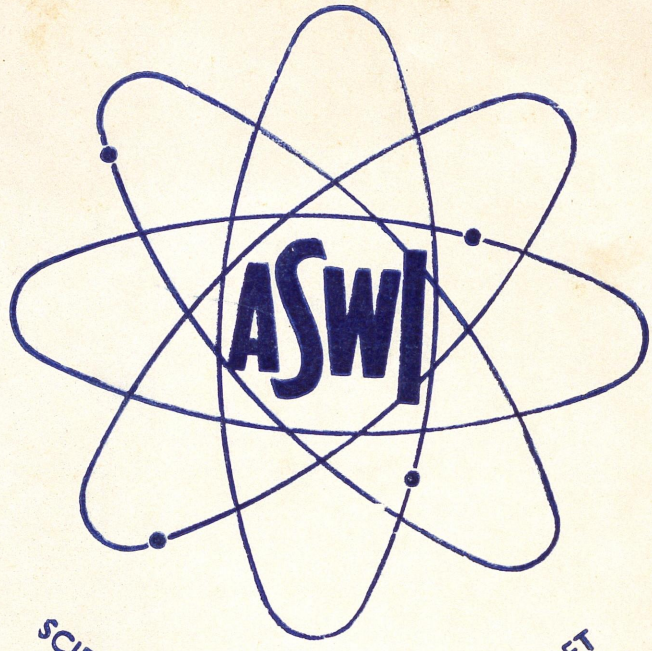

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Vijnan karmee

Vol. XIV JUNE, 1962 No. 6

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(Founder-President : Shri Jawaharlal Nehru)

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KANPUR

Editorial

We have been dealing with various educational aspects of scientific training aimed at developing a personnel with science as way of life rather than as merely a way of living. In previous issues we discussed the factors influencing pre-graduate study courses. We hope to conclude this part of the series by taking up the field of graduate and post-graduate scientific and technical educations in forth-coming issues of V. K.

It goes without saying that the foremost point for consideration for such an education is the selection of candidates. The crucial point in this selection is to sort out candidates who deserve rather than those who can afford, the expenses of the scientific/technical education. Once the right type of candidates are screened out, the pattern of education should be so moulded that the financial handicaps are not allowed to thwart the training of the poorer sections. Government efforts in this directon (for advancing loans and stipends etc.) are no doubt laudable but they are quite inadequate. The amout of loan budgeted usually falls too short of the number of poor candidates; it is not easy to get a loan sanctioned till there is somebody to take personal interest in the applicant's case during its journey from table to table with the red tag on it in various ministerial departments the procedure for grant of loans etc. is quite cumber some (though it is meant to screen out the really deserving candidates but it is usually they who have to face the difficulties while a financially better off class gets over these stumbling points quite comfortably).

Selection of the candidates for admission to scientific/technical institutions should be dictated more by the sort of bend of mind of the candidate than by the acumen he possesses to memorise some scientific bookish knowledge and repeat it in writing on the paper. Present day tests of Indian Institutes of Technology fall too short to screen out the personnel with the scientific/technical attitude of mind. One year's pre-scientific/technical course to gauge the extent of interest of the individual in academic as well as practical field of science & technology may be helpful in this direction. The important point in this regard is to assess the candidates subjectively i. e. how far he will take up the scientific/technical line in his life purely from the view point of his interest in such a life. This assessment should also indicate whether the applicant's acumen is of a high order so as to recommend him for a prolonged course of degree standard; or of a mediocre order so as to equip him with a practical working knowledge with necessary theoretical background upto a diploma course. Candidates with genuine scientific/technological bend of mind but low theoretical acumen can be given a training suitable for a skilled technical/scientific helping hand. Selections of candidates (for higher scientific/technological training) who possess merely a good academic record, without any consi-

deration as to their attitute towards science/ technology will in the end produce first class degree holders. Such degree holders grab (whenever possible) a chance to sit in comfortable cushion-chaired air-conditioned rooms and devote their energy to the paper work rather than face the vigours of weather and machine-uncomfortable life of laboratory and factory which is the true place of a scientist/technologist.

OBITUARY

Sri Beda Prasad Sen, M. Sc., (b. 1930) who was a Lecturer in Chemistry, Vidyasagar College, Suri, West Bengal, and a Senior Research Fellow under C. S. I. R. died under tragic circumstances in May last. He had a brilliant academic career; he completed his thesis for Doctrate Degree under Professor Dr. B. K. Bhattacharjee of Jadavpur University and was to join the Government College, Krishnanagar, shortly as a Lecturer (when the end came). He was soft at heart, loveable and had great promise for the future.

