring a correct conception and reporting of scientific activities by insisting on panelled writers for the news papers and journal (much mischief is done by reporting science as a devil's or magicians' workshop and also by faulty analogies to simplify matters which clash with students' subsequent knowledge in the classrooms) and arranging a regular reporting of country's own scientific researches in different centres. This later job has prepared in other countries valuable ground for receiving patronage to scientific research and for recognition of scientists as useful elements for planning and executing welfare schemes for the community in fields of health, food, shelter and other amenities of life.

The Division of Popularisation of Science in *Unesco* Secretariat at Paris are at the present moment collecting information on the available means for similar work in different countries. Some memoranda have been prepared for guidance of organisations (not for individuals) interested in science clubs and science writing. This Office is willing to establish contacts between those interested in the subjects outlined above and the Division of Popularisation of Science.

From *Unesco* occasional Bulletin No. 28

Comparison of Geostrophic winds with observed winds in Indian Latitudes

By

V Vittal Sarma

The relation of wind force to barometric gradient is of fundamental importance to modern meteorology. Sir Napier Shaw in his introduction to the report on the calculation of wind velocity from pressure distribution (MO. 190 London. MO. Early papers) says "The whole question of the cause and meaning of the discrepancies between the gradient wind and actual wind is of course bound up with the origin of pressure difference. To put the point in a crude form, I do not know, whether in practice the winds have to adjust themselves to the pressure distribution or the pressure distribution is the result of the motion of the air. It is a case of action and reaction in which each modifies the other." Much attention has been paid to this subject in the foreign countries. In India, the first attempt to compare winds derived from sea level isobars with observed winds was by Ishaque (IMD Sc. Note Vol. 1 No. 1). For want of upper air temperature data, he could not extend the comparison of observed winds at upper levels with isobaric winds at the corresponding levels.

Since the second World War, daily observations of upper air temperature and humidity are available from a net work of stations in India and neighbourhood and the contours of constant pressure surface are being studied by forecasters in India. Hence it is of considerable interest to make a quantitative comparison between the contours of the constant pressure surface and the observed winds.

In the present study a method has been evolved for comparing the geostrophic winds on constant pressure surfaces with observed winds. The differences in heights of the constant pressure surfaces between five pairs of stations in India (listed below) north of 18°N latitude have been calculated using the upper wind data for the two levels viz. 850 mb and 710 mb.

Delhi	—	Nagpur
Delhi	—	Allahabad
Allahabad	—	Calcutta
Karachi	—	Veraval
Veraval	—	Poona

The differences have also been obtained from the data of radiosonde ascents. These values have been compared and correlation-coefficients have been worked out. In order to test the validity of the method of camparison adoped here, similar computations have been made for some cases in the British Isles. Leaving aside tropical cyclones, it has been shown that the assumption of geostrophic wind relation (which neglects the cyclostrophic component) in Indian latitudes has as much justification as in the case of middle latitudes where it has been verified by many workers that the Geostrophic relation holds good. As such plausible explanations for the comparatively lower values of correlation coefficients obtained for the Indian stations have been given. Details of the method and results are being published elsewhere.

A summary of the talk given to the members of the Indian Meteorological Department Unit on 12-8-50 mentioned in the Activities of the Branches in the September issue.

NEWS AND VIEWS

The President Visits Scientific Institutions.

The President, Dr. Rajendra Prasad, recently paid visits to the National Physical Laboratory, the Indian Agricultural Research Institute, New Pusa, the Malaria Institute and the Indian Meteorological Department Observatory at Lodi Road, New Delhi. It is reported that at each of the places he visited, the President showed very keen interest in the work being carried out and made several enquiries. Such visits from the Head of the State are always valuable and it is hoped that the increasing interest shown by the President in the scientific work would go a long way in creating a bias for science.

Scientific Farming.

The President at the time of his visit to the Indian Agricultural Research Institute at New Pusa remarked that the best service that agricultural scientists could render to the country was by finding ways and means to make India self-sufficient in food. He considered that when scientific methods had succeeded in other countries they could certainly help to raise the food yield in India also. The endeavour of the agricultural scientist should be to evolve such methods as would be practical and applicable to Indian conditions. It will be recalled that in our August 1950 Editorial we had expressed the necessity of fortifying our Agricultural Front.

The need for scientific farming was also stressed by Dr. B. C. Guha, a member of the Damodar Valley Corporation and the Vice-President of the Association of Scientific Workers of India. Speaking at the weekly meeting of the Calcutta Rotary Club, Dr. Guha said that science could accept the challenge of producing the food that was necessary for proper nutrition of the country. Unfortunately, the problem was not merely scientific but involved socio-economic problems. Production on scientific lines requires co-operative or collective farming which was hindered by the present land tenure system. It was possible to get even 20 per cent more cereals by adopting scientific methods of cultivation.

A report has been received from the Central Rice Research Institute, Cuttack that they have discovered two early maturing and high yielding varieties of paddy of Chinese origin which are suitable for Orissa conditions. The Institute has been making a systematic study of different varieties of paddy and during the last year investigated the performance of 82 varieties of paddy. The Institute is also investigating the prospects of two crops in a year. This is possible by making use of the varying periods of maturity required for different varieties of paddy and other methods of cultivation.

The Madhya Pradesh Government have appointed an Agricultural Policy Committee who have investigated, during the last year, into the agricultural methods and policies obtaining in the country to adopt some sound scientific pattern for the development of agriculture in the Madhya Pradesh. Mr. Khankhoje who is the Chairman of the Committee has asserted that if India were to achieve economic prosperity she would have to develop agriculture on modern scientific lines.

National Laboratories.

Two ceremonies relating to National Laboratories were held recently. The Ceramic and Glass Research Institute was opened at Jadavpur on 26th August 1950. The Foundation Stone of another Institute, the Central Road Research Institute, was laid by Hon'ble Mr. N. Gopalaswami Ayyangar, the Transport Minister, on 6th September 1950. The Institute is located at New Delhi.

Technical Terminology.

It is reported that an All-India Board is very soon to be set up to go into the question of evolving a uniform scientific terminology for the whole country and preparing text-books on

scientific subjects. The Board is expected to be set up as a result of the implementation of the decision of the Central Advisory Board of Education which has recommended the adoption of international scientific and technical terms by Indian languages. The main object of the All-India Board is expected to be to avoid un-coordinated development of scientific and technical terms in different regional Universities. The formation of such a Board is at present under the active consideration of the Ministry of Education and no doubt it will consist of prominent scientists and philologists.

New Power Sources.

Scientists in all parts of the world a watching with close attention work now going on in the town of Wairakei, on New Zealand's Northern Island where engineers are trying to harness the earth's heat for the generation of electricity. The Government is to spend £ 80,000 to investigate the spurting geysers, blow-holes and mud pools in a search for vast reserves of natural steam.

Research for new sources of power goes on. There is investigation into power from water and wind and also from tides. The most significant investigation, however, is concerned with direct utilisation of the sun's energy. All known power sources, with the exception of tidal power derive their energy from the sun. The possibilities are tremendous. The British thermodynamics expert, Prof F. E. Simon, has declared that a total area of the size of Egypt would, given certain assumptions, be sufficient to supply power for the whole world. He has no doubts, however, that direct power from the sun will certainly not be used on any large scale within, say, the next 50 years (UNESCO).

The Fiftieth Anniversary of the Discovery of Radium.

The fiftieth anniversary of the discovery of radium by Pierre and Marie Curie has been celebrated on the 16th of July, in Paris, at the Ecole de Physique et Chimie of the Municipality of Paris, under the Presidency of Mr. Louis de Broglio, of the French Academy, perpetual Secretary of the Sciences Academy and Nobel Prizeman. Mrs. Irene Joliot-Curie and Eve Curie were present, also representatives of the Municipal Council and several delegates of French and Foreign Societies.

Three commomorative tablets have been inaugurated. One in the room where the radium was discovered, the second on the main facade of the School, and the third on the building of the Rue de la Glaciere where Pierre and Marie Curie lived when happened their discovery.

Several speeches were delivered, particularly by Prince de Broglio who emphasized the importance of the radium's discovery in achievements of modern physics, and by M. Boreau, President who facing modern world preoccupations evocated this phrase of Pierre Curie whose he was a pupil : "I belong to those who believe that the achievements of discoveries will bring more good than harm to Humnaity."

(*News from France*).

The 5th International Congress on Cancer.

The session of the 5th international Congress on Cancer ended on July 27th. Doctor Jacquos Iavodan, Head of the Curie Foundation pointed out that the Congress had not revealed any new theory or medical treatment bearing a definite importance. An interesting appraisal of the work done in research since 1947, date of the last Congress, has been made, new ideas and discoveries are announced every day by the Academies and Cancer Institutes, every three years meetings such as this Congress open the possibility of summarizing the results acquired by the scientists of all over the world.

(*News from France*).

Dr. V. R. Khanolkar, President, Bombay Branch, Association of Scientific Workers of India and Head of the laboratories of the Tata Memorial Hospital, Bombay attended the session.

Impact of Scienee on Society

The Natural Sciences Department of Unesco have started a new Quarterly called IMPACT of SCIENCE on SOCIETY. In the foreword the editor has stated that the IMPACT has come into existence because it is believed there is more need than ever before to understand what is IMPACT of Science on Society. Its task is to collect information on the various aspects of the international and social implications of science and to present the material in the form of abstracts so that it is readily available. The first issue contains the introductory statement on how science impinges on society and a bibliography giving details of the main historically important literature in English. It also contains current abstracts of reports on addresses given by leading scientists on such subjects as— (1) Science and Society, (2) Food for Twice as many, (3) 10 Million Scientists and (4) The Encouragement of Science.

