

# VIJNAN-KARMEE

विज्ञानकर्मी

official organ of the  
ASSOCIATION OF SCIENTIFIC WORKERS OF INDIA

Vol IV. ]

MAY, 1952

[ No. 5

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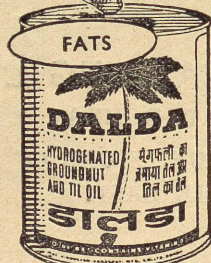
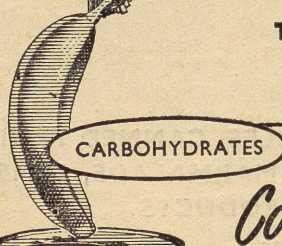
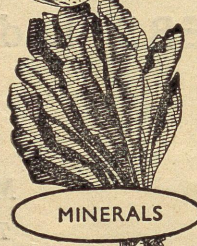
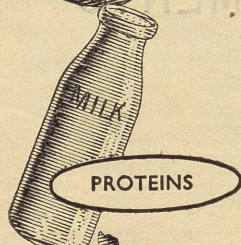
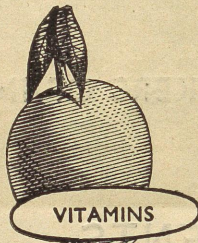
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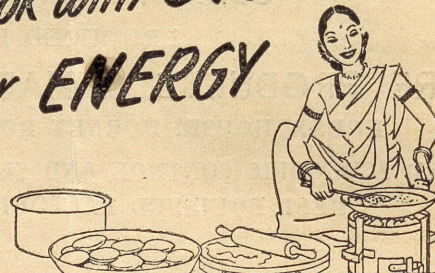


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# Association of Scientific Workers of India

## Questionnaire on Economic and Working Conditions of Scientific Workers.

*N.B.*—It is optional not to answer any question if it is so desired. Statements made herein shall be kept strictly confidential).

1. Name in full (Block letters, surname first).	
2. Date of birth.	
3. Place of work (name of laboratory, institute, industrial establishment etc., with postal address).	
4. Academic qualifications (degrees, diplomas etc. with details).	
(a) Particulars of experience and special training etc.	
(b) Membership of learned or professional associations etc.	
<b>Salaries and Conditions of Service.</b>	
5. Your designation and scale of pay.	
6. What are the chances of promotion in your present job?	
7. Do you get any compensatory allowance for the rise in the cost of living index?	
8. Are you entitled to any bonus? If so on the average how much?	
9. Is your job temporary, quasi-permanent, permanent, or on contract?	

10. Is security of tenure guaranteed?	
11. Is your job pensionable, or is there Contributory Provident Fund?	
12. Are you provided with accommodation? State, if it is free of charge or otherwise?	
13. What are your hours of work in a week?	
14. If you are required to work overtime, are you paid any compensation for that?	
15. (a) How much leave are you entitled to?	
(b) Is this leave commensurate with the nature of your work?	
16. Please state the nature and extent of any other facilities like free medical aid, etc., which you are entitled to?	
<b>Working Conditions :</b>	
17. (a) What is the nature of your present work? Are you engaged in research, research-cum-administration, administration, executive, teaching, supervisory, production, routine analysis, editing or compiling scientific literature or data, or any other type?	
(b) Under what physical environmental conditions do you work? Are any safeguards against hazards, recreational facilities etc., provided?	

<p>18. Is your present work suited to your qualifications, aptitudes and/or experience ?</p>	
<p>19. Are you permitted to apply for jobs elsewhere ?</p>	
<p>20. (a) Are facilities available in your place of employment for the efficient discharge of your duties ?</p>	
<p>(b) Do you consider them adequate or not? If not, how do you think they could be improved? Is the present administrative set up congenial and helpful to effect the necessary improvements ?</p>	
<p>21. Do you think much of your time is taken up by routine work thus interfering with your scientific work etc., ?</p>	
<p>22. (a) Do opportunities exist in your place of employment for research ?</p>	
<p>(b) Do you get any time for the above ?</p>	
<p>23. (a) Have you any facilities for improving your educational qualifications ?</p>	
<p>(b) In case you are undergraduate, do you have any facilities for obtaining higher education for improving your professional status ?</p>	
<p>24. (a) Are you allowed full facilities for publishing, taking patents of or otherwise freely discussing the results of your work or other technical matters without any hinderance ?</p>	

<p>(b) Do you usually publish your papers in Indian journals of foreign? In case you publish them in foreign journals what are the reasons for your preference?</p>	
<p>25. (a) What arrangements exist for the utilization of the results of your research if of industrial importance.</p>	
<p>(b) Are you satisfied with the above arrangements? If not, what are your suggestions for their improvement?</p>	
<p>26. Do prejudices (personal, social or political or of any other type) stand in way of your freedom of work?</p>	
<p>27. Are you satisfied that you are having proper guidance from your superiors?</p>	
<p>28. Is the administrative unit attached to your research institute helpful in research or does it hinder? Give suggestions for its improvement.</p>	
<p>29. Any other remarks.</p>	

Signature .....

## Additional Questionnaire on Income and Expenditure

1. Your gross income including allowances, bonuses etc.
2. Number of dependents : \_\_\_\_\_ Adults \_\_\_\_\_ Children

	Amount	Percentage of the total expenditure
<b>A. General Expenditure (monthly)</b>		
1. Food		
2. Fuel, electricity etc.		
3. House rent		
4. Education		
5. Transport		
6. Entertainment including hobbies, recreation etc.		
7. Remittances to dependents		
8. Income tax		
9. Municipal tax ; if any		
10. Insurance premium		
11. Provident fund		
12. Contribution to any other savings fund.		
13. Any other obligatory expenses		
<b>B. Subsidiary Expenditure (Annual)</b>		
1. Membership of Societies etc.		
2. Books, newspapers etc.,		
3. Repairs and maintenance		
4. Clothing		
5. Charities of contributions to public societies, trusts, if any.		
6. Travelling		
7. Medical expenses		
8. Any other expenditure not included above.		
<b>Total expenditure (average, per month)</b>		
<b>Total saving, if any (average, annual, including life insurance, C.P.F. etc.)</b>		

Signature.....

Any other remarks:

After filling this questionnaire may be returned to the local unit of Branch Secretary. If no unit or branch exists, it may be forwarded directly to : The General Secretary Association of Scientific Workers of India, 22, Havelock Square, New Delhi.

EDWARDS

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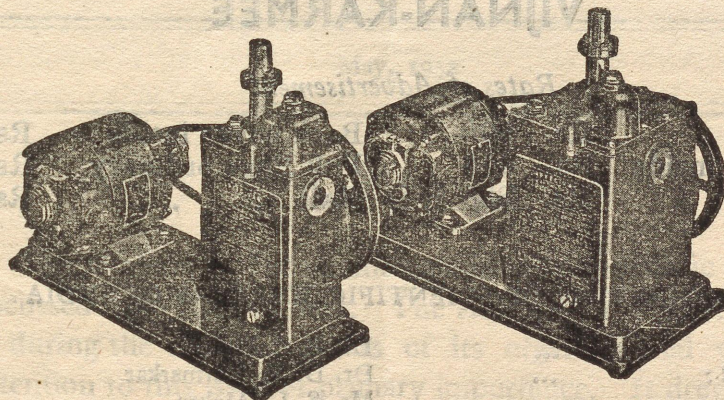
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# VIJNAN-KARMEE

## विज्ञानकर्मी

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### EDITORIAL

The working and economic conditions of scientific workers have been discussed from time to time. The Association of Scientific Workers of India during the first two years of its organisational work devoted much attention to this issue of primary importance. It drew up a memorandum after detailed discussion of the various aspects of the problem in a number of meetings of its constituent committees as well as of the Central Executive. The memorandum has since been published (Vijnan-Karmee, October, 1949) and submitted to every employer of scientific workers, in the Government, Quasi-Government as well as private industrial establishments. Pointed attention was drawn in that memorandum not only to the poor scales of remuneration for the scientific workers but also to the glaring disparities and senseless lack of coordination among the various grades even under the same employer. During the last five years, apart from the representations made from time to time, the various resolutions adopted by the Association often drew public attention to existing conditions and asked for redress. It is unfortunate to record that apart from a few gestures of goodwill here and there by some authorities, no visible effort was made for a thorough scrutiny of the situation. Unemployment and misemployment of scientific workers are rampant, while, paradoxically, Government complains of lack of scientific manpower. In industries, the insecurity of service is a constant worry. In these establishments while a man or two at the top may be well placed, sometime by virtue of qualifications or generally by virtue of personal relations, the main bulk of scientific workers are on the lowest level of subsistence. They have generally no scale of pay, no rate of increment to look forward to, and no assurance of service for tomorrow; and worst

of all—the present emoluments are hardly enough for him, when the cost of living index is so high. Moreover, favouritism is rampant killing the last traces of zeal for creative work or even for carrying on the routine work. Under such circumstances, nothing but frustration can result.

The Association of Scientific Workers of India, from time to time, drew attention of the relevant authorities to this frustration of scientific workers in different employments. The job of collecting the authentic data on working and economic conditions of scientific workers employed particularly, in industry has been found to be a hard one. When economic progress depends mainly on the development of industries based on science and technology, it is of the utmost importance to assess the present conditions of the scientific workers and to adopt ways and means to improve them. The Association of Scientific Workers of India is undertaking with its meagre resources, the arduous task of ascertaining the facts and figures in regard to the working and economic conditions of the scientific workers in the various sectors, in industry, teaching and research, and it is hoped that the scientific workers themselves in their respective spheres will take the initiative of collecting these important data through the questionnaire published by the A.S.W.I. When sufficient data are available, it is hoped to publish them in the form of a brochure so that a campaign may be conducted on the basis of this factual report. All scientific workers are therefore urged to co-operate in this effort.

should be in liquid or plastic states. Now if we try to account for the earth's magnetism, it can be accounted for if we consider the core to be constituted of liquid material. It has been found that nearly 70% of the magnetic field is due to the interior of the earth.

Now let us try to explain why there is no origin of earth quake above 700 k.m. below the surface of earth. It appears that certain amount of change of state of material takes

place at about 700 k.m. and they tend to become more homogeneous in character. It appears that there is no cavity below 700 k.m., In this way we may explain why the volcanoes are superficial affairs."

Dr. Banerjee replied to a number of questions of the scientific workers present. The chairman thanked Dr. Banerjee for his interesting and educative talk and the ASWI for arranging the same.

(continued from page 18)

## The Opportunity and Responsibility of the Indian Scientist

By

DR. AMARJIT SINGH Ph.D., DELHI UNIVERSITY

*(Presented at the Symposium on Social Relations of Science organized by Delhi Branch)*

I was once listening to a talk on the radio by Professor Butterfield of Cambridge University. He compared the life of an individual to a symphony. Its tempo is slow at times and fast at others. In the pattern which it weaves, even the intervals of silence have a part to play. This analogy can be extended to the evolution of a particular society, or of human civilization as a whole. In the panorama of history, we observe societies passing through stages of intellectual ferment, then intense creative activity followed by a decline in originality. Then the same or some other society is influenced by a powerful new stimulus and the process goes on. I believe that India is passing through one of these dramatic phases in history, when a period of repose is ending, and one of rapid growth has just begun.

There is an encouraging parallelism between the social conditions which led to the renaissance in Europe, and the conditions in India today. In order to understand our own opportunities better, it is worthwhile to study the main causes of the renaissance in Europe.

An early cause was the change in attitude regarding learning. In medieval Europe theology had been the main concern of the scholars. However, their contacts with the Arabs and through them with the Greeks and Indians were a new stimulus. The worth of the learning of the Greeks, the Indians and the Arabs was recognised. In the eleventh and twelfth centuries new Universities were founded in Italy, England and France. In the earlier stages there was an unquestioning faith in the ancient Greek scholars. However, a more critical attitude developed later. This critical attitude was the starting point for many new discoveries.

Another factor was the changing social order. A feudal society was being transformed into a mercantile society. The changing requirements of society posed new problems. These were a stimulus for direct observation and experimentation, for the answers to them could not be found in books. For example a pressing problem for ships journeying to the new world was a determination of longitude while at sea. Big prizes were offered for its solution. It was seen that an accurate clock on board the ship, or accurate charts showing the motion of the moon or the planets could be used for the purpose. These practical needs led to the development of clocks, and of astronomy.

Great influence was exerted by the works of Bacon and Descartes, which set forth a new ideology of pursuit of knowledge through objective collection of data, and of application of this knowledge for human needs. This ideology made many converts so that the stream of scientific workers intensely interested in this new approach, began to swell. In this process of diffusion of scientific knowledge and ideology among a larger group of people, a vital role was played by scientific societies and by development of the printing press.

Thus in the universities, scientific societies, and sometimes even in homes of little shops, enthusiastic workers began to probe afresh into the secrets of nature. At the same time people associated with manufacture developed new techniques and even new industries on the basis of the increased knowledge of the laws of nature. The electrical industry is typical example of this growth. Its origins are in the researches of men like Ampere, Faraday,

Maxwell and others striving to understand the nature of electric and magnetic forces. Stimulated by the knowledge thus acquired, inventors such as Morse, Bell, Edison, Marconi and others produced devices which have had a great impact on society. However, their inventions would not have attained the commercial success that they have, without the efforts of countless scientific workers concentrating on limited problems, and steadily accumulating a lot of engineering know-how.

The growth of Science and Industry was not a simple phenomenon, which can be described in terms of a few causes. However, we can say with reasonable certainty that vital factors in this growth were intellectual stimulus from outside, the Universities and scientific societies, a social order in which new ideas could bring material benefits, the growth of the experimental method, and the interaction between science and industry.

In modern India, we find similar factors present. Contacts with the western world have been stimulating. There is increasing interest in the learning of the East and the West. An increasing number of educational institutions are endeavouring to spread this learning to a greater section of the population. The social structure is also changing rapidly. There is an urge among the masses for an improved social order. New problems arise and new approaches become necessary. University laboratories are being developed. Besides these, research institutions have been started with a view to carry out research in special fields. Some research institutions have been started even by industrialists. Above all, we have won our independence, which puts our destinies into our own hands.