Editorial News

LIBERAL EDUCATION & SCIENCE

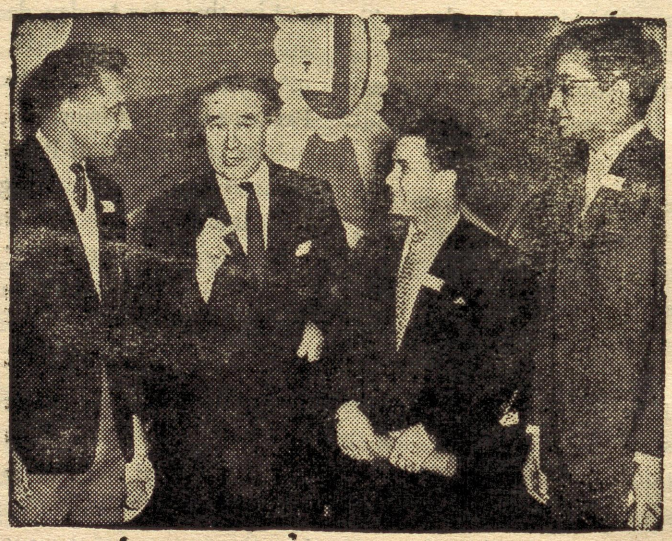
The impact of science on contemporary thought and cultural advancement is a subject which has received ample attention from both the scientific thinkers as well as those whose specialisation is limited to humanities. What perhaps is neglected is the way this impact works. Amongst other thinkers, late Prof. Albert Einstein has enumerated the more obvious areas of this impact ('Science and society' in 'Out of my later years'—Albert Einstein, Thames and Hudson, London). To him the most important of the gains of scientific era is 'the confidence that human thought is dependable and natural law universal'.

However, the breath taking pace with which scientific progress in certain fields, particularly in technology working in the domain of body politik, has taken place within last decade or so has created a vast schism not only between the men who profess science and the lay brothers in the street, but also between scientists specialising even in closely akin fields. An idea of what is meant by this 'progress' can be easily obtained by attending any of the umpteen symposia and conferences which daily take place in more advanced countries. With this has grown another problem; science or at least the outcome of science of pervading every niche and corner of States activity. Take for instance Atomic Energy Administration, restricted purely to industrial energy production. Any centre of atomic power production of even moderate stature does need services of at least a few scores of top specialists, a few hundreds of skilled technicians on the production maintenance and distribution side, a comparatively smaller administrative staff for controlling finances etc. At every stage, the administration has to talk the language of the specialists, and in their day to day decisions have to be guided by the specialists. Thus more and more people today, whether on the floor of Parliament, in Chanceries, Cabinets, public pulpits or columns of Press, are sitting judgement over science, making proclamations in the name of science and framing broad policies on professed 'scientific' information. That at times such 'informed' sources are far removed from science is often only too rudely brought to our consciousness.

The remedy lies in the careful study of the way science interacts with social fabric. A. D.Dupree ('Public education for science and technology' — Science, Sept.1960) in an exhaustive analysis of this problem has come to the conclusion that science education, as distinct from scientific education, has to be part of the liberal education. As understood in Europe and America, liberal education was considered to be essential for maintaining the

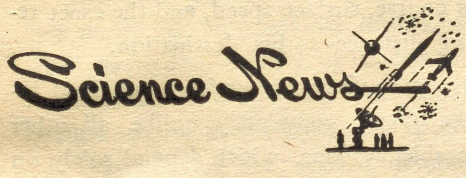
level of social intellect high enough for the benefits of university education to pervade in life at large. Among the European enthusiasts of science education as a part of liberal education Sir Charles Lyell and T.H. Huxeley can be mentioned, with their counterparts Benzanin Silliman and Louis Agassiz in the States. Since the days of these stalwarts, university education in Europe and America has tried to retain science as a part of 'liberal education curricula'. However, science today is a very neglected subject in Indian Universities, nay even in formative stage.