Orders for the publication should be directed to book-sellers of Unesco Publications.

Science Comes Home

The University of Delhi has started a B.Sc., course in Home Scince at the Lady Irwin College, New Delhi. Very recently Dr. S. N. Sen, the new Vice-Chancellor of the University of Delhi inaugurated the course at a function presided over by Rajkumari Amrit Kaur. Dr. Sen emphasised the importance of Home Science in the courses of study now offered by the University.

ACTIVITIES OF THE BRANCHES

Abdullapur Branch

A meeting of the Abdullapur Branch was held on 19th July 1950 in the United Mills Club of Shree Gopal Paper Mills Ltd. Dr. J. C. Aggarwal presided. Shri Amrit Lal read a paper on "Bleaching of Pulp". A summary of the paper is given elsewhere in this issue. A film showing the manufacture of Drying Cylinder of a Paper Machine by Walmsleys (Bury) Ltd., also giving other manufacturing activities of the House of Walmsleys, was shown on the same occasion.

Another meeting of the Branch was held on Tuesday, the 19th September 1950 at 6.30 P.M. in the Sarswati Sugar Mills, Abdullapur. Lala Har Bhagwan, Manager of the Sugar Mills, presided. Mr. Alfred John Hinton of the Indian Sugar and General Engineering Corporation Ltd.. Abdullapur gave a talk on "An Engineer in Occupied Germany". His talk was highly informative and was followed by an interesting discussion.

After the discussion, Shri P. K. Nanda, Assistant Manager (Tech.) of S. G. P. Mills Ltd. bid farewell to Shri Suresh Chandra, Vice-President of the Branch and Chief Chemist of the Sarswati Sugar Mills. Shri Suresh has resigned his job and is leaving Abdullapur shortly. Mr. Nanda dealt with the qualities of head and heart of the friend who was leaving them. He also mentioned about the very active interest that he (Shri Suresh Chandra) had always been taking right from the beginning when this organisation was started as the Scientific Society of Abdullapur and even after its merging with A. S. W. I. as Abdullapur Branch.

The Chairman, Lala Har Bhagwan, associated himself with what was said by Shri P. K. Nanda about Shri Suresh Chandra. He then gave a review about the talk by Mr. Hinton and highly appreciated the same.

The meeting was then dispersed with a vote of thanks to the Chair.

Bombay Branch

The Tata Memorial Hospital Unit.

A lecture was arranged in the month of July 1950 by the Tata Memorial Hospital Unit of scientific workers. The chief speaker was Madame Gandy, a scholar of Latin, Greek and French and wife of Mr. Andre Gandy, Head of the Physics Department (Tata Hospital). She was specially invited for the occasion. She gave a very informative talk on the educational system in France. She dwelt upon the compulsory nature of primary education there, the relations between the teachers and the students and special attention of the government regarding the mental and physical developments of students. The audience enjoyed her talk with full appreciation. She also gave appropriate answers to the numerous questions put to her by the surgeons and doctors.

The Unit of the A.S.W.I. at Tata Memorial Hospital presented garlands to Mr. Andre Gandy, E. P. C. I. (Paris) the Head of the Radium and Physics Department of the Hospital and Madame Gandy on the eve of their departure from India for their homeland, Paris. Mr. Gandy was closely associated with the Laboratory and he has given two years of his service to the Hospital He was a member and an enthusiastic supporter of our Association. He took a keen interest in the welfare of scientific workers.

Delhi Branch

A. D. G. I. & S. Unit.

1. The following films were shown at D. G. I. & S. Unit by courtesy of D. G .I & S. authorities and U. S. I. S.

(a) Valley of the Tennessee (Hindi version).
(b) Pigs in Progress.
(c) To a Great Visi n.

2. Another film show was arranged at the same Unit by courtesy of D G.I. & S. and B.I.S.

(a) Radio Servicing
(b) It Need Not Happen
(c) New Crop
(d) Co-operative Research in Industry.

B. Food Ministry Unit.

A film show was arranged by the scientific workers of the Food Ministry Unit on 31.8.50 by courtesy of the Food Ministry authorities and B.I.S. The following films were shown :—

1. Approach to Science.
2. A.B.C.D. of Health.
3. Potatoes.
4. Rat Destruction.
5. Food Poisoning.

Naihati Branch.

A General Body Meeting of the Branch was held on 31.8.50 and the following two resolutions were unanimously passed at the meeting :—

(1) "This meeting of the Association of Scientific Workers of India's, Naihati Branch most emphatically protest the dismissal of Prof. Joliot-Curie, President of World Federation of Scientific Workers and Parmanent Committee of World Peace Congress, from the post of High Commissioner of Atomic Commission and condemns the action of the French Government and demands his immediate reinstatement".

"This meeting calls upon millions of people of this country and abroad, the partisans of peace, workers, peasants, men, women and youth - all the people of good will, irrespective of political views, colour of the skins, religious convictions, or social status all to whom life is sacred and dear, to stand most resolutely against the aggressive policy of the French Government in dismissing Prof. Curie, who stands at the head of World Peace Movement and devotes all his knowledge, experience and singular ability to the utilisation of Atomic energy for the benefit of humanity.

"Resolved that a copy of this resolution be sent to the Head Quarters of the Association with a request to forward it to the French Ambassador in New Delhi."

(2) "The meeting of the Association of the Scientific Workers of India, Naihati Branch, observe with deep concern the report published in Vijnan-Karmee regarding the autocratic rules of the authorities of D.C.M."

"The Branch endorses the action taken by the Delhi Branch of the Association and assures them that the entire scientific workers of India are behind them. Further this meeting urges the Central Committee to take the matter very seriously as in the opinion of this Branch this is a direct challenge to the very existence of the scientific workers. The Branch is also very much concerned over the reported indifferent attitude of the Directorate of Industry and Supply, as published in the same issue of Vijnan-Karmee.".

"Resolved that copies of this resolution be sent to Head Quarters of the Association and also to the Secretary of the Delhi Branch of the Association."

Poona Branch.

The Annual Independence Celebration of the Branch came off on the 15th August when Dr. S.K.K. Jatkar, Professor of Chemistry, Poona University gave a very interesting lecture. A scientific and educational film show was held in the Assembly Hall of the Nutan Marathi Vidyalaya High School on Saturday, the 2nd September 1950.

A second memorandum in connection with the revision of pay scales of scientific workers in the PH and PW Units has been submitted to the Government of Bombay in the Department of Public Health.

A deputation consisting of representatives of the Kirkee Association waited upon Lt. Col. Chaudhary of A.G's Branch when he was on tour at Kirkee and discussed with him several questions affecting the service conditions of scientific workers of the Ordnance Establishments.

Bangalore Branch.

The Branch has made arrangements with the Scientific Film Society and it is expected that there will be regular film shows every month. The Branch has become a corporate member of the Film Society. The following films were exhibited in September 1950:—

(1) The Discovery of a New Pigment.
(2) The Story of Penicillin.
(3) Water.

The Branch have also recently started a 'study group' in which all the members can take part in discussing highly important and serious subjects. Recently, there was a talk by Dr. G N. Ramachandran on "Physical Basis of Life"—A New Thesis put forward by Prof. J. D. Bernal. Similarly, there was lively discussion on "In Defence of Peace".

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Our diet

CAN IT GIVE MORE STRENGTH?

OUR DIET can certainly give us more strength. Food factors like proteins, minerals and vitamins will ensure that. But these three factors also require the help of fats and carbohydrates which supply the body with "fuel" or energy. In other words, for full health and strength, we must eat a balanced diet in which all the five food factors are present in their correct proportions. Here are some of the foods that make up a balanced diet. You should eat daily one or more from each of the five groups: potatoes, wheat, rice, millet (carbohydrates); dal, milk, nuts, eggs, fish, meat (proteins); amlas, carrots, tomatoes, lemons, papayas (vitamins); brinjals, drumsticks, lettuce, spinach (minerals) and *fat* like *Dalda* which is pure and energy-giving.

VIJNAN-KARMEE

VOL. II September, 1950 No 9

NEED FOR A SCIENTIFIC OUTLOOK

We have published in this issue an address on "Science for Survival" by Dr. Detlev W. Bronk, President, Johns Hopkins University, U. S. A. which appeared in the "Canner" of February 18, 1950. Dr. Bronk has stated that the U. S. A. has become a great world power and this position is due to the achievements of the Scientists and Engineers who have helped to create a civilisation largely based on science. Dr. Bronk maintains that science is more than the means of improving human welfare. It is the necessary agent of mere survival. Older means of life have passed. With increasing population mere survival now depends upon science, lest life be suppressed by starvation. The life of modern civilisation which centers in towns and cities would be quite impossible without the use of science and technology. Survival depends upon the growth of science by more research. A nation that has sensed the satisfactions brought by science will not be content to suffer decay through ignorance and indifference.

Dr. Bronk has stated that in a democracy where all should govern, it is tragic that there are but few who understand the meaning and the significance of science upon which their very life depends. The emphasis on the practical value of science is not new but it takes on new significance because of the growing dependence upon science. The future of a nation would depend on the understanding of science.

The above are the views of a scientist in the U.S.A. where the application of science for technical developments has at present reached its maximum. Dr. Bronk considers that science and scientific research are still necessary for the survival of the nation. We in India have practically no scientific development and the proper value of science is not realised by those who are at present in the Government of the country. This could be seen from the fact that there is not even one scientist on the Planning Commission which is to evolve plans for industrialisation of the country and for raising the living standard of the people. There has been some awakening as could be evinced from the fact that the Government is helping to set up a few National Laboratories but the application of science for technological developments is very slow.