All these are encouraging factors. However the story has only just begun. No one can predict how it will develop. A crucial factor is the calibre of Indian scientific workers: They constitute only a small minority. However, that has been the case in other countries also.

It is tempting to compare the activity of scientific workers with that of hormones in a body. Just as small quantities of these substances produce vital effects on the body, so also the creative ideas of scientific workers can produce big changes in society. The key factor in the progress made by the west in man's fight against hunger, disease, poverty and ignorance, has been science pursued with an open mind. The Indian scientific worker has the opportunity of bringing about similar progress here.

Yet, as Mr. Churchill once said, "Every opportunity involves a responsibility". So it is also an important responsibility of the Indian scientific worker to see that wherever he is, his part of the job is done well.

If he is in an educational institution it is his job to see that the training which the future workers receive makes them fit for their jobs. They should not only have a working knowledge of what is already known in their fields, but also they should acquire the ability to handle new problems, and to create knowledge. In other words they should receive training in the use of the scientific method. The proper atmosphere for this can be created only if the educational institutions are actively pursuing programmes of research also.

If a particular scientific worker is in industry, then it is upto him that techniques and procedures are constantly improved through research and new ideas. He will have to train his employers to recognise the value of scientific research, and to support it in their establishments as well as in the educational and research institutions of the country.

Workers in scientific establishments (like others) have deep happiness awaiting them in the vigorous and purposeful pursuit of their research objectives. On them rests the responsibility of starting new industries in our country without having to transplant whole factories from abroad. The latter kind of growth is not only expensive but also super-

ficial. If industries have to be firmly based, then they must have their roots in the research done in this country. The task of slowly accumulating know-how, through experience, is long and laborious. But there is no way out.

The scientific worker in a high administrative job has his own heavy responsibility. It is his job to see that fundamental and applied research are properly coordinated in the different centres. He has to ensure proper facilities for the workers regarding equipment, libraries and working conditions. He is responsible for maintaining a high morale among the workers through just and sympathetic ad-

ministration.

There can be little doubt that if we perform our own little tasks efficiently, we can raise the living standards of our people, as they have done elsewhere.

But that is not all. So long, the scientific movement has been mainly consisting of the quest for knowledge, and the power to be acquired through knowledge. Its ultimate result can be human happiness, only if knowledge is wedded to fellow-feeling. If the Indian scientific workers can bring about a synthesis of two things, they will be contributing something which is of a higher order than pursuit of knowledge alone.

## Research in American Industries and Universities

### Place of Research in Industry—II

R. K. GUPTA, *The Kesar Distillery, Baheri, U.P.*

As I have stated earlier in my first article (published in Nov. 51 issue of Vijnan-Karmee), there are many different opinions as to what constitutes research. In industry these differences usually stem from differences in corporate organizations and assignment of functions to the various divisions. For example, in one company the responsibility for research and development may reside in the sales department, and in another in the manufacturing department or in the engineering department. More recently, however, the trend has been to establish a separate research and development department and make it directly responsible to the top management.

In a small company or one with limited interests, the organizational relationship of research to the rest of the company is usually of minor consequence. Research often starts in the control or engineering laboratory of a manufacturing division. But as the enterprise grows and its interests become broader and

more diversified this arrangement is less satisfactory. Research must serve all the objectives of the company in proportion to their needs. The only way to assure this is to organize research and development as a separate unit, reporting directly to the top management. It requires a fully integrated organization functioning under one head or manager, to develop new process for the manufacture of new products promptly and efficiently. The successful research and development organization needs to be composed of a variety of highly skilled groups working together to accomplish the desired results. Due to the expense of maintaining highly skilled specialists on the staff and the likelihood that no single department will have sufficient work to completely occupy their time, the most effective and the most economical procedure of operation is to group these men together under a central supervision.

To accomplish this objective, industrial research and development must bring together

all activities necessary to derive, unfold, and evolve an idea into a complete and profitable achievement. The research and development department be headed by a vice-president, who reports directly to the president of the company. A manager assists the vice-president in his administrative duties. The department consists of four major divisions: research, patent, engineering, and sales development.

The activities and importance of the research division generally are better understood than those of the other research and development divisions. Hence, the research division will not be discussed in as much detail as some of the others. The dependence of other research and development functions on a source of fundamental research data is obvious and well recognized. The research division is concerned with fundamental research and basic problems relating to the development of new processes and products and to finding improvements of and better uses for new and existing products. This division conducts laboratory and bench-scale experiments and literature studies. It advises the engineering groups on design problems, works for the improvement of the processes so as to increase the efficiency of the plant, and acts in a consulting capacity in technical matters to the other departments and to management.

The patent division is responsible for obtaining patents on all company inventions. In addition, it makes a thorough scientific study of the patent literature, patent laws, and of the patent activities of competitors.

It is worth noting that the patent division reports directly to the research and development management. Although this group also does patent work for other departments, most companies are convinced that this is the most effective location for the patent activities. Experience has shown that approximately 90% of the contacts of the patent division for administrative decisions are of a technical nature and less than 10% are concerned with legal problems.

The legal department of the company assumes full responsibility for the conduct of patent litigation, supported by the assistance of the patent division.

To conduct its work most successfully, a patent division needs two classes of men: attorneys and scientists. Often an attorney is also a scientist, but it is found that for this work a team of scientists and attorneys who have specialized in their respective fields is needed. These two classes of men are able to bring together their skill and experience, and thereby, more efficiently prosecute the patentable ideas brought to their attention. The attorneys are responsible for the prosecution of patent applications. They must have a broad general knowledge of patents in industry, and in particular the patents of the industry in which they are employed. Also they must be aware of the strength and weakness of patents in the fields in which the research and development department is engaged. The scientists study the technical literature and the experimental data. They prepare disclosures of inventions with a view to their technical merits, and act as consultants to the patent attorneys.

The engineering division (for the purpose of this article I will designate engineering as "chemical engineering" hereafter) is responsible for making scientific engineering studies and economic analyses of the processes which have reached the research stage where serious consideration is being given to pilot plant or large-scale operations by the company.

Pilot plants are designed with the assistance of the research division. Either the research or the chemical engineering division may be made responsible for the operations of pilot plant. The research division is made responsible for the operation of pilot plant when it is used to conduct experiments with a purely research objective, like a large test-tube, or when it is used to check the results of laboratory experiments conducted in the research

division. The chemical engineering division is responsible for the operations when the pilot plant is operated to obtain engineering data necessary for the design and evaluation of large-scale operations or to produce chemicals needed for research and development when such products are not available otherwise. If quantities of these chemicals in excess of such needs can be produced, they are often offered for sale to others. The decision as to which division is responsible for the operation of the pilot plant is made by considering who is responsible for the results obtained. The division that is responsible for the results must be given the proper authority.

The chemical engineering division also handles small-scale manufacturing operations in the cases where a separate organization for manufacturing is not justified. It is found advantageous to maintain a group within this division for the fabrication of scientific instruments and mechanical devices not available in the trade.

The sales development division is primarily interested in market research studies for the purpose of determining present and potential supply of and demand for products being considered for large scale production by the company. This division also handles the sale of new special products that are in the early stages of market development. Market development is usually a critical period for a new product, requiring a high degree of skill and cooperation of technical salesmen, engineers, and research men. After the sale of a product has become sufficiently established, the activity is transferred to the appropriate department or subsidiary of the company.

Licensing of patents is another function of the sales development division which is conducted in collaboration with patent, chemical engineering, and research personnel. In addition to the actual sale of the license agreement, this group arranges for process evaluation for the prospective licensee, and for the preparation of samples for product evaluation.

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## CYBERNETICS

### UNIFIED APPROACH TO THE STUDY OF MAN AND MACHINE

*(Report on the Symposium on Cybernetics organised by the Bangalore Branch on 31-1-52 and 1-2-52).*

The Bangalore Branch of the Association of Scientific Workers of India held a symposium on Cybernetics, the science of control and communication in man and machine on 31-1-52 and 1-2-52 at the Indian Institute of Science at which papers on several branches of science were presented by speakers from Bangalore and outside. Prof. M. S. Thacker, Director, Indian Institute of Science, inaugurated the session and presided over the first day's proceedings. Welcoming the delegates, Prof. Thacker traced in his inaugural address the origin of the new science of Cybernetics to the work of Norbert

Wiener and his associates in the United States and said that it constitutes a significant landmark in the development of both physical and biological sciences. Cybernetics, he pointed out, considers the problems of control and communication in man and machine from a unified point of view and is therefore the field of investigation for the physicist, the engineer and the biologist. Naturally, the mathematician with his powerful tools of statistical methods plays an important role too. Prof. Thacker indicated briefly how a combined study of modern communication systems such as radio,

telephony and television on the one hand and sense organs, nervous system and brain are of mutual advantage to the engineer and the biologist. The study of the working of human brain and the modern electronic calculating machines, popularly known as electronic brains, can also be of great significance. He mentioned finally that an intelligent and judicious application of the knowledge of the growing science of Cybernetics holds great promise to mankind, and devices which help to replace one lost sense by another one are not outside the realm of possibility.

Dr. B. S. Madhava Rao of the Mathematics Department, Central College, Bangalore said that the first problems in the field came from physics and engineering, and it now appears that cybernetics may have important applications in biology, physiology and perhaps other sciences.

Discussing the scope of cybernetics, Dr. B. S. Madhava Rao pointed out how diverse concepts, such as the entropy in statistical mechanics and thermodynamics, feedback in engineering and even some aspects of mathematical logic have found wide use in their application to biological problems. The most important applications of cybernetics are to neurology and are based on the hypothesis that the chief mechanism of the central nervous system is one of negative feed-back which explain purposive and adaptive behaviour. A recent achievement of cybernetics has been the invention of new types of hearing aids for the deaf, making use of touch supplemented by adequate electrical tools. He pointed out that although at present cybernetics has not yet provided any clue to the understanding of the body mind relationship it may be possible in the future that the study of mind from the cybernetic view point may be fruitful. A critical study of Patanjali's Yoga sutras from this point of view is hence worthwhile.

Dr. B. S. Ramakrishna of the Department of Electrical Communication Engineering of the Indian Institute of Science dealt with the pro-

blem of transmission of information and its importance to the satisfactory functioning of any complex organisation. He discussed briefly how the work of Wiener and Shannon now enables us to measure the information associated with a message in a quantitative manner (as we can measure mass or energy) and further how the rate at which information is transmitted in a communication channel can be determined. He then indicated how the problem of communication through speech between one man and another can be viewed from the point of view of transmission of information, and can be the object of investigation for the acousticians, linguists, neurophysiologists and psychologists.

Mr. V. R. Thiruvengkatachar of the Defence Science Organisation, New Delhi dealt with the time series nature of the messages which are transmitted in communication systems. He considered from the mathematical standpoint the two main problems viz., how best can a message which gets corrupted by the accumulation of noise during transmission be recovered and to what extent a statistical prediction of the future of the message can be made from observations on the past statistics of the message. The paper was presented on his behalf by Dr. Dhawan of the Department of Aeronautical Engineering of the Indian Institute of Science.

Dr. J. Chandy and Dr. B. Singh of the Department of Neurology, the Christian Medical College, Vellore, dealt with the physiological aspects of Cybernetics. Dr. Singh presenting the paper, described the neurons, synapses and their central role in the transmission of information in the form of nervous impulses. He further dealt with the essential complexity of the nervous system and pointed out the several feedback processes involved at different stages and their importance in the coordinated and controlled behaviour in man and animals. He described some experiments in electro encephalography conducted at Vellore and elsewhere and showed records of the alpha rhythm of the

human brain, some of which were obtained by Dr. Singh on himself.

Dr. J. Chandy in his presidential remarks on the second day emphasized the importance of and the need for extended study in this country of the somewhat neglected science of the physiology of the nervous system and the brain. He pointed out the great impetus afforded to the development of this science by recent progress in electronic techniques and the unified approach due to Cybernetics. In his concluding remarks, Dr. Chandy mentioned that the comparison of man with machine is however not exact because nervous impulses are not transmitted purely by electrical means at the synapses and chemical agents like enzymes play an important role. At the same time, he stressed the inadequacy of the existing state of our knowledge of the human mind and doubted whether it would be possible to explain completely its complex behaviour in terms of purely mechanistic models.

Dr. G. N. Ramachandran of the Department of Physics of the Indian Institute of Science spoke about modern automatic calculating machines and the relationship between their working and the functioning of the human brain. He gave a brief account of the manner in which these machines work, and how they are able to carry through an extended series of calculations from the beginning to the end without any intermediate human aid. He also described machines which can play games or verify the logic of arguments. He mentioned that in the not too distant future, a large variety of machines might be constructed which could perform many aspects of what we call "thinking". Finally, he pointed out interesting analogies between the functioning of the brain and the machine in the normal and the pathological states and the methods used in treating such cases.

Mr. T. K. G. Menon and Mr. K. K. Nair of the Department of Electrical Communication Engineering, Indian Institute of Science, Banga-

lore, discussed the feedback problem in Cybernetics. Mr. Menon presenting the paper dealt with the fundamental principles of feedback and their applications in engineering. He then pointed out how the principles of feedback could be applied to explain certain physiological phenomena and mentioned the various types of feedback encountered in such studies. He stressed the importance of negative feedback from the point of view of stability. He concluded with a few remarks on how the ideas of feedback might be of possible use to explain some anomalies in social sciences.

At the end of this paper Prof. Tischner of the Department of Communication Engineering Indian Institute of Technology, Kharagpur, discussed the various conditions for stability in feedback systems and their practical determination.

Mr. P. Srinivasa Rao of the Aeronautical Engineering Department of the Indian Institute of Science explained how the general principles of instrumentation in machines are also applicable equally well to the sense organs of the living body. However, the functioning of the sense organs differs from the ordinary engineering instruments such as pressure gauges, etc. in that, the sense organs yield a combination of the instantaneous value and its time rate of change. He pointed out that in its reaction to internal stimuli the human physical motor behaviour is very similar to a servomechanism. According to Wiener's point of view some of the most characteristic activities of the human brain are explicable as circular processes, emerging from the nervous system into the muscles, and re-entering the nervous system through the sense organs.