This country unfortunately lives on prejudices which hamper the progress of the nation. One of the objects of this Association is to take steps to remove prejudices, superstitions and other institutionalised social habits and customs inhibitory to progress and generally to inculcate the scientific spirit among the people. We were given some hope when we saw, as reported in our June, 1950 issue that some members of the Parliament went on study tour to the industrial areas of the country to see for themselves the awakening in the industrial field and the progress made. Unfortunately, it appears from the discussion which took place in the Parliament on Pandit Thakur Das Bhargava's Anti Vanaspati Bill that the prejudices against scientific development still persist in the minds of the Representatives of the People. In our editorial on "Fat and Food" in the November 1949 issue, we made a reference to the fact that the Ministry of Food had appointed a special committee to enquire into the acceptability or otherwise of Vanaspati as a good healthy foodstuff. The Committee has now given their opinion that Vanaspati is not deleterious in any respect. The Committee appointed by the Ministry of Food consisted of scientists. When the report of this Committee was referred to in the Parliament some members questioned the integrity of the scientists and ascribed dishonest motives, as regards the scientists. This is a painful fact that a report of a Scientific Committee should be treated in this manner in the House of the People. It is necessary for this Association to try its utmost to remove the prejudices against science and scientists and to see that the Indian scientists find a place in the Counsels of the Nation. Those who are responsible for the uplift and welfare of the country must appreciate science, casting off false prejudices. Dr. Bernal in his address to the members of the Association at Delhi referred to the work of the Parliamentary Group which the Association of Scientific Workers in the U. K. had set up to work with the Members of the Parliament and to keep them informed of scientific developments. We think that it is now necessary for us to follow the lead given by the U. K. Association and set up a Parliamentary Group in this country. Dr. Bronk has stated that for America science is a necessity for survival. We think that scientific outlook is first essential for the uplift and social welfare of this country.

FOREST RESEARCH

We have published in this issue an account of the history and development of the Forest Research Institute at Dehradun. From the account given it will be seen that we have in this country a fully equipped and well staffed institute for carrying out investigations on problems connected with the development of forests in India. In this connection we would like to refer to an item under News and Views

in the May, 1950 issue of this journal wherein we had referred to the stress laid by Sardar Patel, the Deputy Prime Minister, on the necessity of planned scientific exploitation of the timber resources of the country based on the principles of preservation and replacement.

The recent Vana-Mahotsava and Tree Planting week observed in India has served to focus the attention on this very important side of development. Afforestation of all the available areas in the country is now an accepted principle.. The only point to remember in executing such a policy is that it must be based on scientific forestry. We are glad to note that the Government of India have recently constituted a Central Board of Forestry to co-ordinate and integrate the forest policy pursued by the different States, to integrate plans for use of land and national reconstruction and to co ordinate Forest Research. Full use must be made of the facilities available at the Forest Research Institute, Dehradun.

SCIENTIFIC EQUIPMENT

The Association of Scientific Workers of India in a Resolution passed at the 3rd Annual General Meeting of the Association held on 4th January, 1950 at Poona urged that the Government and the Industry should provide suitable facilities to the Scientific Workers for carrying out their scientific work. The scientific equipment forms an important part of the facilities so required. In our July, 1950 issue of the journal we had welcomed the attempts made by the Department of Scientific Research for getting scientific instruments exempted from import duty. We had also stated that we were collecting information regarding the difficulties experienced in obtaining the scientific equipment required by scientific workers in different institutes. In this issue we have published two letters to the Editors which narrate the difficulties experienced in importing scientific equipment required for use in this country. The Government of India have now temporarily put scientific instruments under the Open General Licence up to the end of December, 1950.

The Editorial in Current Science of June, 1950 has made a plea for the establishment of the Scientific Supplies Stores in India. A reference is made to the difficulty and unhappy position in which scientific workers in India have continued to find themselves with regard to the supply of essential research equipment, an irritating position which has been helplessly and patiently tolerated all these years. We do not consider however that the blame put on the scientific workers for this unhappy position is justified. The scientific workers do not even get sufficient remuneration for their work to meet the living expenses. How could one, therefore, expect them to orga-

nise precision instrument shops and fine chemicals factories ? The Editorial makes a reference to the few feeble and inconsequential attempts made in this direction but at the same time mentions that they did not secure the support they deserved. As far as we know these attempts were made by scientific workers themselves and the causes of their failure need no explanation.

The Editorial in the Current Science has referred to this Association as one of the learned bodies in this country who could give their expert opinion on the solution of this important problem of scientific supplies. We make no pretence to being included in the list of learned bodies but we are trying to give all the attention we could to this subject which we consider as vital for the development of science in this country.

There are two sides of this question. The scientific supplies are obtained by import from outside and from indigenous production. We hope to publish in the near future an article on the development of the Scientific Apparatus Industry. We realise that while we could easily manufacture the ordinary scientific apparatus in this country we shall have to go on importing special scientific apparatus and precision instruments for a few years to come. Under the present circumstances there is a place for the importers and distributors if they could do the job properly and with responsibility and enlightened outlook. The importance of the part played by a distributor of scientific supplies is in many cases not realised by the distributor himself. Increased scientific education in the country is going to create an ever-increasing demand for scientific apparatus and the distributor should co-operate fully with the scientific workers in order to help in this development.

OUR INSTITUTES

* *Forest Research Institute and Colleges, Dehradun.*

(1) History of the Institute—Forest Research:—

A Forest School was founded at Dehradun in 1878 for training Rangers and Foresters by the then Local Government, the Government of North West Provinces. This School was transferred to the Government of India in 1884 and was designated as the Imperial Forest College. The first research post of Forest Entomologist was created in 1900. The School developed gradually into a centre of forest research and became a recognised centre of Forest Research in India in 1906 when staff was appointed to investigate problems connected with the growing of forests and utilisation of forest products. This Research Institute began with Silviculture, Economic Botany, Entomology and Chemistry Branches.

Very soon it was felt that the research branches should have increased accommodation and in 1914 the F.R.I. moved to a well-built and

* By the Courtesy of the Publicity and Liaison Officer, Forest Research Institute, Dehra Dun.

well-equipped estate at Chandbagh in Dehradun, where the activities of all branches progressed steadily. This estate included the Forest College for training Provincial Forest Officers.

In 1921-22 the Economic Branch (later on called the Utilisation Branch) was considerably expanded to include well-equipped sections of Timber Testing, Wood Workshop, Mechanical Engineering Shop (Sub-Section), Wood Preservation, Wood Seasoning, Paper Pulp and Wood Technology. With this development and because of the demands made on the Institute for research during the first war it was realised that the accommodation available at Chandbagh was inadequate and did not give scope for the much needed expansion. Therefore, the New Forest Estate, 4 miles outside Dehradun was planned on a comprehensive and self-contained basis. It was built to include an imposing main building, a number of laboratories and workshops and residential accommodation for staff and officers. It also includes the Central Library, 4 Museums (Timber, Silvicultural, Entomological, Minor Forest Products), an extensive Herbarium, Demonstration Plantation Experimental gardens. The Institute moved into its present site in New Forest estate in 1929 and made rapid progress. Especially during the second war the different branches were called upon to take up many and varied problems which it solved satisfactorily to help the War effort in many ways. It then became apparent that the demands made on the Institute especially as regards the utilisation side of the Institute's activities were so heavy as to call for a complete re-organization especially because the machinery had become too old and required replacement by more modern machinery.

Under this Re-organisation scheme the Utilisation Section was split up in 1947 into various branches viz, Wood Working and Timber Mechanics, Composite Wood and Wood Preservation, Wood Seasoning, Cellulose and Paper and Wood Technology. A new Statistical Branch was created for ensuring that the experiments were designed on a statistically acceptable basis and that the data from experiments were statistically analysed before conclusions were drawn. A Publicity and Liaison Branch was set up to serve as a general service branch, to be in charge of all publications work, to effect liaison between the Institute and various provincial forest departments and forest industries and to publicize the work of the Institute. The other four original branches of Botany, Silviculture, Entomology and Chemistry were also suitably expanded and re-organised.

Recently the branches have again been reorganised and expanded to include 10 branches dealing with Timber Products, 5 Biological Branches and One Publicity and Liaison Branch apart from the two colleges. A chart of the revised organisation is attached.

Scope.

Forestry Research, Forest Products (utilisation) research, training in research methods and training of personnel, correlated industries and Forest Education.

Colleges.

A college for training forest rangers which had started in Dehradun in 1878 continued to work regularly, except for a break of 2 years in 1933 and 1934. In 1912, a two year's provincial forest course for recruitment of gazetted provincial service officers was started at Chandbagh but it was closed in 1928 and in its place the new Indian Forest Service Course was started which too had to be closed in 1932 in the days of economic depression. In 1938 the Indian Forest College was re-started for training personnel for the gazetted forest services in the provinces and states and has since been working steadily.

Progressively increasing demands have been made on the accommodation in the Indian Forest College since the last war, largely as a result of post war expansion schemes. These demands were met by doubling the number of classes taken each year in the two colleges, but

this could not be done indefinitely without jeopardising the efficiency of instruction. Consequently the Government of India decided in 1948 to take over the Madras Forest College at Coimbatore and to run it as a Central Government Institution under the auspices of the Forest Research Institute. It has now been expanded and equipped so as to train, like the Colleges at Dehradun, 70 rangers and 30 forest officers annually. However, the position has somewhat changed because of financial stringency with the result that there is now only one senior officers class at Coimbatore and no recruitment has been possible for the junior officers's class for that college.