Mr. V. Narayana Rao of the Department of Electrical Communication Engineering, Indian Institute of Science, dealt with the principles of servo systems and pointed out that servo systems were characterised by the feedback employed to control their behaviour and this feedback created problems regarding their stability. He then

described methods of maintaining their stability and also some applications of servomechanisms in data transmission, automatic tracking and remove control systems.

Dr. Govindaswamy of the Government Mental Hospital Bangalore said that Cybernetics certainly helps one in understanding some aspects of neurophysiology, but there are many problems for which it gives no solution. He pointed out that the analogy of the nervous system with the communication system of the engineer is not complete, for there are several bodily functions which are not decided by neu-

ral impulses, e.g. the amount of insulin that is released. In fact, the central nervous system is used only in an emergency and not regularly.

In spite of this he said that the cybernetical approach may help one to understand many disorders in the nervous system which cannot be explained at present by anatomical or neurophysiological changes.

However, he was of the opinion that although machines may be made to work in a manner similar to human beings, whether this approach can ever explain man completely is rather doubtful.

## Titanium and Zirconium Resources of India

*(Lecture delivered by Mr. P. Viswanathan of Travancore Minerals Ltd., at a meeting of the Bangalore Branch).*

I consider it a very great privilege to have this honour and opportunity of meeting such a distinguished gathering of scientists. I am grateful to Sri N. N. Narayana Rao, the enthusiastic Secretary of the ASWI for arranging for this gathering. I intend telling you something of the minerals containing three elements Ti, Zr and Hf which belong to the odd series of Group IV of the Periodic Table. These three elements have long been labelled as rare and their chemistry has been comparatively oblivious. But in reality Ti and Zr exist in nature in much greater percentages than many other common and well known elements like Nickel, Copper, Zinc and Lead.

The romance of metallurgy is both intriguing as well as fascinating. Prehistoric man improved upon his implements of bone and stone by utilizing metals easy availability and working out. The iron age and the present alloyage provide man with metallic material to answer every need. There is an alloy for every purpose whatever be the specifications that have to be answered.

But one fact which needs emphasis is that while progressive utilization of metallic ores increases, the possible exhaustion of reserves may be within sight. For example the rate at which ironore is being consumed in the constructional and structural engineering have induced genuine fears in the minds of experts as to what will have to be done to meet ever-increasing demands. But nature is a wonderful treasure trove and science's toils always bring forth effective answers to such fears. A brilliant example is that of that wonder metal aluminium, which now has come to the rescue in the field of structural engineering. The first bars of this metal were exhibited in the Paris Exhibition in 1855. The price was £ 12 0-0 per pound and the metal was considered very novel and precious so much so the story goes that Napoleon III used aluminium spoons in Court banquets in preference to gold ones! But today aluminium sells at a few shillings a pound and millions of tons of Al and its interesting alloys are produced every year. Recently a bridge has been fabri-

cated of Aluminium in Arvada in Canada which not only has cut out huge recurring costs of maintenance by painting replacements etc., but saved the handling and weight of about 300,000 tons of structural material.

Almost like the romantic development of Aluminium, another great metal, with perhaps equally great potentialities is now in the embryo stage of mass production. That metal, is Ti and its close following young brother is Zirconium with its satellite Hf.

We in India have occasion to be proud that the expanded commercial application of Ti and its compounds commenced, by large scale use of Titanium ores which originally came almost entirely from India—i.e. Travancore which still continues to be one of the major producers of Titanium ores. The story goes that a French Chemist named Rossi spilt some turpentine over titanium-dioxide and noticed how the combination gave a brilliant bright colour. That is how the manufacture of this whitest substance (barring magnesia) commenced in the early twenties of this century. Starting with an annual production of a 100 tons, today the total production of this pigment oxide exceeds 400,000 tons! Till the commencement of the World War II India used to supply nearly 90% of the requirements of the Titanium ores, but since then the situation today is that many other world sources have gone into competitive production so much so the contribution of India—Travancore—to the supply of Titanium ores is less than 50%.

The history of the Ilmenite industry is very interesting. At the turn of this century, what was known as a "Thorium-fever" was raging in the Western countries particularly Norway as this material was consumed largely in the manufacture of incandescent mantles. It would appear that when a godown in Germany which held a stock of coir was emptied, a yellow material was noticed on the floor which on a check-up proved to be the much wanted monazite. How the monazite got there

was like this. Travancore produces some of the finest products of coir. When spinning the coir, the local residents mix the fibre with the heavy sand from the beach containing appreciable percentages of monazite as well as other minerals. Not only does the sand weighten the coir but also lends a good grip to the spinners who work the coir into ropes. It was therefore an easy matter to trace the monazite to the place which supplied the coir. That is how monazite was first discovered in Travancore beaches in 1909 by that enterprising German, Schomberg. Trade in monazite was not progressively good. After a few years monazite production dwindled but meanwhile interest developed in ilmenite which was noticed in the crude monazite material exported in the beginning. Trial consignment of ilmenite of a few hundred tons sowed the seed of the vast industry now turning out several hundred thousand tons of ilmenite now being produced in Travancore from beach deposits. Just as ilmenite was born out of the impure concentrates of monazite, zircon, rutile and sillimanite have also been produced as by products in commercial quantities from the beach deposits.

These deposits now being exploited occur in two beds, the first and the older one being at Manavalakurichi and the second, but richer ores being at Neendakana a few miles north of Iuilon. The genesis of these deposits have not been studied exhaustively, nor has any regular surveys of the extent of these mineral deposits been carried out so far. But opinion is undivided that these minerals were originally disseminated in the gneissic rocks which form the main geological feature of the country. The ultimate metamorphic desintegration of these rocks yield these minerals in sand form which are now accumulated by the sedimentary action of rivers and monsoon torrents. River mouths yield rich deposits of these minerals. The initial work of drilling, blasting, crusting, and grinding and sizing have been accomp-

lished by the perennial work of nature. A theory has also been advanced stating that just as the gneissic rocks in the interior undergo continuous meta-morphosis, such action could also happen in sub-terranean rock beds in the sea, and the tidal action of seasonal currents could have worked and reworked the loosened heavy minerals and accumulated them in the form of rich deposits where we see them today. But this needs much confirmatory work.

So far Travancore has produced and exported nearly 3,000,000 tons of ilmenite by now.

The mined material in Travancore may contain :—

Ilmenite round 70% zircon and sillimanite round 5 and 4% respectively, rutile 3 to 4% and the balance silica and traces of many minerals like hornblende, hypersthene, spinels, staurolite tourmaline etc. The dressing of this is as per accompanying flow sheet which yield Ilmenite, Ziraon, Sillimanite and Rutile (The working of monazite and its details have to be cut out as all information regarding this is to be treated as confidential).

The speciality of Travancore ilmenite lies in its highest content of Titanium 60% and its being free from troublesome impurities like magnetite, staurolite, hornblende and tourmaline which tend to make concentration work very troublesome. What is ilmenite? The theoretical formula  $\text{FeO} \cdot \text{Tio}_2$  corresponding to 52%  $\text{Tio}_2$  is not met with in nature. The  $\text{Tio}_2$  content may vary from anything from 3% to 60%. It has been pointed out that such variation in the  $\text{Tio}_2$  content is due to varying inter-crystalline growth of ilmenite with magnetite or arizonite,  $\text{Fe}_2\text{O}_3 \cdot 3\text{Tio}_2$  or with both. Also ilmenite and arizonite usually includes varying proportions of a weathered product known as laucoxene containing 70 to 90%  $\text{Tio}_2$ . Rajputana rock ilmenite 18/20%  $\text{Tio}_2$  Cochin beach mixture of ilmenite and hornblende ilmenite itself 4%. Bimlipatam ilmenite 47%

Ratnagiri 50% MK 54% and Quilon 60% Ceylon 55/56%.

The world's richest ilmenite producer today is located in the Adovindack mountains in the N. Y. district, known as the Mac Intyre Works owned and operated by the National Lead Company of N. Y. the world's largest consumer of Titanium ores. This is in the form of rock— $\text{Tio}_2$  10.5% Mgo 13.4%  $\text{Sio}_2$  16.6% The rock is blasted, crushed and ground to 30 mesh and on wet magnetic concentration yields a magnetic fraction containing ilmenite and a non-magnetic fraction of low titanium iron ore. The ilmenite is further dressed to a product 43/45%  $\text{Tio}_2$ . This mine now produces over 300,000 tons ilmenite every year.

The beach deposits of Florida, quite unlike Travancore deposits in being lean and impure are being operated by E.I. du Pont de Nemours and Co, who are one of the major world consumers of Titanium ore. The sands as mined, contain but 3/5% heavy minerals but by an ingenious device known as Humphreys Spirals, some 8/10,000 tons of sand are handled every day which yield a concentrate - Ilmenite 30/35% Zircon, rutile 5% Staurolite a troublesome and worthless material 45% trace monazite and rest silica. The  $\text{Tio}_2$  content of the finally dressed ilmenite is 60% - as good as Travancore product. The latest sensation in the Titanium world is the discovery of huge deposits Titanium cum Iron ore by Kennecot Copper and New Jersey Zinc Company, which is located in the neighbourhood of Allard Lake, Quebec, Canada. The first electric furnace to smelt this has already gone into operation at Sorel near Quebec and five more are under construction. This process will revolutionise the pigment titania processing. The ore is smelted with dolomite and coke which yields a polytitanate of calcium magnesium - aluminium giving 60/70%  $\text{Tio}_2$  which can more easily be attacked with acid yielding comparatively more  $\text{Tio}_2$  than arizonite or rich ilmenite. But the demand for Titanium pigments and other products has been

increasing in such phenomenal degree that over-production of this may not result. Titanium di-oxide is used widely as a pigment, a filler and in lacquer and vitreous enamels. It is used for sizing paper, rubber, plastics, cosmetics and in fact in the manufacture of any thing bright white. The tetrachloride is used in sky writing and smokescreens, in delustering of rayon, tinting of artificial teeth and in the manufacture of arc welding rods and also titanium alloys. The present trends in the manufacture of ductile Titanium are very promising. The Kroll process of Titanium-reduction with Magnesium is being exhaustively studied as well as other alternative continuous electric arc processes like the iodide reduction process. So far 100 lbs. ingots are in production and as more success results from increased batch production, prices will tumble

down to more economic levels making universal application of the metal for many advantageous items of structural needs.

Rutile too is an extremely rare mineral difficult to concentrate but economic production has been attained. Synthetic items rivaling diamonds have been produced from  $TiO_2$  by the National Lead Company. Zircon is a silicate of zirconium millions of tons of which are known to be available in India. Its metallurgy is almost analogous to that of Ti. The oxide is a super refractory. The natural oxide mineral exists in the beach in very small percentages. This is Baddeleyite, an extremely rare mineral worked commercially only in Brazil. Every Zircon compound contains upto 1% Hafnium which is extremely difficult to separate from Zr. The only known method of separation is by ion-exchange methods.

## ACTIVITIES OF THE BRANCHES

### Bangalore Branch

1. On 26th January 1952, Prof. J.B.S. Haldane addressed the members of the Association on "Popularisation of Science". He said that all attempts at the popularisation of science should be related to the actual daily needs of the people. Thus, in a predominantly agricultural country like India, such problems as the physics of the plough, optimum diameter of bullock cartwheels, etc., would be of great interest both to the layman and to the scientist. Prof. Haldane also dealt with the question of food and suggested greater utilisation of such foods as duck's eggs.

2. On 31-1-52 and 1-2-52, a two-day Symposium was held on Cybernetics, a report on which has been published elsewhere in this issue.

3. An Ordinary General Body Meeting of the Bangalore Branch was held on 25-1-52. The Annual Report was presented by the Secretary

and passed. Extracts from the Report are given below:—

"The Branch Executive Committee met thrice during the year under review and made some important decisions. Many recommendations were made to the Central Executive Committee about improving the Vijnan-Karmee. A recommendation was also made to amend the constitution so that graduates whose basic income is less than Rs. 100/- per month may be permitted to become Ordinary Members by paying the enrolment and subscription rates of Associate Members. This recommendation has since been accepted.

"The Executive Committee took up the case of one C.S.I.R. Research Assistant in the Indian Institute of Science whose services were terminated without proper notice and followed it to a successful conclusion. The Executive Committee also supported the case of a Research

Scholar in Hyderabad whose scholarship was terminated without any reasons being assigned.

"The Association continued its efforts towards the popularisation of science. Nearly 35 films of scientific interest were exhibited during the year for which the Scientific Film Society of India from whom many of these films, were borrowed, may be thanked. Two popular lectures were organised, one by Mr. P. Viswanathan on "Titanium and Zirconium Resources of India" and the other by Prof. D. D. Kosambi on "Is India Overpopulated?"

"A symposium was held, at the beginning of year on "The Education of the Engineer" jointly under the auspices of all the Engineering Societies of the Indian Institute of Science and the A.Sc.W.I. (Bangalore). It was presided over by Prof. M. S. Thacker and among the speakers were Prof. O. G. Tietjens Prof. H. A. Havemann, Prof. Brahm Prakash, Prof. K. Srinivasan, Mr. M. C. Munshi, Mr. M. A. Govinda Rau and Prof. C. S. Ghosh.

"Opportunity was taken of the presence of the Chinese Cultural delegation to the City to meet Dr. Chien-wei-Zang, a member of the delegation and one of the leaders of the Chinese Association of Scientific Workers. He impressed on us that the need of the hour is unity of all Scientific Workers."

"The membership of the Branch has increased during the year to 110.

The following office bearers and Executive Committee were elected for 1952.

<i>President :</i>	Dr. S. Dhavan.
<i>Vice-Presidents :</i>	Dr. G. N. Ramachandran. Mr. N. N. Narayan Rao.
<i>Secretary :</i>	Mr. M. V. Bhatt.
<i>Treasurer :</i>	Mr. K. Lingamurthy.
<i>Jt. Secretary :</i>	Mr. M. A. Cobly.
<i>Members :</i>	Mr. Radhakrishnan. Mr. K. S. Prabhu. Mr. M. M. Sondhi. Miss P. Soni. Mr. Y. V. Nagabhusan Rao.