Chart of the revised organisation of the Forest Research Institute & Forest Colleges, Dehradun.

Accounts. President. Registrar.

Vice-President

Wood Working Branches.

1. Cellulose & Paper.
2. Chemistry of Forest Products.
3. Composite Wood.
4. Minor Forest Products.
5. Service (Workshop).
6. Timber Engineering (to be constituted).
7. Timber Mechanics.
8. Wood Anatomy.
9. Wood Preservation.
10. Wood Seasoning.

Director of Forest Education
&
Publicity & Liaison Officer.

Colleges

Directors, Rangers Colleges.
Principal, Forest Colleges.

Biological Branches.

1. Botany.
2. Entomology.
3. Mycology.
4. Silviculture.
5. Statistical.

The Head of the Institute is designated as President, Forest Research Institute and Colleges. List of Officers who held charge from time to time is given below :—

Name.	*Period.*
Sir Eardley Wilmot	1906-1908
Mr. L. Mercer	1908-1916
Mr. B. B. Osmaston	1916-1919
Mr. W. F. Perree	1919-1925
Sir A. Rodger	1925-1930
Mr. A. D. Blascheck	1930-1933
Sir C. G. Trevor	1933-1937
Sir L. Mason	1937-1940
Sir S. H. Howard	1940-1944

Mr. C. E. Simmons	1944-1945
Mr. D. Stewart	1945-1947
Mr. C. R. Ranganathan	1947-

The pioneer workers in the Institute included the following 4 officers :—

Mr. R. S. Troup	...	Silviculturist
Mr. R. S. Hole	...	Botanist
Mr. E. P. Stebbing	...	Entomologist
Mr. R. S. Pearson	...	Utilisation Officer

Later workers of note are mentioned below :—

Mr. H. G. Champion	...	Silviculturist
Dr. C. F. C. Beeson	...	Entomologist
Dr. S. Krishna	...	Chemistry.

In addition to the above almost all the officers and research workers in the Institute have contributed towards scientific development with regard to the Biological and Timber Products Branches on which the work has been carried out at the Institute. However, without making any invidious distinction a few names may be mentioned as below :—

Mr. H. H. Haines	...	F. Botanist
Mr. E. Marsden	...	Silviculturist
Mr. H. Trotter	...	Forest Economist (Utilisation Officer).
Mr. H. P. Brown	...	Wood Technologist.
Dr. K. A. Chowdhury	...	Wood Technologist.
Dr. D. Narayanamurti	...	Composite Wood- and Wood Preservation Officer.
Mr. W. Raitt	...	Paper Pulp Officer.
Mr. A. D. Imms	...	Entomologist.
Mr. R. N. Parker	...	Forest Botanist.
Mr. P. C. Kanjilal	...	" "
Dr. D. L. Bor	...	" "
Dr. K. D. Bagchee	...	Forest Mycologist
Mr. Puran Singh	...	Forest Chemist
Mr. J. L. Simonsen	...	" "

SCIENCE FOR SURVIVAL *

By

Dr. Detlev W. Bronk

President, Johns Hopkins University.

Four years have passed since we achieved freedom from the immediate threat of violence by war, but in those four years we have formed no clear vision of new objectives. There is no unity of purpose which transcends selfish aims and stirs our hopes and courage. On the contrary, there is doubt and dissidence and paralysis of purpose that could lead to defeat by fear.

There is fear of the spurious unstable power of totalitarian nations. Doubt shakes faith in our ability to maintain our democratic institutions and preserve freedom for individual action. There is fear that we shall be unable to sustain our economic system based upon free enterprise. Doubting the ability and motives of others, men goaded by the hysteria of fear abandon co-operation for persecution and carping criticism. The spectre of want anomalously haunts the timid citizens of a nation envied throughout the world for its achievements and its resources. We live in an anomalous age in which knowledge of men and

* Reproduced from the Canner, February 18, 1950 by kind permission of the Editor of the Journal. The address was given at the 43rd Annual Convention of the National Canners' Association held in Atlantic City N.J. (U.S.A.) January 24-31 1950.

natural forces gives us undreamed-of powers, but powers which stimulate more fear than faith and courage.

Day after day, scientists add laboratory-created materials to our vast store of natural products, but there is lack of confidence that we can make those material resources generally available to those by whom they are desired.

Fetters of Fear.

Communication between the peoples of states and nations requires but moments, and yet we fear that the new means of communication may be used by few to dominate the thoughts of many. The friendly meeting of peoples of widely separated areas is accomplished in a few brief hours, but these new modes of transportation are feared as means of attack and invasion. Our unseen enemies of disease are being vanquished and the span of life increased, but the brilliant hope of medical progress is tarnished by fear of economic limitations on its usefulness, and by the spectre of over-population made possible by medical progress.

Whenever I think upon such matters in Washington, I must confess that I am shocked to sadness that fear could sap the confidence and courage of so many who have so little faith in the vigor and rightness of American ideas. In that magnificent city, which is a symbol of the freedom of individuals to participate in the direction of their social destiny, fear for the future seems a shameful thing. Whenever I look upon the dome of our Nation's Capitol, it seems unthinkable that 150,000,000 free Americans, fortified by knowledge, should have less faith in the future of democracy than did our ancestral pioneers.

Through the faith and efforts of its builders our nation has grown in stature to the greatest nation in the world, heavy with responsibility but endowed with vast powers for great achievement. Now, as in the days of our nation's founders, the rights of the citizen are still a primary right of our democracy.

The most precious of those rights is the privilege of participating in the government of the people by the people. Thus the share in shaping the future of the nation is the most important of our responsibilities. Government of the people, by the people, for the people, has never been free from the threat of those who seek for selfish power. Today the selfish few have available to them the vast powers of science, and they find unwitting allies among the many who abdicate their freedom of thought and action. If we lose that freedom for which our ancestors faced danger and death, it will be because too many are indifferent to the value of the freedom they have the power to maintain.

If a remote government by few ultimately controls the affairs of many, it will be because individuals in craven fear have shirked their responsibility to solve the problems which confront them. Those who belittle our democracy, because of its imperfections, ignore the vast potentialities for improvement by the efforts of individuals who are free to think and act with due regard for the rights of others.

Source of Danger.

Governments possess no superhuman power to solve problems unsolvable by humans, for governments are composed of no more than mortals. Governments exceed the power of individuals only when governments are a focus for the thoughts and efforts of its citizens; therein lies the strength of our democracy. Its future is endangered less by those who would seize power than by the many who refuse to accept their democratic responsibility for the affairs of their nation.

You and I should delude ourselves if we did not admit that civilization is more complex than it has ever been before and that the times are more confused. We should belittle our courage if we did not agree that satisfaction is greatest in doing the most difficult tasks for the greatest stakes. Science is one of our most powerful tools in the achievement of those tasks.

Energy has been harnessed so as to increase without limit the unaided power of men and women. Transportation makes it possible to carry men and food and the supplies of industry so that all the world could, if we would, be one. Communication and vision across great spaces supplement transportation in bridging the barriers of distance. The sciences of climatology and construction provide for man environments suitable for life, no matter where he be—on land, below the sea, or in the upper reaches of the atmosphere. Through science the nature of life itself is better understood, disease is vanquished, health and the span of life increased.

But science is more than the means for improving human welfare. It is the necessary agent of mere survival.

Older means of life have passed. With increasing population mere survival now depends upon science, lest life be suppressed by starvation. The life of modern civilization which centers in towns and cities would be quite impossible without the use of science and technology. All this no thinking man or woman will deny.

Growth Thru Research.

Nor will many deny my next assertion, which is this: Survival depends upon the growth of science by more research. One need not be an historian of nations, one need not be well versed in the ways of human nature, one need not be a scientist to know that men and nations are not static. Human nature and the forces of inanimate nature are such that change there will always be. A nation that has sensed the satisfactions brought by science will not be content, I think, to suffer decay through ignorance and indifference. Nor will the problems which now confront us as a result of scientific achievements of the past solve themselves. They can be solved and our ways of life improved only if research is brought to bear upon new problems created by each new scientific advance.

For Americans, these are times pregnant with responsibility and challenge, for we have become a great world power faced by the necessity for decisions which will shape the future of world civilization, such as the problem of which you and I are all aware on this momentous day.

That America has reached this status is due to the vigor of our people, made vigorous by the exercise of individual effort and initiative, fostered by our freedom to follow the lure of our curiosity and by our ingenuity. That this is so is due also to the achievements of our scientists and engineers who have helped create a civilization largely based on science.

But these are times in which we can not rest in pride and be complacent, trusting false security in our scientific achievements.

Science Against Us.

As a scientist, I would stress three hazards which face us in our present situation. The first is this: We delude ourselves when we talk of living in an age of science. We are among the few people of the world who directly benefit from science. The scientific cultures of America and Western Europe are very different from those of many other regions. If science in America expands without a corresponding development everywhere, there will be a further imbalance of world cultures and world power. There lies a grave threat to the peace and stability of the world.

The use of modern science gives a nation tremendous power and material advantages. Accordingly, it is natural in these days of international tension that these countries in which the practical aspects of science are developed to a high degree should be feared and envied for the benefits they reap.

America, however, has accepted the responsibility to share its technical methods and its knowledge, excepting that of military value to potential aggressors, with all peoples and especially with those who are victims of poverty and disease and ignorance. Such is not the case in

those nations in which science is used as a weapon of aggression to increase the power of a selfish few.

You can rest assured, as do I, that American supremacy and security will not go unchallenged by those who have learned to use science to suppress human freedom rather than to use science as a means for enriching the material and spiritual welfare of every man.

Money for Research.

This threat which we face accents what I consider to be a second hazard in the present scientific situation. It is this :

In a democracy where all should govern, it is tragic that there are but few who understand the meaning and the significance of science upon which their very life depends. You may reply that more scientists and engineers are now supported than ever was the case before. And I could add that the number of industrial laboratories has increased more than tenfold in but a score of years. Private and governmental finance of science has risen from 100,000,000 to a billion dollars. This is true and in our national interest. But much of this is for the practical development of military strength and industry. That, too, is good. But not so good is the fact that there is little realization of the need for free exploration of the frontiers of science and little support for that.

If you would doubt this assertion I suggest that you compare the compensation of scientists in universities and the support of science within university laboratories, with that which is available in military establishments and in industrial organizations. I suggest that you make the comparison as the National Research Council has just done and then recall that the universities have been the breeding grounds for the scientists of the future and the homes of many of the brilliant new ideas upon which practical developments of great value have ultimately been based.

This emphasis on the practical values of science is not new, but it takes on new significance because of our growing dependence on science. Despite that, I would emphasize that the primary and most potent motive of the scientist is curiosity. Science is an intellectual adventure of individual scientists. Do not misunderstand me. I realize that to be an isolationist in science is quite impossible. The course of new discoveries starts from the territory of established knowledge, the genesis of new ideas is catalyzed by the work and thoughts of others. Nor is it reasonable to assume that a division of experimental and theoretical labor is unnecessary for the accomplishment of most scientific tasks. But I know of no evidence which disproves the theses that new ideas and concepts are formed within a single mind. Great scientific discoveries have been made and will be made by individuals who work without direction from others, as surely as will the creation of great music and sculpture and art.

During this period when scientific activities are rapidly increasing, it would be well to consider how to nurture curiosity which is so common in childhood and so quickly suppressed by civilization. Hostility toward freedom for the scientist's curiosity goes back to the days of Bacon who inspired the creation of the great Royal Society. Said Graville, his friend, " Science should first purge itself of curiosity and turn its attention to practical rather than theoretical values, for

" Learning is a bunch of grapes
Hung up among the thorns where but by caution
None the harme can miss."

Curiosity has certainly caused a great deal of trouble from the days of the Garden of Eden to Hiroshima but human nature being what it is, I doubt whether curiosity can ever by suppressed. If curiosity is to benefit mankind, curiosity had best be developed through the agency of the disciplined mind of a scientist, whether he be called natural or social.

This attitude toward the practical values of science at the expense of fundamental exploration has been characteristic of America. Busy with the development of our geographical frontiers and our vast natural resources, American science has largely rested on the foundation of European science. But times have changed. Because of our responsibility for world leadership and the relative abilities of Europe and America to support research, we will not in the future be able to skim off the cream of new ideas to apply for our advantage through technology.

Remaining Frontiers.

Also I would stress with you the fact that our geographical frontiers are gone and only the endless frontiers of science now remain.

I ask you to believe me when I say that in the frontiers of science lies hope for our future welfare and survival. If you will not take this on faith, I would ask you to consider the ways and influence of scientific pioneers who gave no thought as to what was to be the ultimate, practical value of the work they did in following their curiosity.

I was thus led to consider this one Sunday afternoon, as I stood in the Great Court of Trinity College, Cambridge, watching the Flying Fortresses return from one of their aerial assaults against the Nazi's European fortress. As they came over by the score, totaling hundreds, at such an altitude that they seemed to hang suspended in the soft, English evening-sky, I was then reminded that I was standing outside the rooms of Isaac Newton. My great pride in American supremacy was eased a little, for I recalled that in these rooms the laws of gravitation and fundamental principles of mechanics had been discovered. These laws which govern human flight had been discovered with no thought that they would ultimately make possible the defence of Western democracy.

Nor can I go to the rooms of the Royal Institution, which housed the little laboratory of Michael Farraday, without remembering that our great American power industry was made possible by the discoveries of that simple physicist working to understand the laws of nature. When I fly over the granary of America I cannot easily forget Gregor Mendel's contribution to the production of our present food supply because of his discoveries in the gardens of a monastery, driven by a desire to know that which was not known.

When a few years ago, my friend, Neils Bohr, sat in my study discussing with me the consequences of atomic energy, I saw in that simple professor in the University of Copenhagen, the originator of a new world order, whether it be a world destroyed by the use of the atomic bomb, or whether it be a world recreated by the peaceful uses of atomic energy.

I would be more confident of the future of this nation if a wide-spread understanding of science were made manifest by the willingness of American industry to provide for the two great agencies of American Scientists—the National Academy of Science and the National Research Council—merely $ 1,000,000 a year to be used by the scientists themselves in training promising young scientists to be their successors and for the exploration of brilliant new ideas. But I speak bluntly when I say that I see no evidence that American industry will do so.

I am aware of the fact that there is recurrent hope that a National Science Foundation may be created for this purpose. I am one who favours such an organization. But this brings me to my third concern.

Industry's Role.

As a firm believer in the precious values of democracy I hope that government will supplement but not supplant the efforts of private individuals and private industry in the development of science for our survival. I repeat that governments possess no super-human power to solve problems not solved by humans, for governments comprise but mortals. We hang

on the horns of a dilemma. Citizens who plead inability to support universities and science because of government taxation admit the need for more education and research if civilization is to survive. If these same citizens refer the responsibility for science to the government, they merely ask others to do with their own tax supported dollars that which they could better do themselves.

I am no analyst of political motives, but I seldom see government do in the field of science that which has been done by private initiative. It is m firm belief that the people of this country as individuals and groups of individuals—should assume their responsibiiity for their scientific future rather than delegate their power to a few. We need in science more examples of individual action and co-operative organizations such as yours; more examples of co-operative action directed by individuals who thus control their own future.

As a scientist, I am well aware that much of the anxiety and confusion of today is due to science. Science frees men from the hazards of ignorance and the uncontrolled domination of natural forces. But science and technology also create a complex civilization that taxes the abilities and spirits of men. The internal combustion engine that cultivates fields for starving millions is the same agent that drives tanks and bombers on their missions of destruction. Modern cities of great beauty, built through science, contain slums which blight the lives of men. Industries which create new products for human use dwarf the spirits of those who must toil without the satisfaction of creative effort.

Science provides us with the building stones of a better world. But that world will be as we choose to make it.

As we consider our place in the scientific world of today, it is well that we remember our relationship to the peoples of other lands. It would be unnatural if those of the world who are starving and ill-clothed and homeless did not seek our material assistance which we can make available to them, because of our technological resources. But it is my deep conviction, derived from contacts with the peoples of many war-torn lands, that the people of the world desire of us more than food and more than shelter. They prize the vision of a nation which preserves the rights of individuals to work for a common purpose and to resolve differences of opinion by free discussion. They look to us as a nation to prove the power of free men and women, to create for themselves and others a more satisfying life through a knowledge of the past and the new discoveries of science.

You, of this Association, combine knowledge of human requirements with the industrial and scientific means for satisfying those human needs. You have a unique opportunity to show how science can be devoted to the satisfaction of human welfare. You have a unique opportunity to prove that private citizens can use science and technology in order to satisfy more adequately the needs of the nation and thus preserve the foundations of a free American democracy.

The Canadian Association of Scientific Workers

Since the end of the war the membership of the Canadian Association of Scientific Workers has fallen considerably. Recruiting of new members has not been very successful. There is no doubt that the "spy" enquiry in 1946 and the linking of the Canadian Association of Scientific Workers with "red" activities by the Taschereau-Kellock report has been largely responsible for the difficulty in bringing new members into our Association. The net result is that

some of the former branches have not been able to carry on actively and only the branches at Montreal and Ottawa are now active as district branches. Members belonging formerly to other branches are now considered as members at large and are kept informated through the Montreal or the Ottawa branch.

The national Executive has been changed so that the Chairmen of the branches are co-chairmen of the Executive while the post of foreign correspondent has been retained as such. Finances are to be pooled and responsibilities are shared by the two branches on a pro rata basis. Periodic meetings will be held between the Montreal and Ottawa executives. The News Letter produced by the Montreal branch will continue to be one of our main activities.

There was little done this year in the way of public lectures or film showing owing to the reorganisation and to financial difficulties in procuring suitable speakers and films but attempts will be made next year to correct this deficiency.

The Parliamentary and Scientific Committee which it had hoped to establish has fallen through because of lack of support by other scientific organisations. The Association wishes also to continue to support the World Federation of Scientific Workers and to do all it can to further its programme in Canada.

In concluding, the Canadian Association of Scientific Workers wishes to have it known that it would like to be kept informed by other Associations in the World Federation when any of their members are visiting Canada so that we may have the opportunity of meeting them and if possible have them speak to us.

(*Science and Mankind, 2, August, 1949, p.92-93*)

UNESCO

*Occasional Bulletin No. 27**

Scientists going abroad

From our sister Science Co-operation Offices working in the distant centres of the World-Shanghai and Manila for the Far East, Cairo and Istanbul for the Middle East and Montevideo for Latin America — there comes a keen desire on the part of the scientists in each of these areas to come in more close contact with the scientists in other distant areas. Many scientists of the South Asian region are now going out on official missions or professional invitations. Their co-operation is sought to establish the personal contacts with fellow scientists in adjacent countries, over which they pass on their journeys. It is possible to make arrangements for their stay in those above cities enroute or on the way back home, where they will meet fellow-scientists and will often find problems of mutual interest to discuss and exchange information. In any of the above cities or any other places near by the expenses for living will be met by the zonal Science Co-operation Office. While starting on tour if this Office is informed of the programme about a month in advance, it is likely that arrangements will be finalised to receive the visiting scientists and also to inform them before their departure of the programme in those places. Any suggestion or information on this subject will be welcome at this Office.