Mr. Y. C. Subrahmanya.  
Mr. M. A. Tirunarayanan.

### Calcutta Branch

The Annual General Meeting of Calcutta Branch was held on 16-2-52, the following office-bearers and Executive Committee were elected.

<i>President :</i>	Prof. P. C. Mahanti.
<i>Vice-Presidents :</i>	Mr P. S. Paul. Dr. S. Banerjee
<i>Secretary :</i>	Dr. A. B. Roy Chowdhury.
<i>Joint Secretary :</i>	Mr. H. P. Chattapadhaya.
<i>Treasurer :</i>	Dr. M. L. Chatterjee.
<i>Executive Committee Members :</i>	Mr. J. S. Sanyal. Mr. A. N. Mukherjee. Dr. A. Chaudheri. Dr. D. K. Chaudhuri. Dr. Moni Chakravarti. Dr. S. K. Bose. Dr. Souren Ghosh. Dr. B. K. Banerjee. Mr. K. K. Nag. Mr. S. C. Majumdar. Mr. P. K. Roy. Dr. R. C. Banerjee. Mr. A. N. Chowdhury.

*Extracts from Secretary's Annual Report for 1951, are given below :—*

"The Calcutta Branch of the Association of Scientific Workers of India has just entered into the sixth year of its existence. During the year 1951, the Executive Committee met several times. Some important decisions about Lake Medical. College, organizational matters etc. were discussed and reported in Vijnan-Karmee from time to time.

"During the year under review, several scientific film shows, to say, once every two months, through the courtesy of the British Information Services were arranged with a view to creating an interest among fellow scientific workers. Besides these, a Symposium on the "Social Responsibilities of the Scientific Workers" was organised in which Prof. S. N. Bose, Prof. K. V. Krishnan, Dr. B. C. Guha and Dr.

C. P. Das Gupta took part. Dr. A. C. Ukil gave a talk on his recent visit to U.S.S.R. and Prof. Tripurari Chakravarty on his impressions about his visit to "New China". A fairly good gathering of scientific workers assembled on all these occasions.

"As the Annual General Meeting of the Association of Scientific Workers of India was to be held at Calcutta, the Executive Committee of the Calcutta Branch appointed a sub-committee with Mr. P. S. Paul of the National Instrument Factory as Chairman mainly for the double purpose of: (1) propagation of the aims and objects of this Association in and around the city of Calcutta by means of postering; (2) to accord a reception at a Tea Party to those of our brethren of this Association from all parts of India and some distinguished guests assembled at Calcutta during the Indian Science Congress.

"Success, we attained for this, I should say, was mainly due to the encouragement and advice we had from our able Chairman of the sub-committee Mr. P. S. Paul.

"Though the Calcutta Branch of the Association of Scientific Workers of India has just completed the fifth year of its existence, but I am really distressed to say that the great enthusiasm and zeal which were exhibited among the scientific workers of Calcutta at the start of this Association, have considerably dwindled down during recent times. I should mention that this Association which enrolled about 500 members at Calcutta in the first year of its existence had only about 125 members on its roll in 1950. Last year with much efforts in collaboration with Dr. A. B. Roy Chowdhury of the School of Tropical Medicine, Mr. P. K. Roy of Glass and Ceramics Research Institute and Mr. H. Bose of Science College, the number could not even be raised to more than 200. In a city like Calcutta where there are several scientific institutions and many industrial establishments, I should confess, that this number is too small. In this connection I should like to remind my

friends that this Association is a platform from which something beneficial to the scientific workers could possibly be done for the redress of their grievances if the scientific workers join in larger number and take more interest in it. As a matter of fact in the past a few instances of injustice and dismissal had been rectified through this Association mainly due to the efforts of our General President, Dr. B. C. Guha. Had there been no Association, I wonder what would have been the fate of those unfortunates involved. In the light of the experiences it is all the more necessary that we should try to make it a stronger body. I therefore appeal to my friends assembled here this afternoon to make greater efforts to convince the scientific workers in different spheres of activities about the utility of the existence of this Association. Here I am glad to say that our friend Mr. Kanailal Bhattacharyya, an earnest worker of the Calcutta Branch of this Association has been elected to the West Bengal Legislative Assembly with an overwhelming majority. We hope he will try to improve the conditions of the scientific workers with the help of the privileges and influences he will have by virtue of being elected to the Assembly. Let us congratulate him on his success."

#### Delhi Branch

##### "Interior of the Earth"

Dr. S. K. Banerjee (retired Director-General Observatories) Professor of Mathematics, College of Engineering, and Technology, Calcutta delivered a popular talk on "Interior of the Earth" on the 7th March 1952 under the auspices of the Association of Scientific Workers of India. The lecture was held in the Observatory Buildings, New Delhi with Mr. A. K. Roy Deputy Director General of Observatories in the chair. In the course of his talk Dr. Banerjee said:—

"In these days of scientific advancement the scientists are trying to understand what is happening inside the earth. The scope of geology does not normally extend beyond 10,000ft.

below the surface of the earth. Even when waves are produced by explosion we can get information about a depth of 3-4 KM inside the earth. When electric current passes through earth it cannot pass through deep layers. These along with other methods are used in many countries for geological prospecting. Canada adopted gravitational, magnetic and conductivity methods for geological prospecting. They found enormous minerals in the ice-cap. In India the B.O.C. applied some of the methods successfully. Recently the Geological Survey of India are applying some of the methods to find out ores.

The only source which allows us to get some information about the deeper layers is the occurrence of earth-quakes. The energy that is released from an atom bomb is about  $10^{20}$  ergs while that from an earth-quake of moderate intensity is a million times more. In the case of earth-quakes there are two different ways for the wave to propagate (a) longitudinal and (b) transverse. The speed of the former is about 7 k.m/sec while that of the latter is about 4 k.m/sec. Even this speed of the longitudinal waves is not same everywhere as they are found to bend downwards when they pass through special layers called crustal layers. In this way two crustal layers have been identified (a) granitic layers and (b) basaltic layer. The depth of the former layer has been found to be 15-20 k.m while that of the latter 50 k.m. The non-uniformity in crustal layers gives us an idea of solid matter some 50 k.m. deep.

The experiments performed in the laboratory relating to behaviour of materials under high pressure and temperature have changed our entire idea. It has been found that one k.m. below the surface of earth there is an increase in temperature by  $20^{\circ}\text{C}$  per k.m. The temperature of volcanic lava is about 1000-1100 C which shows its origin below 50 k.m. It is assumed from various considerations that the temperature at the centre of the earth is not less than 3,500 C, the density 12-13 and

the pressure 3-4 million atmosphere. The study of the action of this pressure and temperature throws a considerable light on what is going on inside the earth.

In the laboratory the high pressure produced 5,000 kgm per sq. cm corresponds to a condition at a depth of 100 k.m. To prepare a container for this experiment renders a great problem. It has been found that silver at a pressure of the 5,000 kgm/sq cm. melts. While this pressure is increased it solidifies and at a second stage it flows again. Prof. Bridgeman got his Nobel Prize for the discovery that pressure changes resistivity of a substance. When graphite is subjected to a high pressure it changes its physical characteristics. When mica is subjected to 10,000 kgm. per sq. cm, it becomes a lubricant. Ice shows a pronounced effect with the application of high pressure. Ordinary ice melts and flows like water with the application of pressure and again solidifies with pressure. This is ice No. 2. In this way several varieties of ice have been found to exist. These experiments have enriched chemistry opening a new chapter namely "chemistry of polymorphic transition". Each transition is attended with thermodynamic changes. This discovery has necessarily to be applied in understanding the interior of the earth. The Hindukush Earthquakes have been found to be originated from a depth 120 k.m. In some other violent shocks the seat of the earthquake has been found to be 700 k.m. deep.

The earthquakes may also be due to materials which are radio-active in the deep regions. In some cases the flow of heat converts solid matter into liquid thereby changing the volume of the matter which may be responsible for earthquake shocks. Again gravity anomalies suggest isostatic compensation. Any deviation from that may lead to earth quake.

Below 3,500 k.m. shear waves do not trouble. Hence below that depth the materials

(Continued on page 4)

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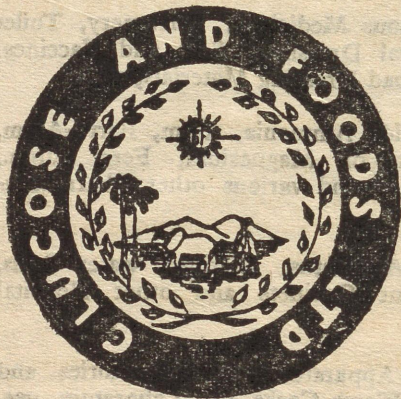
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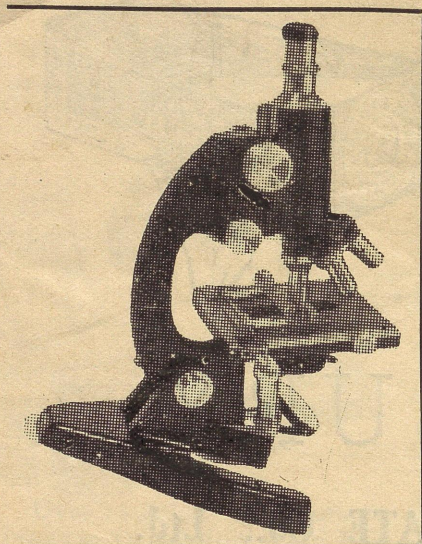
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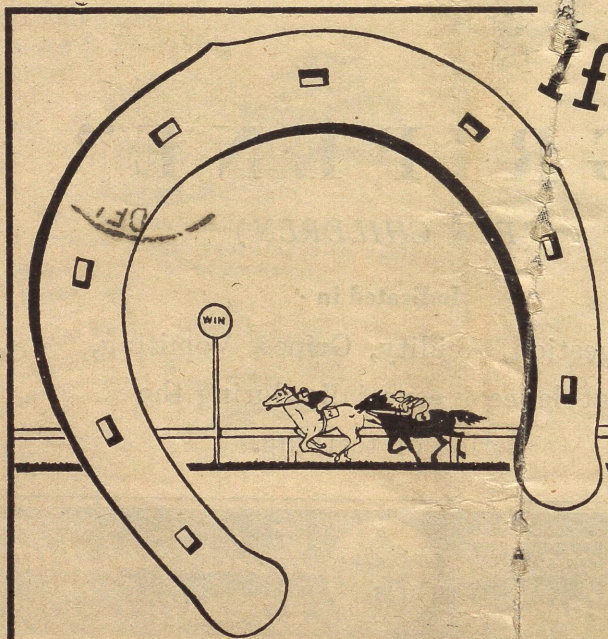
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# VIJNAN-KARMEE

विज्ञानकर्मी

official organ of the  
ASSOCIATION OF SCIENTIFIC WORKERS OF INDIA

Vol IV. ]

JUNE, 1952

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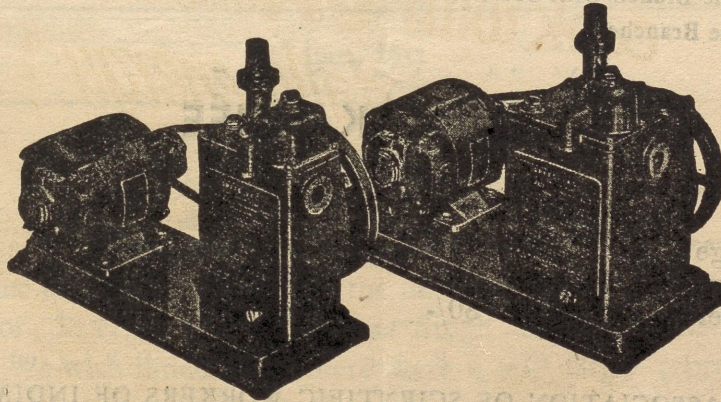
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# VIJNAN-KARMEE

विज्ञानकर्मी

VOL. IV ]

June, 1952

[ No. 6-

## SCIENCE AND PARLIAMENT

It is a matter of congratulation to the scientific workers in India that science is ably represented in the new Parliament by Prof. M. N. Saha, Prof. S. N. Bose, Sardar Lal Singh and Major-General S. S. Sokhey. We wish indeed that there were a still larger representation of science and technology in Parliament.

The vital role that science has to play in the rapid economic progress of the country is generally recognised. But administration in India, even after the advent of freedom, is weighed down to a considerable extent with past traditions which largely ignored this role. Scientists are still regarded by the bureaucratic machine to be on 'tap' and not on top. Excepting the Prime Minister of India and a few others, who do wish to give science a place in the new set-up, practically all other people in authority are still moving in the old groove of thought. And yet it is a truism that unless scientists are placed on the highest level with the professional administrators, rapid advance on sound lines cannot be made. The reason is simple. If scientists are mere advisers, their advice may not be implemented by the administrators. Even if their suggestions are accepted, in the execution itself, if left to the so-called administrators, there may be aberrations. This may frustrate the objective and discredit scientific advice itself.

In some western countries, particularly during and since the war, the fundamental role of science and technology in modern society is fully acknowledged by the Government and the public. More scientists are increasingly associated with the administration and even when that is not the case their advice is more often than

not implicitly obeyed. They are made to feel that they are on top. The governmental authority has humility. It usually knows enough to know that it does not know and therefore treats the technical advice they get with great respect.

Unfortunately in India a similar relation between the administrators and scientists has not yet grown up. Political leaders who might have directed the professional administrators towards a correct attitude to science and scientists are themselves not sufficiently cognisant of the fact that, that attitude is a *sine qua non* for the progress of the people on modern lines.

We expect that our leading scientists, who are now adoring the Parliament, would now give a lead to politicians and administrators so that they might acquire the necessary orientation to science and scientists. No doubt they will use their scientific thought and scientific method to clear many of the cobwebs of parliamentary debates. No doubt they will try to guide governmental actions on planned, creative and fruitful lines with clear-cut targets set in front. No doubt they will make their stentorian voice heard in the cause of the preservation of peace and of the exclusive use of science for the ends of peace and progress. They must try to see that the Government of India takes a lead in the United Nations for the banning of the atomic bomb, napalam bomb, gas warfare and all other horrible weapons of mass destruction. We would finally appeal to our scientist members of Parliament to see that scientific workers of India get their proper position and a decent standard of living in contemporary society. They are fully aware of the present lowly condition of scientists in the country and they know best how they can help the scientific workers to get a fair deal from Government, Universities, industry and other institutions. The Association of Scientific Workers of India places its unstinted services at the disposal of our scientist Members of Parliament in the cause of the scientific and economic advancement of this country.