Research Specimens and Materials

Many research workers have been helped in their research work with microfilms of papers published in foreign lands obtained by this

**Issued by Science Co operation Office for South Asia ; reproduced for information of the Scientific Workers.*

Office. The UNESCO Book Coupons have now become useful to obtain such microfilms and they eliminate all difficulties of payment in foreign exchange. Microfilm services in USA, in UK, and in France are now well organised.

There has been also a steady flow of plant seeds and other types of specimens and materials of research from outside countries. This Office with the kind assistance of some research institutions has been able to reciprocate the supplies. There are possibly a large number of individual scientists who have very good collections of scientific interest. Information on the availability of such plant and animal specimens will greatly assist the liaison work that this Office is trying to build up in course of its activities.

Books and Journals

There is a small library attached to this Office which is receiving some books and has been subscribing to a number of journals. The main objective is to supplement the usual list of journals and books not usually procured for other libraries. Specialised journals and books were suggested by many of our friends but the Office desires to place its services for as large a number of people as possible within its budget limitations. The library has also a number of bibliographies in its collections. All the collections are available for consultation on the spot and scientists visiting Delhi are invited to come to the Office and offer their valuable suggestions for future selection of books and journals.

Supply of Scientific and Technical Personnel

With the rapid development of Science and Technology in this region, there is a great demand of trained scientists and skilled workers. As there is a general dearth of those personnel in nearly all countries of the world, foreign experts are very difficult to obtain. UNESCO is making a survey of scientists available for employment outside their own country in order to render technical assistance to the developing countries.

Several organisations specifically concerned in placing trained persons abroad are also active. Among them the following are most important :

(1) *The International Refugee Organisation (IRO).* — The organisation is a branch of the UN and deals with the rehabilitation of the persons displaced by the last war. It has about 20,000 persons in its charge, among them there are many highly qualified scientists, doctors and skilled technicians. Any institution can ask for these scientists if they have posts which cannot be filled by their nationals and if the country agrees to adopt them eventually as citizens.

(2) *The Netherlands Institute for Professional Activity Abroad.* A voluntary organisation which has a number of Dutch scientists, engineers, agriculture experts, available for employment abroad. Some of these scientists have long working experience in the tropics.

Further information on the above organisations can be obtained from this office, and for specific vacancies enquirers will be well-advised to furnish in advance the particulars of qualifications required for the posts they have and the terms of appointment.

Letters to the Editors

Planning Commission

We feel compelled to address this letter to you in reply to your editorial in the June 1950 issue, entitled 'More About the Planning Commission', in the light of the resolution adopted by our unit on this subject and the policy resolutions adopted at the Poona session of our Association.

A perusal of the April and June editorials shows them to be very much different from each other. In the former, you were at pains to felicitate the Government for having acted in accord with the Poona resolution, hailed the appointment of this commission as a 'relieving news in the present all-round depressing atmosphere' and made out a case for the commission having been 'set up to achieve the main objective to promote a rapid rise in the standards of living of the people. Even the 'deliberate absence' of a scientist was' not to allow our enthusiasm to fade out on a *Minor* issue but extend our full co-operation to the commission'.

In your June editorial, you feel that 'the commission's composition leaves much to be desired' and realise 'the absence of the representatives of the scientific workers, peasants and workers whose needs must determine the whole *Course* of planning.....'. You are only too conscious of the 'limitations of planning in capitalist economy and of the Association's conviction that the benefits of planning to the common man can only come in a socialist economy'.

The assurance that 'the journal stands by the Poona resolution and the misgiving that it is trying to go behind the resolution should be dismissed' is welcome. But, perhaps, the editors would care to explain how, in the April editorial, the Poona resolution came to be quoted without the most important part of the last sentence' on the basis of a socialist economy', and why the planning commission was not evalued in the light of the full resolution. At the same time we regret to point out that in our opinion the June editorial, in essence, does not conform to the policies of the Association and is highly misleading.

You correctly state that 'there is no fuundamental solution of our problem if we bypass socialism'; but rather than emphasising this fundamental solution and directing the scientific workers on the ways and means of achieving it you helplessly proceed 'to take cognisance of the contemporary situation and see what can be achieved even within the limitations from which we suffer'. You go on to quote the example of the TVA and thus try to make out a case for your support of planning within the four walls of capitalist economy. It can hardly convince scientific workers when examples like the TVA are given in an absolute manner divorced from their true social perspective. We know that in the great economic depression of the early thirties a partial solution of the crisis had to be found in the U. S. A. Roosevelt who had won the elections by the support of hart-hit millions of America on the basis of the New Deal reforms had to have the TVA Act passed by the Congress within three months of his assuming office in 1933. The TVA experiment could be carried out with partial success in spite of capitalist opposition mainly because it was a part of the basic economic reforms carried out by Roosevelt under 'New Deal'. But a densely-populated sub-continent like India which has been and is being exploited by foreign and indigenous capitalists can hardly survive experiments of planning within capitalist economy.

It is not disputed that the setting up of this commission may result in better coordination etc., of the work on valley projects and other industrial enterprises though one may

wonder how far even this is possible under present economic conditions. The Government could have done this long ago. But this does not mean any change in the basic economic and political policies of the Government which constitute and continue to be the cause of the miserably low standard of living and unemployment amongst scientific workers and other sections of the people. Where is the justification for the Association's organ violating its fundamental policies and creating confusion by welcoming the appointment of the commission and offering all co operation? It must be remembered that the much-boosted river valley projects cannot lead to the benefit of the agricultural workers under the present land tenure system but it will benefit only the landlords; and it should be known that these projects are being developed with the help of the World Bank loans under severe restrictions on furthur industrialisation of the country; under the present economic and political conditions, the enhanced steel production would go on to make more armaments instead of more tractors or houses; and the penicillin and sulfa-drugs produced under partial foreign control can hardly be within reach of our country's poverty-stricken millions. It must be clear that there is no planned industrialisation for the benefit of the common people under the present social and economic framework.

Planning cannot be viewed in abstract. Planning can be resorted to under fascism also with disastrous effects to the common people as was illustrated by fascist Germany before the war.

Your editorial admits that in the USA today in spite of the very high production, the benefits of science and technology have not bettered the common man's lot. Unemployment among the masses continues and is on the rise; destruction of food crops continues while the hungry masses starve to death. In fact, this contradiction is working out in the U.S. ruling circles taking up an aggressive hunt for markets, colonies and war bases.

Surely, you do not want the scientific workers, their organisation and their organ to welcome, much less to co-operate with a planning commission established to make the functioning of capitalist economy more efficient and further enrich the exploiting circles. It should be clear that we can have only such planning that is determined by the needs of the peasants and workers of the country. For this we cannot bypass socialist planning nor advocate as a substitute, support to planning for the benefit of capitalists.

What should be the attitude of the scientific workers to the Planning Commission under the circumstances? Should we give our co-operation, ignore it, or oppose it? We feel that under the circumstances we cannot welcome it nor cooperate with it.

We are an organisation of scientists and we realise that in the present state of social development, socialist planned economy is the only form of economy beneficial to the common people while, capitalist economy having outlived its utitity, can only lead to misery, war and destruction. No amount of planning under the present set-up can raise the living standards of the people, objectives for which the Association stands.

As such it becomes the duty of the organisation and its journal to critically examine the objectives, personnel, schemes, and functioning of the commission and show scientifically and analytically with concrete facts how these can not lead to raising the standard of living of the people. Our journal, rather than creating, should clear the illusions and confusion created by the appointment of the Commission. Rather than offering helpless support to the present Commission, it should clarify issues and mobilise support amongst scientific workers for a change in the social set up in which planning in the interests of the people is possible.

Secretary,
CLSIR Unit, A.S.W.I., Hyderabad.

Import of Scientific Equipments

From your July, 1950 issue of Vijnan-Karmee we are glad that scientific instruments would be exempted from import duty provided applications for exemption are addressed to the Department of Scientific Research, Government of India, New Delhi. This is really a laudable object. You would appreciate that this object would be completed provided that this exemption applies all round. Scientific equipments are imported into India from foreign manufacturers by their representatives and direct importers in India. A very good part of scientific equipments is supplied by such importers and dealers throughout India to institutions. It is this regular Trade Channel which has been serving the needs of the Institutes and laboratories, please note.

We agree that there have been considerable difficulties regarding the import and availability of scientific equipments since the beginning of the War.

There are several factors responsible for this difficulty. Before the War Germany was the main supplier of these apparatus, and it has been cut off. Even today barring the internal difficulties in Germany, considerable difficulties are there due to the way and method of licensing in general and particularly from Germany. Scientific equipments is a part of Trade Agreement with Germany. But sufficient licenses are not issued for the import of this kind of materials. The main difficulty of past importers is that they are not able to produce complete evidence of their past imports as required by the authorities as the papers could not be maintained for a period of about 11 to 12 years.

During and after the War India has mainly to depend to a considerable extent on England and to some extent on U.S.A.. Our representatives and particularly the Trade Commissioners are not able to impress upon these countries to make available to us sufficient equipments, specially very precise type of apparatus, which are in short supply. To add to this, licensing policy has been changing from time to time and a licence expires before an apparatus is ready for delivery. Foreign manufacturers have lost faith in Indian importers as they had to cancel several supply orders they received due to the cancellation of licences and O.G.L facilities.