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## AN APPEAL TO THE MEMBERS OF PARLIAMENT

### Introduction

Scientific workers throughout the world have been attempting during recent years to organize themselves. There are several reasons for this movement. One is that science and technology constitute the very bedrock of modern civilization and scientific workers are directly concerned both with the application of science for the promotion of human welfare and with the prevention of the destructive and anti-social uses of science. They have, therefore, in a sense, a special responsibility to society. Further, recent events have shown, as in regard to the question of the control of atomic research, that even freedom in science which is necessary for its unrestricted growth may be in jeopardy. Again, scientific workers in many countries have to suffer living and working conditions under which the proper development and application of science is well-nigh impossible. In India trained scientific workers are sometimes paid less than even unskilled workers in the same factory. Whether the employer is Government or University or industry, scientific workers have not in general got a fair deal. This is not only hard on the scientific workers themselves but reacts on the society itself by keeping the scientific sector of the community weak. The improvement of professional social and economic status of scientific workers is an imperative necessity for the community as a whole. Scientific workers must also take an active part in public affairs, help the progressive forces at work within the society and spread the knowledge of science and its social implications among all the people.

With such purposes as indicated above, a number of organizations of scientific workers have developed in different countries, for instance, in Britain, France, U.S.A., Canada, China, Holland and Czechoslovakia. Many of

these National Associations of Scientific Worker have joined and formed the World Federation of Scientific Workers. The World Federation's aims and objects are similar to those of the national Associations and it seeks to co-ordinate the activities of and give a world-wide collective voice to the scientific workers of all countries.

In common with this movement, the Association of Scientific Workers of India was started by the General Committee of the Indian Science Congress. It was formally inaugurated by Sri Jawahar Lal Nehru, General President of the Indian Science Congress on the 7th January, 1947, and he was elected the first President of the Association. Professor Blackett, the then President of the British Association of Scientific Workers and Dr. Shapley of the American Association of Scientific workers spoke on the occasion and conveyed greetings to the Indian Association. Sri Jawaharlal Nehru in an inspiring message said.

"I consider it a privilege to be associated with the Indian Association of Scientific Workers. Such an Association was urgently needed in India and the Indian Science Congress has given shape to it at the right moment. It is meant to protect these workers and to help them. It is meant also for the advancement of science and the service of the community. I hope that scientific workers all over the country will join this Association and make it an active and vital organisation".

### 2. Constitution.

The constitution of the Association was framed by a Provisional Committee which was later ratified by a general meeting of the members. The constitution was attested by the President Sri Jawaharlal Nehru when the Association was registered under the Indian Trade Union Act (1926).

The objects of the Association are :—

(a) To improve the professional, social and economic status of scientific workers.

(b) To work for the fullest utilisation of science in promoting peace and the welfare of society ;

(c) To encourage scientific workers to take an active part in public affairs ;

(d) To spread the knowledge of science and its social implications among the people ;

(e) To promote international co-operation in science :

(f) To create public interest in science by organising popular scientific talks and by diffusing basic and applied scientific knowledge ;

(g) To take steps to remove prejudices and superstitions and other institutionalised social habits and customs inhibitory to progress, and generally to inculcate the scientific spirit among the people ;

(h) To maintain a register of technically trained personnel in the country whose services can be utilised by the nation ;

(i) To see that the practice of science for remuneration be restricted by law to those possessing adequate qualification.

Scientists (natural/social), technologists, engineers and medical graduates are eligible to be members of the Association. There are four classes of members : ordinary members, associate members, affiliate members and honorary members. Ordinary membership is open to any person who holds a degree or equivalent diploma in science, technology, engineering, medical or social sciences or other diplomas together with professional experience. Associate membership is open to any person who is ordinarily a Matriculate and is not eligible for ordinary membership but is engaged in a technical capacity under supervision of a person qualified for ordinary membership.

### 3. Branches and Units.

The Association has got 11 branches and 4 Units distributed all over the country as mentioned below :—

*Branches*—Bengalure, Bombay, Calcutta, Dehra-

dun, Delhi, Hyderabad, Lucknow, Naihati, Patna, Poona, Raniganj.

*Units* —Dehra Dun (F.R.I.), Izatnagar, Jaipur, Kanpur.

Each branch consists of a number of units located at different scientific and technical institutions.

According to the constitution of the Association, an organisation with kindred objects may be affiliated to the Association. The Associations of Scientific Workers of Ordnance Establishments, Kirkee and Kanpur, have been affiliated to A.S.W.I. Negotiations are in progress for the affiliation of the Association of Scientific Workers, Ordnance Establishments at Jubbulpore with A.S.W.I.

### 4. Members.

The Association has more than 1500 members on its roll. It is the only organisation in the country that looks to the interests of scientific workers and differs from other national scientific bodies in its preoccupation with the economic condition of scientific workers and the effective application of science and the scientific method to the welfare of the community.

### 5. Activities.

The Association has undertaken the responsibility of creating public interest in science by organising popular scientific talks and by diffusing basic and applied scientific knowledge. In pursuance of the above objectives the A.S.W.I. is organising popular scientific film shows by courtesy of Foreign Embassies and the Education Ministry, Government of India.

The Association has been trying its best to secure employment for the unemployed scientific and technical personnel. It is also alive to the mal-employment of scientific workers and has drawn the attention of the authorities to the manner in which scientists had to drift from their creative lines of work. It has unceasingly struggled for improving the status and living condition of scientific workers. The Association has expressed its disappointment at the steady deterioration of the economic situation in the country and has

indicated methods by which this decline can be arrested and the country placed on the path of planned progress.

The Association has been paying attention to the most immediate problem facing the country namely the insufficiency of food. Several symposia on "Food and people" have been arranged and various suggestions made to the Government. It has insisted on the application of modern knowledge to agricultural production and on land reforms for stimulating food production. The agricultural institutions should be increased and given full facilities to carry out research work on agricultural development. The Central College of Agriculture at Delhi, which the Govt. had decided to close down, has been continuing due to the efforts of the Association. The scientific workers in the pioneer agricultural institution in Delhi have been getting extremely low remuneration and the Association has submitted a memorandum to the Government to raise their pay scales a par with those of the other technical institutions in the country.

The condition of scientific workers in industry is exceedingly bad. The greatest bane is the insecurity of their jobs. The Association has taken up this matter with the government of India.

#### 6. Resolutions.

The Association adopted various resolutions at its Annual Meetings dealing with living and working conditions of scientific workers; mal-employment of scientific workers; employment of foreign scientists and technicians; conditions of research workers in industry; leave facilities for attending scientific conferences; permission to apply for jobs outside; facilities for improving one's qualifications in spare time, institution of yearly prizes for the best scientific work; banning of atomic weapons and maintenance of peace; economic policies of the Government; the first Five Year Plan and labour bills; liberalizing the import of essential raw materials and scientific instruments; closing down of

Lake Medical College in Calcutta.

#### 7. Vijnan-Karmee.

The Association has been publishing its monthly journal, *Vijnan-Karmee*, since June, 1949. It serves the purpose of bringing the scientific workers together and focussing the attention of the public in general and of scientific workers in particular on the problem of the application of science and scientific method for the welfare of the community. It acts as a medium for discussion of different problems facing the scientific workers in India and helps the growth of trade unionism amongst this important section of workers in society. It is helping to create an effective voice of the scientific workers in India.

#### 8. Recognition.

It may be reported with pleasure that various Ministries of the Govt. of India have given their best consideration to some of the proposals made by the Association and in several cases grievances have been redressed but far more remains to be done regarding the improvement of pay scales, status, living and working conditions of scientific workers. The proposed Trade Unions Bill and Labour Relations Bill pending before the Parliament vitally affect the very existence of the Association. Efforts are being made to get a blanket recognition of the Association as a body representing all scientific workers irrespective of their employment in industry, universities or Government.

#### 9. Appeal.

The needs of the people of the country can be met only by the rapid development of science and its application to the national problems. The Association has been working for this end. It has been working in close co-operation with the various national and international bodies like the Indian Science Congress, National Institute of Sciences in India, United Nations Educational Scientific & Cultural Organization etc. It appeals to the members of Parliament for their co-operation in this great cause.

## Survey Reports on Working and Living Conditions of Scientific Workers in Greater Calcutta Area

### Factory No. 1. (Greater Calcutta Area)

[ We are publishing below a factual survey report on the living and working conditions of scientific workers in two factories in Greater Calcutta area compiled by two scientific workers there. Along with the tables describing the prevalent conditions, are given two tables showing the cost of living of (i) a scientific worker with his wife, one dependant and a child and (ii) bachelor scientific worker living in company's mess. While preparing these two tables it was assumed that the scientific workers live in a fairly modest way but not very comfortably and they do not go into any expenditures such as even to possess a radio or a bicycle or any other costly hobbies. The minimum expenditure is based on the price level prevalent in the Greater Calcutta area in the end of 1947. — Editors ]

Category of Sc. Worker.	Min. Qualification required.	Starting basic pay.	Usual variation	Annual increment.	Remarks.
		Rs.	Rs.	Rs.	
1. Lab. Asstt.	I. Sc. preferred B.Sc.	65	70	5-7	In special cases it may vary upto ten but not granted every year.
2. Junior Chemist.	B.Sc. Generally recruited B.Sc. (Hons.) Chem. Engineer or Dip. in the particular Technology.	75	100	10-15	Generally a start higher than Rs. 75 is given to a candidate with previous experience.
3. Senior Chemist.	Same as Junior Chemist with experience in the particular industry.	150	Upwards	15-20	Higher start or higher increment is given to candidates with vast experience sometimes on contract basis.
4. Factory Asstt.	Same as Junior Chemist.	75	Upwards	15 Upwards	According to experience and contract.
5. Draughtsman	Diploma in Civil Engineering.	75	...	10-15	...
6. Electric Supervisor	Supervisor's licence with sufficient exp. in electrical maintenance.	No available record on contract basis.	...	...	...
7. Doctor.	Medical graduate	No available record. On contract basis.	...	...	Private practice allowed.
8. Compounder.	Passed Compounder	70-75	...	...	...

**D. A. Bonus and other allowances**(a) *D.A.*

Up to Rs. 100 (basic pay) generally Rs. 31/-

From Rs. 100 upto Rs. 175/- generally Rs. 39/8. Above Rs. 175/- there is no fixed rate. It varies in sliding scale from Rs. 50/- to Rs. 150/-.

(b) *Bonus*

One month's basic pay is generally declared every year by the company as bonus but not exceeding Rs. 250/-. This year Company declared one and half month's basic pay as bonus and maximum given was Rs. 375/-

(c) *Servant allowance*

A consolidated amount of app. Rs. 7/8 is given to those provided with family quarters.

(d) *Contract Service Bonus*

A special bonus which was previously given to employees on contract basis after satisfactory completion of their contract period has been abolished.

**Security of service**

After confirmation service can be terminated by one month's notice on either side or one month's salary in lieu of. This is the general rule but sometimes 3 months' notice is served according to contract.

**Working conditions**

Whether in the laboratory or in the works no proper protection is provided against acid or varnish fumes nor any specific measure is taken to prevent Lead or Mercury poisoning.

**Medical facilities**

A new hospital has been started by the Com-

pany, a few beds have been provided but no nurse or attendant is provided. Medicines are generally served in the form of stock mixtures. No injectable or patent medicine or any other costly medicine is supplied. Exceptional cases are treated on individual merit. No pathology or surgical section is maintained.

**Provident fund**

Ten per cent of the basic pay is employees Contribution. The Contribution from the Company increases on a sliding scale, full contribution being made on completion of 10 years service. The amount of full contribution depends on the declared profit of the Company never exceeding employees' contribution.

**Leave and recreation facilities**

- (i) One month a year is granted as privilege leave which cannot be accumulated. This also cannot be taken by the employee at his will. It is allotted from the beginning of the year.
- (ii) Medical leave :—No definite rule.
- (iii) Casual leave :—No system of granting Casual leave but employees may get a few days at Company's discretion. No facility is given for recreation.

**Accommodation**

The Company maintains 8 family quarters and 20 single room quarters (mess type). The family quarters are distributed at the discretion of the management amongst the senior staff. The single rooms are not particularly allotted for scientific workers, rooms being available only when is vacated by any of the existing occupants. The following table shows the present manner of distribution.

Category of Scientific Workers.	No. of Sc. Workers employed by the Company.	Provided with family quarters.	Provided with single room.
1. Senior Chemists ...	6	5	1
2. Junior Chemist ...	6	...	4
3. Laboratory Asstt. ...	3	...	1
4. Factory Asstt. ...	4	1	...
5. Electric Supervisor ...	1	...	...
6. Draughtsman ...	2	...	1
7. Doctor ...	1	1	...
8. Compounder ...	1	...	1

One quarter has been allocated to Welfare Officer.

## Factory No. 2. (Greater Calcutta Area)

Category of Sc. Worker.	Minimum qualification.	Starting basic pay.	Usual variation	Annual increment.	Remarks.
		Rs.	Rs.	Rs.	
1. Lab. Asstt.	Matric	60	...	5-6	No specific grade for Lab. Asstt.
2. Apprentices.	Preferably science graduate.	Quarterly 250	...	...	Apprenticeship for 5 years.
3. Chemist.	B.Sc.	75 After three months. Rs. 100	...	20-25	Usually on contract basis.
4. Supervisors.	After completion of apprenticeship period or from amongst Chemists.	150	...	25	"
5. Engineers.	No available record.	...	...	25	...
6. Doctor.	Medical graduate.	No available record.	...	...	Private practice allowed.
7. Compounder.	Passed Compounder or with sufficient experience.	No available record.	...	...	...

**D A. Bonus and other allowances****D.A.**

Upto Rs. 300/- (basic salary)—30% of salary but min. Rs. 35/-. Above Rs. 300 (basic pay)—25% of salary but min Rs. 75/- Bonus and other amenities has been abolished since 1948. Foremen on the machine get production bonus.

**Provident fund**

There are several provident fund schemes which are given below :—

(a) *Mill Provident Fund*: upto Rs. 200/- basic pay.

6½% of the basic pay is employees contribution. The contribution from the Company

increases on a sliding scale full contribution being made after several years of service. The amount of full contribution is same as employees contribution.

(b) *Muffusil Provident Fund*:—Above Rs. 200 basic pay.

This is run by Managing Agents Ten per cent of the basic pay is employees contribution. The contribution from the company increases on a sliding scale and maximum contributed by the company is 7½%.

(c) *Super Annuity Fund*:—

Senior staff having proper age are allowed to join this fund but it depends completely at the discretion of Managing Agents.

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Employee is allowed to make a maximum contribution of 10% of the basic pay. Employers Contribution is made against insurance policies. At the expiry of service members get some annuity at the discretion of Company. 4% interest is given on employees contribution.

#### Security of service

Usually three months notice on either side is given for termination of service and this holds good for senior staff only. For junior scientific workers there is no definite rule.

#### Working condition.

Average working condition is fair.

#### Medical facilities.

Mixtures, injectable and other medicines available but not patent medicines. Usually 2 beds are kept reserved in an existing hospital for the patients of the factory. No arrangements for indoor patients in the mill hospital. No surgical or pathology section is maintained. Two rooms have been provided in mill for infectious cases. In some difficult cases medicines and other costs of treatment are partly or fully given by the company but it depends completely at company's discretion.

#### Leave.

(i) Privilege leave :—One month a year

is granted as privilege leave which cannot be accumulated.

(ii) Medical leave :—Ordinarily one month a year is given as medical leave. Grant of extra medical leave depends upon company's discretion.

(iii) Casual leave :—No system of granting casual leave but employees may get a few days which depends upon company's discretion.

#### Accommodation.

The company maintains family quarters and single room quarters (mess type) out of which 15 family quarters and 7 single room quarters have been allocated to scientific workers. The family quarters are distributed at Company's discretion and the single room quarters which are meant for apprentices can be availed by other scientific workers if vacant. The family quarters for senior staff e.g. Chemist, Supervisors etc. are furnished but those which are meant for junior staff are unfurnished. The following table shows the present manner of distribution.

Category of Scientific Workers.	No. of Sc. Worker employed by the Company.	Provided with family quarters.	Provided with single room (mess type)
1. Chemist	10	4	2
2. Supervisors	7	5	...
3. Apprentices	5	...	5
4. Engineers	2	2	...
5. Doctor	1	1	...
6. Compounder	2	1	...
7. Lab. Asstt.	8	1	...
8. Foreman (Work on machine)...	2	1	...

Both the companies do not provide any other accomodation and some of the married scientific worker have been compelled to stay in the Bachelors' mess.

**Cost of Living for a Family of Four***Monthly Expenditure*

Item	Amount		
	Rs.	A.	P.
<b>Establishment :</b>			
*House rent, water, light and conservancy	75	0	0
Servant (excluding meals and Dhobi)	25	0	0
<b>Food :</b>			
Ration	25	0	0
Supplementary food	15	0	0
Milk	30	0	0
Ghee and oil	15	0	0
Fuel (wood and coal)	10	0	0
Pulses, spices and sundry groceries	18	0	0
Vegetable, fish and meat	60	0	0
Tea and tiffin	22	0	0
Toilets and birthcontrol appliances	15	0	0
Newspaper	6	0	0
Schooling for children	15	0	0
	<b>331</b>	<b>0</b>	<b>0</b>

*Annual Expenditure*

Clothings	300	0	0
Conveyance	160	0	0
Footwear	60	0	0
Medical charges	120	0	0
Insurances	200	0	0
Books	25	0	0
Subscriptions etc.	25	0	0
Donations etc.	30	0	0
	<b>920</b>	<b>0</b>	<b>0</b>
<b>Total per year</b>	...	920	0 0
<b>or per month</b>	...	76	10 0
		407	10 0
<b>Miscellaneous and unaccountable</b>	...	40	6 0
<b>Grand Total</b>	...	448	0 0

\* Rs. 75/- should be deducted from the total where the employee lives in company's quarter.

### Cost of Living for a Bachelor

#### Monthly Expenditure

Items	Amount		
	Rs.	A.	P.
Mess (excluding seat rent)	60	0	0
Guests and extras	5	0	0
Dhobi and barber	6	8	0
Toilets	5	0	0
Recreation	10	0	0
Stationery and Postage etc.	5	0	0
Medical charges	5	8	0
Milk	6	0	0
	<u>103</u>	<u>0</u>	<u>0</u>

#### Annual Expenditure

Clothes and footwear	150	0	0
Railway fares	125	0	0
Books	50	0	0
Subscriptions	16	0	0
Donations, charities, dinner etc.	35	0	0
Total per year ;	376	0	0
or per month	31	5	0
Total :	134	5	0
Miscellaneous and unaccountable	13	7	0
Grand Total :	147	12	0

### CONCLUSION

Let us now analyse stage by stage the condition of scientific worker engaged in these two industries. At a first glance in the table we find that the starting salary for a young scientific worker is very poor and the allowances given are still poorer specially when we find that it is even less than any of central or provincial Govt's scale. Nor is it comparable with the allowances given to personnel at the head offices of these industries where nowadays 110% of basic pay is given as D.A. In fact a young scientific worker in these industries gets a starting salary similar to or sometimes even less than a clerk in any other office or even at the some factory although he has to undergo much harder physical and mental labour. Leaving

aside this fact when we consider from the standpoint of his maintainance we find that most of the scientific workers begin their career with a salary ranging from Rs. 90/- to Rs. 130/- after deducting Provident Fund, which is not even sufficient for their own maintainance as is apparent from the table indicating that Rs. 147/12 is necessary for every bachelor scientific worker living in company's mess. The condition of Laboratory Assistants in worst, they cannot become self dependent even after several years of service. It is also a fact that most of these people have got several dependants. Then when we consider the case of a married scientific worker we can take it for granted that he has already completed several years of service but

all that he has gained is annual increment for few years or at least an increase in D.A. of Rs. 10/- but when we look at his expenditure, it has already gone up several times as indicated in the corresponding table for married scientific workers.

From the foregoing statement it is clear how such scientific workers have to cut their coat according to their cloth. They cut off their cost of living by reducing their consumption of fish, meat, milk, butter, vegetable etc. thus abnormally reducing the nutritive value of their food. They have to refrain from entering into any sort of games, recreation or distant travelling and are to spend their leaves and holidays in their homes. Even sometimes their economic conditions do not permit them to purchase daily newspapers, magazines or other books or insure their life in any way. It is also to be noticed that saving is completely omitted from the table as any one can easily imagine that a man who has to struggle hard to meet his bare necessities can hardly save anything for future thus making no provision for unpredictable happenings such as accident, serious illness, child-birth etc. Due to heavy increase in the house rent of the locality, arising out of huge increase in population, some of the scientific workers who are not provided with any accommodation by the company have been compelled to live in small unhealthy houses which has got a marked effect on their health. They continually suffer from ailments and their medical expenses increase. Such a state of affairs is not at all conducive to scientific work and research. This is the general condition of most of the scientific workers engaged in these industries. There are of course a few senior and convenanted staff who are better paid and can live in a fairly decent way incurring an expense as shown in the table.

#### *Security of service :*

Next let us consider the security of service of a scientific worker engaged in these industries. We do not hesitate to say that the service is not at all secure as evidence is available that in certain cases a scientific worker after ten years of loyal and creditable service has been discharged on a vague round of being a surplus staff in a leading industry, where there is sufficient room to absorb him even if we take it for granted that he has been found to be surplus in any particular department. It is a fact that the company can remove any person, of course with proper notice without sufficient convincing reason in their favour. Then it can be easily imagined what will be the condition of a scientific worker with his family when he will be thrown out of employment in an advanced age and in the present state of mass unemployment.

#### *Medical facilities :*

Average conditions under which most of the scientific workers are to work have got marked effect on their health and proper attention is not paid to the deteriorating health of scientific workers. It is apparent from the foregoing facts that the medical aids given to the scientific workers are far from requirements and in fact each scientific worker has to pay from his own pocket for the purchase of medicines and sometimes they are to go without medicine for want of funds.

#### *Employment of Foreigners :*

Further in some industries controlled by foreign capital a large number of unqualified foreigners are recruited on a fabulous salary to boss over qualified and trained Indian scientific workers resulting in deterioration in quality and out-put which is a national loss and which acts as a brake in the general development of scientific workers.

## INTEGRAL LAND RECLAMATION

By

Shri M. L. Mehta, Retired Director Land Reclamation, Panjab

The peasant in India is more or less imprisoned within the walls of his own agricultural system; year by year his members grow and the walls remain. This has intensified the pressure of population on the land so much so that in some states of the country the area cultivated per cultivator family has dwindled down to less than two acres. Actually the number of cultivators who cultivate less than two acres is very numerous.

So far some palliative measures have no doubt been taken in an un-coordinated manner but no attempt has yet been made to meet with the crisis that is likely to come on account of the growing population.

Astounding technical and scientific progress has been made through specialisation and analysis, but a full use of the new discoveries at least so far as rural life is concerned has not yet been made largely because of lack of enterprise, coordination and synthesis.

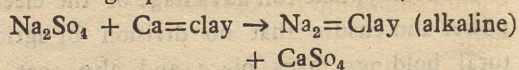
The Government of India and some state Governments have launched a number of power and irrigation projects. It is expected that, at an early date immense amount of electric power would become available which will enable most radical progress being made in all activities of the country. A very large share of electricity will have to be utilised in villages.

Considerable attention is also being devoted by the National Government to the political awakening of rural population. Every adult man and woman has been enfranchised and this has enabled him or her to have a say indirectly in the management of public affairs. Naturally, therefore, in time to come the farmer will no longer be isolated. A whole new system of civilised life will arise, which, while improving rural conditions and increasing the number of

families settled on the land, will confer on the farmer the skill of the artisan, leading to the formation of a whole new series of productive activities, which connect farming with other branches of production. A new type of family business, partly agricultural and partly industrial will arise, which will form a connecting link between the farm and the industry. This will not only conserve the individuality of the worker, it will also utilize all the labour power of the family, take full advantage of the electric power and ensure that no division of agricultural holdings takes place and also that the savings are properly invested. All this can be achieved by incorporating principles of guild or corporative effort in all spheres of activities, social; financial, political, industrial, medical, humanitarian, historical, journalistic, educational etc. This will lead to considerable increased production and higher standards of living.

At a rough estimate more than 80 millions acres of waste land is available in the country which can be brought under cultivation. Quite a large portion of this waste land lies in semi-arid tracts which are characterised by the presence of excessive quantities of sodium salts. Considerable work has been done to study the formation of these salt lands. It is not possible to deal at length in this article with the processes that lead to the formation of these soils and the various chemical reactions that take place during the process of deterioration and also the methods employed for arresting deterioration and reclaiming such lands. Only a very brief account will be given. It has been established that the salts responsible for causing salt efflorescence were deposited along with the alluvium now forming the soil in the alluvial plains. Further deterioration of land in which

sodium salts exist takes place by the process of base exchange. Chemical reactions take place between the salt and the clay in the soil. The clay in a normal fertile soil is mainly present in the form of calcium clay (Ca-Clay). A soil containing calcium clay is permeable to water and air, the conditions in it are aerobic and the methods to be adopted for the cultivation of such a soil are known to farmers. When a relatively concentrated solution of sodium sulphate, sodium chloride or sodium carbonate is brought into contact with a calcium clay soil, base exchange takes place, the sodium replacing the calcium in the clay, resulting in the formation of sodium clay. The reaction is shown in the following equation :—



In an alkaline soil the structure or tilth has been adversely affected and colloidal substances have been altered with the result that the clay is deflocculated. This soil is impermeable to water; it presents difficulties in leaching thus making it unsuitable for the growth of normal crops. The cultivation of alkali land is exceedingly difficult on account of the fact that it is too hard when it is dry and too sticky when it is wet.

Methods for the reclamation of such saline and alkali lands are now known and the organisation for the application of these methods is available. In reclamation of waste lands, therefore, it would be essential to do a preliminary soil survey and plan a programme of development to reduce the salt content and the alkalinity to the normal to enable maximum crop production.

With the introduction of irrigation from the new projects cultivation of the existing area on which barani crops are grown will be intensified. It would thus be necessary to build more villages, new towns, new roads and new railway lines.

For complete development it is suggested that an individual village or helmet should cater

for an area of 1000 acres approximately. This will settle 100 families of farmers plus some artisans and other officials. In canal colonies an area of 1000 acres was found to be most suitable for development.

Instead of the rectangular type a new circular type of design for constructing a village is proposed. The main features of the new design are :—

- (i) Cattle live in separate compartments in each house and yet they are adjacent to living rooms and are therefore within easy reach.
- (ii) Cattle and bullock carts do not find entry into the inside of the village thus enabling the population to keep the village neat and tidy.
- (iii) Every house has a manure pit at its back just across the road. All the cow dung and house sweepings can easily be taken to this pit daily. As holdings would also be situated the same way, the manure can very conveniently be carted and used in fields.
- (iv) Washing will be done at the village pond which is situated at a distance from the village. If possible this pond will also be used for fish culture.
- (v) In addition to the trees that grow in holdings a small forest plantation will be maintained. This will give enough timber and wood for implements and fuel. It is also proposed that there should be some surplus wood which could be sent to the township. When cheap electricity becomes available the plantation land can be used for other purposes. In any case it will continue to afford good shade for cattle.
- (vi) On a co-operative basis the village will maintain a fruit garden the produce of which should be in excess of local requirements; the surplus will go to township and then to the city.