The matters in recent past - a year and quarter - have been made gloomy by the authorities having issued practically no licence particularly from U.S.A. and small valued licences from England, Germany etc. We have been hammering this point on the autboities and have made representations through the Department of Scientific Research etc. But the Government machinery moves very slowly as is known and pious hopes and vague promises only are given.

The worst and the most stumbling difficulty is the way scientific instruments are classified by the authorities. Articles are classified simply from appearance or the material they are made of without reference whatsoever to their use or purpose. A micro flask or beaker or an extra big size glass flask or beaker, specific gravity bottles, measuring flasks and other measuring apparatus even of 'A' class accuracy are classified with ordinary household and crockery glassware. Items like Pyrez - hollow and graduated glassware are on the restricted list and their imports have been prohibited for about a year and half. Silicaware items like crucibles, basins etc. are classified as plumbago and graphite materials and would not be allowed to be imported. Laboratory porcelainware materials like, casserole, gooch crucibles, evaporating basins, crucibles etc. are classified with ordinary household china and porcelainware materials like cups and saucers etc, sundry glass materials like funnels and crucibles are also classified as ordinary glassware items. Agate articles like agate mortar and pestle etc. are classified with the most common marble and stone articles. The common articles with which the scientific equipments are classified are naturally restricted in the present position of

our foreign exchanges. But along with them the scientific equipments are also prohibited. The classification is too technical an affair and has created a muddle of its own. This has resulted in the present shortage of equipments in general. Even the new laboratories call for these types of materials every now and then. But the trade in general is with its utmost not in a position to offer these materials. There may be some other reasons for the present shortage, but the main fundamental and substantial reason is the unrealistic licensing policy and the dubious classification of scientific equipments.

(*The Scientific & Surgical Traders' Association, Bombay*).

A glance through the history of science shows that progress of scientific thought has been mostly due to experiments which took the place of guess work. Once this was realised there was a gradual demand for Instruments for accurate measurements and to-day we find a great need of an Industry for making Scientific Instruments which is closely inter-woven with the growth of science itself.

No doubt earlier scientists such as Sir Isaac Newton and later on Sir William Herschel and in more recent times Sir Howard Grubbs did construct their own instruments for their astronomical studies. This tradition has been kept up even now and we find that specialised instruments are still being devised and made in the workshops of the different research institutions. However, to-day we find, particularly after the last World War, that for real progress in Science, one cannot afford time for making stereotyped apparatus for his scientific investigations. This has brought into existence a Scientific Instrument industry all over the world.

During the last war, a great demand was made on the Industry, new plants were erected, specialised machinery built and craftsmen trained as a result of which the capacity of the industry in the foreign countries increased to almost four-fold. In England there are approximately 65000 people in the Industry producing goods worth over £s 50,000,000. This has been the story of independent countries but in India, however, no real progress has so far been made in spite of some laudable attempts made by a few pioneers in the industry. The country has to depend for most of its scientific instruments, particularly of the precision type, on foreign imports. During the last few years many new Universities, Engineering Colleges, Technical Institutions and Industries have been started in India which has made a great demand on scientific instruments. But unfortunately the import policy of the Government has not been very helpful in the matter because of the earlier mistakes made in exhausting the foreign exchange by imports of cosmetics, crockery and various other items of non-essential nature from the point of view of the country's progress. A gradual tightening of the exchange control has prevented a free flow of scientific equipment into the country. The position was not so bad when the Open General Licence No. XI was in existence. However, with its withdrawal, the position has worsened. Moreover, for the past some time the import trade policy of the Government has changed so frequently that the modest requirements of the Importer of scientific goods meant especially for teaching and research institutions have not been properly met with in spite of the heavy demand. The main trouble has been that apart from giving facilities to Government Scientific Departments the Government has not given as much facilities to the trade. All import applications from scientific dealers have been considered along with other applications which has resulted in the following difficulties :—

1. *Delay in disposal of applications* :—Sometimes it takes about 6/9 months either to get an import licence or to get a refusal.
2. *Short duration Licences* :—The period of validity of import licence has been not more than 6 months so far in spite of the fact that

the supply position of many scientific instruments makers especially from the U.K. has been of a period more than 6 months. The requirements of scientific institutions and research laboratories, being of a specialised nature, have to be individually manufactured in the workshops only after receipt of firm orders and the delay in issue of licences together with the time taken in its manufacture means a delay of about 1½ years.

3. *Licences from dollar and hard currency areas* :—It is well known that the industry as a whole in the U. K. due to incessant bombing and shortage of manpower suffered greatly during the last world war. Conditions in America have been very much better. The supply position of scientific equipment from that country is far better, but owing to the difficult exchange position of dollars, the Government has been very reluctant in issuing the licences for the import of scientific goods from America in spite of the fact that some of these specialised items are made only in America because of the advanced research work which has been exclusively done in that particular country.

4. *Classification* :—The classification of scientific goods does not seem to be scientific. Many a time we find that strictly scientific goods are taken as ordinary household equipment. So called physically known optical goods are not taken as optical goods for custom purposes. Sometimes the importer of scientific goods is not quite sure at the time he places an order abroad, as to what will be the duty chargeable or whether if at all the equipment will be cleared as a scientific eqnipment. Therefore there is no wonder that his quotations are not up to the mark. At one time Government had an alphabetical classification list wherein goods were classified by name for the purpose of assessment of duty but now it is no longer available and it seems that the Government has issued a publication for use of Department only and not available for general public. It is not quite clear as to what are the reasons which have led the Government to take this decision.

5. *Appraising* :—The assessment of duty by either the Postal Appraising Department or the Appraising Department of the Customs Office at various ports is often manned by people who have never had any scientific training. Naturally enough it is very difficult for them to classify various scientific instruments, which have grown enormously during the last few years. There is thus a considerable amount of delay even in clearing the goods and often the duty charged is not correct, which leads to later correspondence for refund.

Therefore it seems desirable that the whole question of scientific instruments is referred to a small committee consisting of one representative of Scientific Government Departments, one representative of the Commerce Ministry, one representative of the Universities and Research Institutions and one representative of the Trade. Its report on the future import policy about scientific instruments and also on the future organisation of the Scientific Instrument Industry in the country should then be examined by the Government and the Planning Commission. There is no doubt that some instruments are made in India but if the quality is not controlled from now onwards, the nascent industry might have a bad name and a scientific worker may dis-favour the purchase of instruments made in our own conntry.

(G. R. Toshniwal)

ACTIVITIES OF THE BRANCHES

Delhi Brauch.

1. D. G. I. & S. Unit.

A film show was shown for Scientific Workers of D. G. I. & S. Unit on 31-7-50 by courtesy of D. G. I. & S. authorities and B.I.S. The following films were shown :—

1. Steel.
2. In all weathers.
3. Colour in Clay.

2. I. Met. D. Unit.

(a) A film show was shown for Scientific Workers of I. Met. D. Unit on 2-8-50 by courtesy of I. Met: D. authorities and B. I. S. The following films were shown :—

1. In All Weathers.
2. Wonder Jet.

(b) Mr. V. V. Sharma delivered a talk on 'Comparison of Geostrophic winds with observed winds in Indian Latitudes' on 12-8-50. The members of I. Met. D. Unit took part in the discussion. The Unit is thankful to the departmental authorities for offering facilities.

Poona Branch.

The lecture "Twentyone months in U.S.A." delivered by Shri V. V. Gokhale, M.Sc. (Tech), M. Ch. E (New York) under the auspices of the Branch on the 16th July 1950 was a success. Attendance was good and the audience evinced a keen interest in the subject, judging by the number of questions asked on the occasion. The demonstration of the 'wire sound recorder' which followed the lecture was also highly appreciated. Some 16 mm. popular films were also screened on the occasion through the courtesy of the N.M.V. High School authorities.

The Extra-ordinary Meeting of the General Body of the Kirkee Association was held on the 22nd July. Recognition accorded to the Association by the Government of India was announced in the meeting. Shri V. R. Joshi narrated how the efforts put in by the Executives during the past two years were crowned with success, how opposition was encountered and what were the implications of the conditions laid down by the Ministry in that respect. A resolution expressing regret at the dismissal of Prof. F. Joliot Currie from the post of Atomic Commissioner for France was also passed. Dr. W. D. Patwardhan, a founder member of the Association was felicitated on the occasion on the eve of his departure to the U.K. on official deputation.

A deputation consisting of Dr. Damodaran, Dr. W. D. Patwardhan, Dr. V. K. Lele and Shri V. R. Joshi met Professors Jatkar and Bhide, University Professor and Dean respectively, of the University of Poona on 22nd July and had a cordial talk on the question of post graduate scientific studies for scientific workers of Poona employed in various laboratories. As a result of the understanding arrived at, the Unit Secretaries are now to contact Officers-in-charge/Directors of their Establishments and request them to submit applications to the Poona University for recognition of their laboratories for post-graduate scientific work and for getting one of their Scientist Officers recognised as a University Teacher. The Scientific Workers could then register themselves as post-graduate students of the Poona University and would be able to carry out research work and appear for examination leading to the M.Sc. or Ph. D. degrees.

Kanpur Unit.

A meeting of the Kanpur Unit of the Association was held on 31st July, 1950 at 3-30 p.m. in the Indian Institute of Sugar Technology. Dr. K. S. G. Doss presided. At the meeting Prof. R. D. Desai, B.A., M.Sc. D.Sc., (Lond), F.I.I.Sc., F.R.I.C., F.A.Sc., F.N.I., Department of Chemical Technology, University of Bombay gave a very interesting and thought-provoking lecture on 'Romance of Coal Tar'. The speaker in the address extending over an hour and a half traced the history of the development of different industries, viz. dyes, antimalarials, antiseptics, explosives, insecti-

cides and saccharine from coal tar. Dr. Desai gave some interesting anecdotes from the lives of great chemists viz. Perkin and Remsen to illustrate what an important part chance and luck play in scientific research.

Calcutta Branch.

The Annual General Meeting of the Calcutta Branch, Association of Scientific Workers of India, was held on Saturday the 29th July, 1950. Mr. M.L. Chatterjee, Vice-President of the Calcutta Branch took the chair, but owing to some unavoidable reasons he left the meeting and Mr. Pal took the chair till the end.

The meeting began at 3-30 P M. The election of the Executive Committee of the Branch which was held by postal ballots was declared open in the meeting. The following is the list of the new Executive Committee members.

President :-	Sri C.R. Das Gupta (S.T.M)
Vice-Presidents :-	Sri M L. Chatterjee (S.T.M)
	Sri P. Nandy (Bose Research Institute).
Secretary :-	Sri Susil Kumar Bose (Sc. Coll.)
Jt. Secretary :-	Sri J. Sanyal (M.I.O)
Treasurer :-	Sri Lala G.C. Das (G.T.H)
Members	1. Sri Bhupati Kumar Banerji (IACS)
	2. „ K. L. Bhattacharjee (Sc. Coll.)
	3. „ Nalini Ranjan Chakraborty (MIC)
	4. „ Barid Baran Sen (Sc. Coll.)
	5. „ Parbati Chandra Sen (S.T.M)
	6. „ Ananda Bhattacharjee (C.D.L)
	7. „ Shyamaunda Chandra.
	8. „ Pankaj Roy (C.G.C. R.I)
	9. „ Haripada Chattopadhya (Pres. Coll.)
	10. „ Anil Bhushan Shome (Pres. Coll.)
	11. „ Ram G. Bose (IJMARI).
	12. „ S.C. Chakraborty (M.I.O)
	13. „ Ramesh Bagchi (G.T.H)

The Secretary then gave a brief report of the activities of the Association during the session in the following words:—

"The Association of Scientific Workers of India has entered into the 4th year of its existence. During the year under review the Executive Committee of the Calcutta Branch met on seventeen different occasions to discuss various measures to be adopted for popularising the activities of the Association, for disseminating scientific knowledge amongst the common men either by film shows or by popular lectures, for increasing organisational strength of the Association, for protecting the trade union interests of the scientific workers, etc.

The Association held a Press Conference to give publicity to its activities. It is very unfortunate that the press usually devotes only a small fraction of the total space for the propagation of any news relating to our Association. It is for this reason that the conference was held. Most of the representatives from different newspapers attended the conference. Dr. B.C. Guha, Vice-President of the Association of Scientific Workers of India presided over the function. He explained to the press representatives the aims and objects of the Association with the request to give proper publicity to its activities.

The Executive Committee appointed a Sub-Committee for propagating science and scientific knowledge. Under the auspices of the said Sub-Committee, film shows and popular lectures were arranged for the purpose. Film shows were arranged on different occasions on 'story of penicillin', 'extraction of penicillin' etc.

The Sub-Committee also arranged the popular lecture on food and population. Many distinguished speakers took part in it.

On the organisational front, the Executive Committee has been moving very strenuously and a fair amount of success has been attained in this direction. About 60 new members have been recruited. Two new units have been formed, one at Bose Research Institute and another at Dum Dum Air Port. It is gratifying to note that we are getting increasing co-operation from industrial quarters; but the response we are getting from scientific workers attached to different educational institutions was not up to the mark, in spite of the fact that the scientific workers engaged there have got a number of grievances which need immediate consideration.

During the year under review, 6 cases of trade union disputes were placed before the Committee. The Executive Committee made thorough investigation into these cases and gave their considered views to authorities concerned. It is a matter of great regret that only in one case the authority has agreed to come to terms. Regarding the other cases the negotiations are still being continued.

During this year Prof. Bernal, Prof. Joliot and Madam Currie gave a visit to Calcutta. A meeting was organised to give a reception to these distinguished guests. Unfortunately we failed to meet Prof. Joliot and Madam Currie who left Calcutta before the meeting. However we were glad to have Prof. Bernal in our midst. It is to be regretted in this connection the assault on Dr. S. K. Bose, Lecturer. Calcutta University; Secretary of the Eastern Region, Association of Scientific Workers of India by the organisers of a meeting held under the auspices of the so-called joint committee of the scientific workers in Raja Rammohan Library Hall to receive the guests. The year under review has suffered a great shock when we remember that Prof. Joliot the great advocate for the utilisation of atomic energy for peaceful purpose was removed from the post of High Commissioner on Atomic Energy Commission by the Government of France on political grounds.

It is very unfortunate that the economic conditions of the country as a whole have further deteriorated during the year. Unemployment has become the order of the day. The capitalist system prevailing in the country has failed to switch over the war-time economy. Consequently most of the people who were engaged in war industries are being gradually retrenched. The only way to overcome the present impasse is to build up the economy of the country on socialist basis. It is for this that we the scientific workers should work together. It is high time that we the scientific workers should compose our differences and try to develop this organisation as a movement of the scientific workers of India. Herein lies the salvation of the scientific workers and so of the society as a whole.

The Treasurer then appraised the House of the financial position of the Association.

Variuos resolutions that were adopted in the meeting are given below:—

(1) This meeting of the Calcutta Branch of the Association of Scientific Workers of India views with deep concern the deteriorating international situation with the threat of an atomic war looming in the horizon.

The Association firmly declares its determination to check the conspiracy to plunge the world into a new war by creating a firm public opinion against war and for peace. The Association also pledges to create opinion against the use of atomic weapons in warfare.

The Association demands the unconditional prohibition of the atomic weapon as a weapon of terror and mass annihilation of human beings. The Association demands the establishment of strict international control for the implementation of this decision.

The Association considers that the Government which first uses the atomic weapon against any country will commit a crime against mankind and must be regarded as a war criminal.

(2) This meeting gave due consideration to the present system of the research organisation of the country. Most of the research schemes financed by C.S.I.R., I.C.M.R , etc., are granted at the first ins ance for one year only. It is within this stipulated period, the research worker has to devote a considerable part of his time for collection of literature, procurement of chemicals, apparatus, etc. Consequently he is hardly left with enough time to devote for research work, which may enable him to draw a positive conclusion from his results. In view of the above circumstances, it is the considered opinion of the house that research schemes should be sanctioned at the first instance for at least two years in order to give full facilities in respect of time for the satisfactory working out of the schemes.

Proposed by — Jagat Jiban Ghosh
Seconded by — Kanailal Bhattacharyya.

Copy to be forwarded to the appropriate authorities.

(3) This meeting of the Calcutta Branch of the Association of Scientific Workers of India voices the grievances of Scientific Workers who are not eligible for submitting a thesis either for D.Phil. or Ph.D. degree merely on the ground that they do not belong either to the University or to any institution recognised by the University.

This meeting therefore urges that suitable arrangements should be made between the University and the institutions (not yet recognised) so that workers there may get proper facilities to submit their theses through those institutions.

Proposed by — Durlav K. Roy.
Seconded by — Sushil K. Bose.

Copy to be forwarded to the appropriate authorities.

(4) It is the opinion of the meeting held under the auspices of the Calcutta Branch of the Association of Scientific Workers of India that in view of the abnormal rise in prices of foodstuffs and of other daily necessities of life, the value of University Research Scholarship should be raised to Rs. 200/- per month and that the deduction of a certain part of this scholarship, as is now prevalent and encouraged by some Professors and Lecturers, should also be discontinued.

Proposed by— Lala G. C. Das.
Seconded by— J. S. Sanyal.

Copy to be forwarded to the appropriate anthorities.

(5) This meeting of the Calcutta Branch of the Association of Scientific Workers of India views with great concern that in some commercial firms, the authorities, taking the advantage of mass-scale unemployment, employ scientific workers at a very low scale of pay disregarding their qualifications and very often these scientific workers are forced to sign some ignoble bonds so that they may not be in a position to avail themselves of any opportunity that they may come across in their life.

In view of this fact, this meeting resolves that this practice should immediately be stopped and the authorities concerned should immediately fix the scale of pay according to the Charter of the Association of Scientific Workers of India as far as practicable.

Copy to be forwarded to the appropriate authorities.

(6) This meeting of the Calcutta Branch of the Association of Scientific Workers of India views with great concern the unusual haste with which the two new labour bills, viz. Trade Union Bill and Labour Relations Bill are being ushered in the Indian Parliament. The aim of the bills is to impose new restrictions upon the right of employees to form association and thereby impede the healthy growth of the Trade Union Movement in the country. According to the Trade Union Bill Government servants

drawing salaries above Rs. 200/- are debarred from being members of any recognised trade union with the result that most of our friends will be debarred from its membership. Turning to the Labour Relations Bill it may be noted that the method of negotiations which is very often resorted to to form a happy settlement of a trade union dispute has been unnecessarilycomplicated and secondly it deprives the fundamental right of a worker to strike his work even when the authority is not prepared to make any compromise whatsoever.

In view of the above circumstanaes, it is the considered opinion of the house that both the bills should immediately be withdrawn.

Proposed by— K. L. Bhattacharyya

Seconded by— S. K. Bose.

Copy to be forwarded to proper authorities.

The meeting was closed with a vote of thanks to the Chair.

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THE OBJECTS OF THE ASSOCIATION

ARE

To improve and safe guard 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.

Science is still in its infancy in India. It requires careful nursing for its proper development to provide the army of scientific workers and technical men required for the industrialisation of the country on modern scientific lines—the only way to the uplift and welfare of the society.

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