- (vii) A small kindergarten school will be maintained by Zamindars in each village.
- (viii) The other vacant space can be used by village artisans like weavers etc.
- (ix) For providing drinking water supply each segment will carry a hand pump.
- (x) When cheap electricity becomes available and the whole colony takes to mechanised farming then the space reserved for cattle in each house can be converted into small workshop or a factory thus enabling mass production of commodities.

In the centre of each tract of 40,000 acres comprising of 40 villages will be built a small township in which are provided amenities of urban character. In this town would be built :—

(a) A middle and a high school. (b) a sugar or cotton ginning factory. (c) an oil and a flour mill. (d) a rice husking machine. (e) a workshop. (f) a dairy. (g) a dehydrating plant or card board factory. (h) a hospital and veterinary dispensary. (i) a post of telegraph office. (j) a fruit preservation plant.

As this town will cater for an area of 40,000 acres only the maximum distance to be travelled from any village to the town will be a little over three miles.

A new feature about this township would be that the entire town together with all industrial concerns and other institutions in it will belong to the 40,000 acres of land that make the rural suburbs of this town. In other words each acre

would be shareholder of every thing in the town and will pay all the losses and share all profits.

The greatest advantage will be that as the population of the village grows, all that is surplus can be absorbed in the town. As a matter of fact spare time with farmer can most usefully be employed either in the village workshop attached to each village or in the town itself. Thus there will be no sub-division of agricultural holdings.

There would no doubt be the necessity for financing such projects and it is suggested that after forming a registered corporate body, the possibility of raising a loan either through banks or through Government should be investigated. Such loans would be payable by each acre of land.

The design and lay out for the township is a matter for consideration and can be got out either by open competition or through an expert engineer. The venture proposed will ultimately lead to a highly developed co-operative resulting in greater profits per acre and also per head of population. It will also afford an opportunity for introducing joint services for spraying, irrigating and harvesting. Joint ownership of expensive equipment will reduce considerable overhead costs.

Health co-operative, rural insurance and even crop insurance will also be possible.

The maxim will be that the unit of land viz an acre will be the owner of everything, all profits both in the village and in the town will go to the acre and losses will be borne by it.

## NOTES AND NEWS

### 1. India's First Penicilin Factory.

The foundation stone of India's first Penicilin Factory was laid by Mr. N. V. Gadgil former Minister for Works, Production and Supply, Government of India on 10th March, 1952 at Pimpri, Poona. World Health Organisation and the United Nations International Children's Emergency Fund cooperated with the Government of India in materialising the Scheme by offering technical assistance and training facilities and by providing important machinery items. The Government has a project for the production of D.D.T. in collaboration with the aforesaid international organizations. Dr. K.C.K.E. Raja, Director General of Health Services rightly observed that rapid manufacture of drugs and medical appliances is urgently required for healthy and prosperous nations.

### 2. Artificial Rain.

In order to "cause at least some rain" in the draught areas of the country, Dr. S. K. Banerjee, Professor of Mathematics, College of Engineering and Technology, Jadavpore has planned some experiments under the auspices of the Council of Scientific and Industrial Research. Dr. Banerjee has achieved substantial progress in laboratory experiments on the subject. He has planned to make some field experiments as to the various methods and techniques of artificial rain making. He has built two large clouds chambers for detailed study in the laboratory and has achieved valuable results regarding the way in which cloud particles can be stimulated to grow in size by various methods.

### 3. Kallinga Prize Award.

Mr. V. Patnaik a member of the Orissa Legislative Assembly, has offered the prize of one thousand pounds sterling as a gift to Unesco to be awarded annually for outstanding achievements in the interpretation and dissemination of science. The Unesco has appointed the jury consisting of the following members for the

1951 prize :— Prof. M. N. Saha, University of Calcutta, Prof. M. Paul, Gaultier Institute of France, Dr. Goran Liljestrang, Carolina Institute, Stockholm. Nominations will be made annually by the scientific organisations connected to the International Council of Scientific Unions and by Unesco based on suggestions received from the various national Associations for the advancement of science. For the 1951 prize nominations have been received by Unesco from the National Scientific Organisations Australia, U.K., France, India, Netherland, New Zealand and South Africa.

### 4. Impact of Science on Society.

The Unesco magazine "Impact of Science on Society" has begun its third year. While the previous numbers Surveyed wide fields of social effects of science and presented extracts of articles in those fields, with the present number a new policy has been adopted to present a study of what is happening today and what will happen next. "They will be written not only for scholars but for thoughtful persons in all walks of life and especially for those whose interest is the advancement of the society and the improvement of social conditions. Many of the articles will include references and selected bibliographies to enable the readers to pursue the subject further."

Volume 3 No. 1 of the above magazine contains besides comments on current events and book reviews three articles on (1) Energy as the Key to Social Evolution by W. Tiraspolksy (2) Science and Foreign Policy, by E.M. Friedwald ; (3) Science, Technology and Leisure by Pierre Ducasse.

### 5. Science for Peace.

(reproduced from American Association of Scientific Workers News Letter dated February 15, 1952).

Impressive growth has followed the organization in England of a "Science for Peace"

committee. A statement of principles was circulated over the endorsement of 26 eminent British scientists, headed by Lord Boyd Orr and including Professors Born, Gregory, Lonsdale, Bowell and Synge, among others. It was emphasized that the committee is completely independent and that its members, of widely divergent political views, are acting in common simply as scientists. The General Principles are :—

“We are now in danger of a third world war and we are determined to do what we can both as citizens and scientists to prevent it. The following statement of views will, we believe, have the approval of most of our scientific colleagues in all parts of the world.

“The weapons of modern war are a product of scientific technology. Their increasing destructiveness is compelling scientists to recognize their moral responsibility. It is our duty to appeal to peoples and Governments for a negotiated and lasting settlement which will prevent a recourse to these instruments of extermination.

“We assert the international character of science. It is a world-wide republic of the mind. Scientists form one fraternity, united in a common attempt to understand nature and a common concern for human betterment. It is our duty to strive for the removal of all barriers that restrict or embarrass the free intercourse of scientists throughout the world”.

Hundreds of Britain's outstanding scientists have announced their support of these principles, and a national conference was held in London late in January, 1952.

#### 6. **Film strips on Human Rights.**

The Unesco secretariat has produced two

film strips on “Fundamental Education and Technical Training” for dissemination of information regarding the universal declaration of human rights. The film strips are meant for creating greater understanding of the work which Unesco and its Member States are doing to provide fundamental education and technical training. These are available on loan from the Indian National Commission.

#### 7. **Nuclear Research Co-operation Plans.**

The machinery for planning an international laboratory and for organising other forms of co-operation in nuclear research in Europe has been established with the collaboration of UNESCO. The first session was held in Paris recently in which the Council of representatives of European States has appointed Professor E. Amaldi of Italy as the Secretary of the Council and Professor C. J. Bakkar of Holland, Professor O. Dahl of Norway, Dr. L. Kowarski of France and Professor Niels Bohr of Denmark heads of the different study groups. A conference of the nuclear physicists is to be held in early June in Copenhagen to detail out the co-operation plans.

#### 8. **International Centre of Type Cultures.**

An International Centre of Type Cultures was formed in 1949 in Lusanne in co-operation with Unesco. The Centre has been rendering efficient and important services to the scientists and research workers in bacteriology and allied subjects, all the world over. It publishes a catalogue containing the index of the types of of microbes and viruses cultivated in the bacteriological laboratories in the world. The scientific workers may obtain, on request, the cultures of strains from the centre.

## World Federation of Scientific Workers

### Meeting of the Executive Committee

A meeting of the Executive Council of the World Federation of Scientific Workers was scheduled to be held in March, 1952 at Cambridge. The British Government however refused to grant visas or entry into England to all non-British members of the Executive Council. A statement issued to the Press by the World Federation office is reproduced below:—

“The World Federation of Scientific Workers had proposed to hold a meeting of its Executive Council at Madingley Hall, Cambridge on March 22nd and 23rd, 1952. The Home Secretary has now informed the Federation that no foreign members of the Council will be granted Visas or allowed to enter England to attend the meeting.

“The World Federation of Scientific Workers is a Federation of sixteen organisations of scientists from fourteen countries, including Britain, the United States, U.S.S.R., China, France and India. It was founded six years ago on the initiative of the Association of Scientific Workers in England and is one of the Non-Governmental international organisation recognised by the United Nations. Its representatives have taken part in a number of United Nations committees and conferences. The Federation is a unique body, for no other international organisation of scientists is concerned with the economic and social conditions of scientists.

“The President of the Federation and Chairman of its Executive Council is Professor Frederic Joliot-Curie. Its Vice-Presidents include the Nobel Laureate, Professor C.F. Powell of Bristol and Professor Linus Pauling of California.

“Among those who were to have attended the meeting, besides Professor Joliot-Curie, are Dr. Pierre Biquard, also of France, Academician Vassily Nikitin, Member of the Presidium of the U.S.S.R. Academy of Sciences,

Mdme Irena Nikitina, Professor Ivan Lebedev, President of the Higher Institutions and Scientific Workers' Union of the U.S.S.R., and M. Oraevsky; Professor Tsien San Tsiang and Dr. Chi Tsin Jen of the Chinese Federation of Scientific Societies; Professor Leopold Infeld and Professor Zygmunt Kuligowski of the Polish Federation of Scientific Societies and Professor I. Malek of the Czechoslovak Association of Scientific Workers as well as other representatives from India, Britain and the Dominions.

“The Executive Council is a body of some twenty members whose business is private and concerned with the administration of the Federation. The refusal of the British Government to allow the foreign members to attend the Council is an interference with the international collaboration of scientists and thereby a serious blow to the growth of mutual understanding between the peoples.”

A letter addressed by the American Association of Scientific Workers to the British Ambassador in Washington is also reproduced below:—

“Your Excellency,

I have been authorised by the officers of the American Association of Scientific Workers to convey to you our deep regret that the British Government has refused to grant visas or entry into England for the purpose of attending a Council meeting of the World Federation of Scientific Workers. The realisation that this ruling would have applied to Dr. Linus Pauling, ex-President of the American Chemical Society and without doubt the foremost chemist of our generation, comes as a profound shock. We take this occasion to remind you of the objectives of the World Federation of Scientific Workers, namely, the betterment of conditions for scientific work, better utilization of the results of science, more extensive diffusion of

scientific publications, and the re-establishment of contact between scientists all over the world. Such aims merit the support of governments as well as scientists, and, indeed all men everywhere.

Most respectfully yours,  
M. Phillips".

### Celebration of Cultural Anniversaries.

An appeal from Professor F. Joliot-Curie regarding celebration of Cultural Anniversaries is reproduced below. ( The appeal was received late - Editors ).

"There are treasures which are the common property of all nations. These are the works of the great—the literature and the masterpieces of art which preserve for posterity the mark of genius.

"Humanity can draw upon the inexhaustible well-springs of this cultural heritage. It has provided a common ground for bringing men together through the ages; it has given them the opportunity, today, of grasping the link which unites mankind. It opens up prospects of a future of universal agreement and understanding. It constantly strengthens their confidence in man.

"At a time when mutual understanding is more than ever necessary, we call upon all the

nations to pay tribute together to those men who, by the importance of their works, belong to the whole of humanity.

"February 26th, 1952 will be the 150th anniversary of the birth of Victor Hugo whose monumental works reflected his century's hopes of achieving the ideals of justice, liberty and progress. March 4th, 1952 will be the centenary of the death of Nicolas Gogol, the great Russian writer whose concept of the brotherhood of man was born out of his love for his people. April 15th, 1952 will be the 500th anniversary of the birth of Leonardo da Vinci, an artist whose versatile genius was expressed both in his artistic masterpieces and in his constructive talent the result of which often anticipated modern inventions.

"May, 1952 will be the 1000th anniversary of the death of Avicenna, the great doctor, philosopher and scientist of the Eastern world, the whole of whose works was based on the claims of truth and integrity.

"These men have a right to world tribute.

"Men will meet in spite of their differences and the frontiers which still separate them. They will add new wealth to the common heritage. In this way they will advance along the road where shadows disappear and towards the dawn of confidence and peace."

### ADDRESSES OF THE BRANCH/UNIT SECRETARIES OF ASWI

1. Mr. R. M. Adhikari, Staff Superintendents' Quarters, Purification Plant, Tulsi Pipe Road, Bombay.
2. Dr. S. Sharan, Bihar College of Engineering, Patna-6
3. Mr. R.K. Roy, Technical Development Establishments Sunderwala Camp, Dehradun (U.P.)
4. Mr. M.V. Bhatt, Indian Institute of Science, Bangalore-3
5. Mr. L.Y. Sane, 431/2 Purandare Colony, Poona-2.
6. Dr. P.M. Bhargava, Central Laboratories, P.O. Jamia Osmania, Hyderabad-Deccan.
7. Mr. I.S. Mathur, 21, Reading Road, New Delhi.
8. Mr. J.R. Sen, Bengal Paper Mills Ltd. Raniganj
9. Mr. S.K. Sen Gupta, Jenson and Nicholson (India) Ltd, P.O. Gorrifa, 24-Parganas (West Bengal).
10. Mr. N.P. Gupta, Department of Pathology, Medical College, Lucknow (U.P.)

11. Dr. A.B. Roy Chowdhury, Office of the Serologist, Government of India, School of Tropical Medicine Buildings, Chittaranjan Avenue, Calcutta-12.
- Unit Secretaries.**
1. Mr. H.C. Srivastava, Indian Institute of Sugar Technology, Kanpur (U.P.)
  2. Mr. G.B. Bakore, Maharaja's College, Jaipur (Rajasthan).
  3. Mr. C.P. Dhamaney, Forest Research Institute, P.O. New Forest, Dehradun (U.P.)
  4. Dr. K. Sahai, Poultry Research Section, Indian Veterinary Research Institute, Izatnagar (U.P.)

## ACTIVITIES OF THE BRANCHES

### A New Unit at Izatnagar.

A new Unit of the A.S.W.I. has been formed at the Indian Veterinary Research Institute, Izatnagar (U.P.) with the following office bearers :—

President	Dr. N.D. Kehar
Vice-President	Shri Balwant Singh
Secretary	Dr. K. Sahai
Treasurer	Shri H.P. Tandon

### Calcutta Branch.

A New Unit called Science College Unit has been formed at the University College of Science and Technology Calcutta with the following office bearers :—

President	Dr. Sushil K. Mukherjee
Secretary	Mr. Hiren Basu
Jt. Secretary.	Mr. Sambu Nath Banerjee
Treasurer	Mr. F.S. Sanyal

### Hyderabad Branch.

The Annual General Body Meeting of the Hyderabad Branch was held on 31st January, 1952. The following office bearers and Executive Committee were elected :—

President	Dr. N.V. Subha Rao.
Vice-Presidents.	Dr. G.S. Sidhu and Mr. M.M. Ravi
Secretary.	Dr. P.M. Bhargava
Jt. Secretary.	Mr. B.V. Ranga Rao.
Treasurer.	Dr. M.G. Krishna.
Members of the E.C. :	Mr. S. Mehdi, Ali, K.S. Chari, Mr. Fazalul Haque, Mr. Baldev

Singh, Dr. (Mrs) Sultana Iyengar, Dr. A.D. Bhogle, Mr. G. Sannarayan Rao, Miss Razia Osmani and Mr. A. Shankar.

### Delhi Branch.

A General Body Meeting of the Delhi Branch was held on 12th April, 1952. The house learnt with pleasure the formation of two new units; one at C.S.I.R. Publication Division and the other at Malaria Institute of India. The following were elected as office bearers and the Executive Committee of Delhi Branch for the year 1952.

President	Dr. B. Vishwanath
Vice-Presidents	1. Dr. J. J. Chinoy 2. Dr. Y. V. Kathavate
Secretary	Mr. I. S. Mathur
Joint-Secretaries.	1. Mr. D. C. Jain 2. Mr. Mohinder Singh

Chadha

Treasurer.	Mr. T. N. Srivastava.
Members.	Miss. S. Hoon, Mr. B V. Subbiah, Mr. Shanti Swaroop Sharma, Mr. P. K. Gupta, Dr. D. V. Karmarkar, Dr. S. Nimkar, Mr. K. V. Krishnamurthy, Mr. M. L. Aggarwal, Mr. R. L. Kumaria, Mr. R. K. Gupta, Mr. R. K. Tandon and Mr. H. Mitra.

The Secretary's Annual Report outlined the various types of activities which Delhi Branch had been pursuing during the year, under the following heads:—(a) meetings of the Executive Committee and General Body (b) trade union activities (c) popularisation of Science by talks on various subjects, a symposium on "Social Relations of Science" and film shows (d) visits to technical institutions (e) drawing of a questionnaire on the living conditions of scientific workers which with slight modifications has been published in the May issue of Vijnan-Karmee etc. Reports on these activities have been appearing in Vijnan-Karmee from time to time. Brief summaries of some of the talks are given below:—

1. **Lecture Dr. J. J. Chinoy, Delhi University, on 'Science in the Soviet Union.'**

Dr. J. J. Chinoy, Reader in Botany, Delhi University who had recently visited the U.S.S.R. as member of a cultural mission gave a talk on "Science in the Soviet Union" on 9-9-51. Dr. Chinoy reviewed the scientific progress made by the Soviet Union specially in the field of botany, agriculture and medical sciences. He made a special mention of the interest the Government takes in the welfare and health of the general public. The people in general were very hard working and drew their inspiration from their heroes like Lenin whose mausoleum was visited by lakhs of people every day. The farming was done on a co-operative basis. The actual day to day problems facing the agriculturist were freely discussed among the heads of various units and were then passed on to the Research Institutes for solving the difficulties. The teaching profession was in general esteemed very high and many recreational and medical facilities were available to even the ordinary labourers in the form of clubs and sanatoria.

2. **Dr. A. Stone on "Rhythm method of birth control"**

Dr. Abraham Stone, the W.H.O. Expert on family planning gave a talk on "Rhythm method

of birth control" on 16-12-51. Dr. Stone described briefly the need for family planning and some of the methods used for the purpose. For an under-developed country like ours the rhythm method of birth control was the one which could be tried with advantage in the sense that it needed no medical facilities but was based on abstention which is already mentioned in Hindu religious books. Dr. Stone told that the middle ten days of the monthly cycle were the periods to be avoided and if this was done there were 90% chances of success in prevention of conception. He also showed a film depicting the activity of the spermatazoa in the serum of normal and sub-normal persons and the effect of various jellies on the same. The film also threw light on the practical side of the use of check pessaries. The lecture was followed by very lively discussion.

3. **Dr. (Mrs.) Rajammal P. Devadas on 'Nutrition and Human Welfare.'**

Dr. Mrs. Rajammal emphasized the importance of a balanced diet for the people of any country. She said that the greatest single cause of good health is good food and we eat not only to eat but to live well. Tracing the effects of food habit and balanced food for the growth and development of the children she said that of all the environmental factors food is most important in effecting the physical, mental and social development of a child and further it was very essential for the welfare of the individual to make him a good citizen. Consequently it cannot be treated as a trade commodity but as a first and most important requirement for the fuller life of the new world order. She expressed the importance and attention it has received from United Nations through its various organisations like F.A.O., W.H.O., Unesco, U.N.I.C.E.F., Colombo Plan, Point Four Programme and the Technical Co-operation Agreement.

She also discussed summararily the place it has been given by the National Planning Commission both from the point of view of feeding

the people and also from the point of checking the various nutritional diseases that are prevalent in India. Finally she ended her lecture by stressing how nurture can assist nature in shaping our destinies.

4. **Mr. P. M. Das on "Fading of radio signals."**

Mr. P. M. Das of India Meteorological Department, delivered a lecture on 'Fading of radio signals' under the auspices of the A.S.W.I. The lecture was held in the Observatory building with Dr. L. S. Mathur, ( Vice-President I. Met. D. Unit ) in the chair.

In the course of his talk Shri Das said, listeners experience while turning long-distance broadcasting stations, that often enough there are intensity variation as well as quality distortions of the incoming signal. The phenomenon of fading may be classified into, (a) Phase fading; (b) Polarisation fading; (c) Appleton and Beynon type of fading; and (d) Skip distance fading.

He dwelt on the propagation of radio waves through ionosphere and explained the origin of different types of fading as classified above.

Continuing on the role of fading phenomena in Ionospheric research he referred to (1) Appleton and Barnett's early determination of Ionospheric height by signal fading method; (2) Pagsey's idea of measuring ionospheric winds by observing fading on spaced receiver; (3) investigation of ionospheric clouds; and (4) vertical movement of the ionosphere.

He then mentioned some experimental

methods employed in fading observations, viz., (1) recording milliammeter method; (2) oscillographic method with moving film-camera; and (3) galvanometer and rotating drum method.

Finally he explained the different methods adopted for the elimination of fading, viz., (1) automatic volume control; (2) polarisation diversity; (3) space diversity; and (4) Musa system.

5. **Dr. L. A. Ramdas on "Crops and Weather in India".**

Under the auspices of the A.S.W.I., Dr. L.A. Ramdas, Director, Agricultural Meteorology, Poona, delivered a popular lecture on 'Crops and Weather in India' on 24th April, 1952 in the Observatory buildings, New Delhi. Mr. A. K. Roy, ( President I. Met. D. Unit ) was in the chair.

With the help of a set of graphs in which the rainfall of all the regions of the country for the past fifty years was vividly depicted, Dr. Ramdas stressed the point that it is in the nature of things that some regions do get profusion of rain while others get nearly none of it. He then suggested that for the purposes of agricultural planning this should be a guiding factor. Speaking further, he illustrated by means of slides the devastation wrought by hail, snow and other vagaries of nature, on crops.

He then referred in passing to the studies of micro-climate that are being conducted in the Agri-Met. Research Station at Poona. Finally he dwelt on the importance of the studies on agricultural Meteorology and how it helps in the economy of a country.

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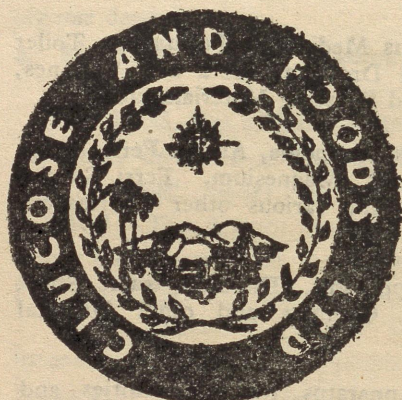
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## NOTICE

## Examination of Associateship.

(To be held in November, 1952)

The Second Examination for admission to the Associateship will be held in November, 1952. The last date of receiving applications from the intending candidates is 31st July, 1952. The examination in Group A (Analytical Chemistry) is divided into nine sections and the candidate shall be examined in any three of them according to his choice.

Sections:—(1) Analysis of Minerals, Silicates, Ores and Alloys; (2) Analysis of Drugs and Pharmaceuticals; (3) Analysis of Foods; (4) Analysis of Water and Sewage; (5) Biochemical Analysis; (6) Analysis of Oils, Fats and Soaps; (7) Fuel and Gas Analysis; (8) Analysis of Soils and Fertilisers; and (9) Analysis connected with Forensic Chemistry.

For the theoretical examination there will be two papers; three hours being allowed for each paper. One of the papers will be on General Chemistry dealing with the fundamentals or Organic, Inorganic and Physical Chemistry. The other will be on Applied Analytical Chemistry dealing with the three sections for which the candidate has opted. There will be three days' practical examination, each of not less than six hours' duration and an oral examination dealing with the three sections chosen.

Candidates appearing at the examination are required to comply with the following conditions:—

(1) Along with his application for admission to the Associateship examination, the candidate must state his choice of the three sections in which he wants to be examined. (2) Candidate for the Group A will be required to satisfy the examiners of their ability to translate, with the aid of dictionary, technical literature in German, French or Russian into one of the Indian languages or English. (3) He should forward along with his application for admission to the Associateship Examination, a returnable fee of Rs. 28/- corresponding to the admission for Associates and first year's subscription and a non-returnable fee of Rs. 15/- No admission fee, however, will be charged from the candidate who is already an Ordinary Member of the Institution. Such a candidate should forward, along with his application, a returnable fee of Rs. 16/- corresponding to first year's subscription along with the usual non-returnable fee of Rs. 15/-. The returnable fee will be returned in full in case the candidate fails to satisfy the examiners.

The result of examination will be published in the Journal and Proceeding of the Institution of Chemists (India).

Last year's question papers are available at Rupee one per set.

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

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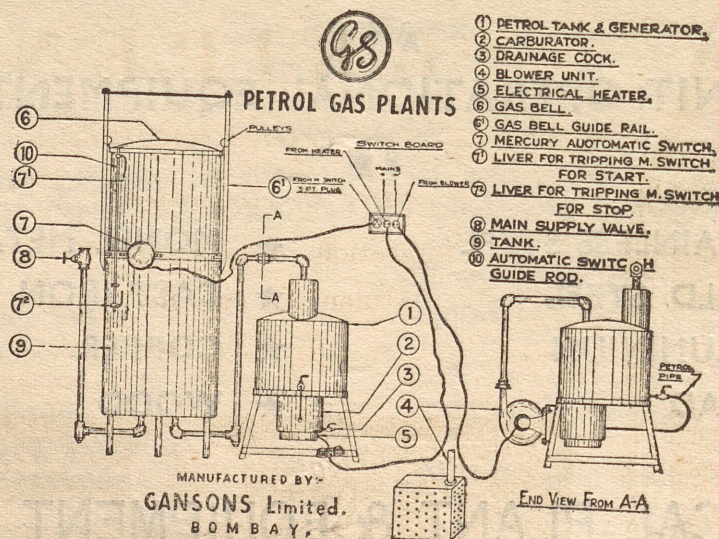
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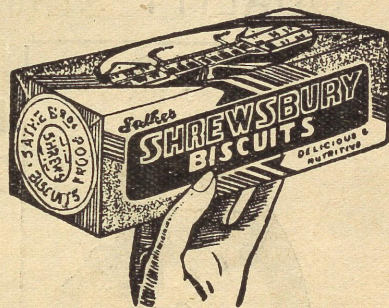
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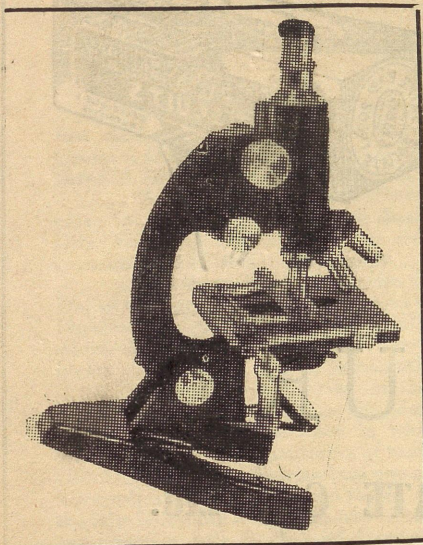
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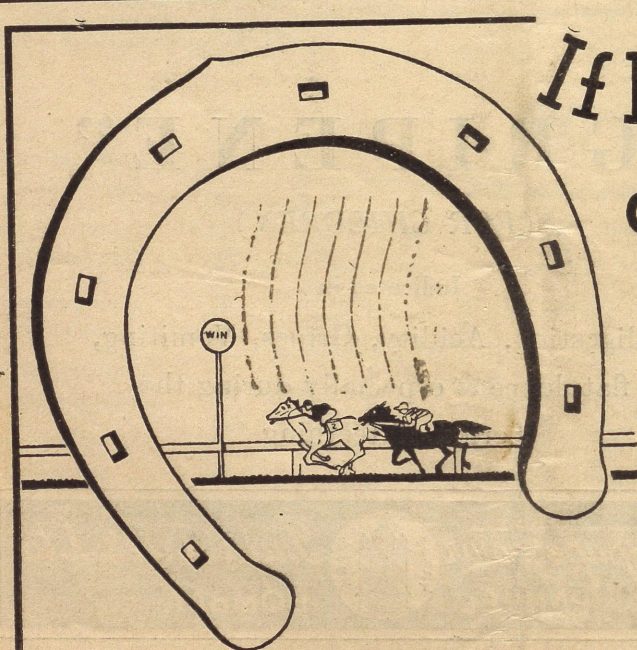
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