The only link which an enquiring mind can maintain with the fundamental fields of human knowledge is through the foundation of education. Training is essential for specialisation but education as a process arms a man sufficiently to grasp the essential trends of human endeavours and progress. Through the media of universities where science—education ought to be a part of liberal curricula a close tie between the otherwise alien fields of science and humanities can be maintained. How exactly these curricula ought to be worked out is a matter which universities amongst themselves and perhaps best through the agency of University Grants Commision can decide. The essence of any such attempt has to be providing a link between science as a social process and other areas of intellect. This is absolutely essential for an under-developed country marching rapidly towards industrial revolution with a democratic and socialistic politico-economic bias.



OVERSEA ENGINEERING STUDENTS

Three engineering students from India, Cyprus and Uganda, who have been awarded Associateships of the Woolwich Polytechnic in London after completing their training there last year, chatting to the famous British scientist Sir Harold Roxbee Cox at a beffet super after the awards. (From left to right Sochinder Singh of India; Sir Harold Roxbee Cox; Andreas G. Adamiders of Cyprus and Viviano F. Carvalho of Uganda).



SMALL KEROSENE LAMP PROVIDES ELECTRIC POWER

A practical, inexpensive method for making electricity from a kerosene-operated lamp has been developed by a U.S. company.

The Minnesota Mining and Manufacturing Company of St. Paul, Minnesota, developed the unique generators for the Government of Mexico which is using them to supply schools in the interior of the country that do not have electricity, with power to receive educational radio programmes.

The "thermo-electric generator" converts heat to electricity by using strips of different conductive materials called solid-state thermo-electric couples or thermo-couples. One such "element" is positive and the other is negative. The kerosene heat is applied to one junction of this pair. The opposite, open junction, is kept cool and a voltage develops across the ends.

A number of thermo-couples are joined together in series to provide power output. A small voltage converter inside the base of the generator completes the electrical circuit to the radio.

The company says that air-tight sealed generators of this type have operated continuously for more than five years.

With no moving parts the silent thermo-electric generator requires no lubrication or maintenance. It starts and operates easily even in cold weather. One pint (one-half liter) of kerosene or similar liquid fuel keeps it going for 24 hours. Two candles can be used for heat in an emergency. The generator can be stored indefinitely when not in use.

Two side-effects of the generator can also be useful—light and heat. The device provides light through tiny windows so people can see to move around in a storm shelter, for example. Enough heat is given off to raise the air temperature slightly.

The manufacturer recommends the generator for use aboard boats, in weather stations, and at mining and lumber camps.

The company also buildes larger thermo-electric generators that burn natural or manufactured gases. These generators weight from 6 to 12 pounds (27 to 54 kilograms) and produce 12 volts of direct current. They have been used successfully to power sea buoys, radio transmitters and receivers in fire towers and on long railroad trains.

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Met orite Gives Clue to Life in Outer Space British Scientists' Discovery

Two British scientists have discovered strong evidence of life in outer space locked in a meteorite which crashed to earth in southern France almost 100 years ago.

They put crushed samples from the meteorite's centre under a powerful microscope and detected signs of tiny cells which looked as though they had once been alive. The cells, oddly shaped with spikes and tubes

sticking out, are similar to primitive plants of the kind which form a green scum on ponds.

The scientists are Dr. Max Hey, a chemist, and Mr. Robert Ross, a British Museum botanist. The result of their research was shown at a recent Royal Society meeting in London.

Mr. Ross says that the amount of evidence gathered so far does not provide conclusive proof, but it does indicate a probability of life beyond the earth. The black meteorite, like a crumbly stone, could be a piece that broke off the moon or a fragment from an exploded planet.

In fossil form, the cells have probably been dead for millions of years and look as though they need a moist environment to live in. This rules out the possibility that they got into the meteorite on earth. The meteorite was picked up within a few hours, and has been in dry conditions in museums ever since.

So far the tiny life forms have only been seen under a microscope. Now the scientists want to analyse them chemically to find out what they are made of. This would give clues to what they are, but there is a difficulty in finding a technique for collecting together a large number of the cells.

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New Electronic System Improves Airplane Navigation

A remarkable new electronic air navigation aid, the Doppler Position Indicator, has been installed on the jets of one of the leading United States airlines. With the new system, the jetliner's pilot can at any moment of a long domestic or international flight verify his course, surface speed, and the exact remaining distance to his destination.

The new system is entirly contained inside the plane, completely unlike all other comparable systems, which depend solely on signals originating on the ground. Thus, the system is expected to be of particular value for navigating planes in regions where ground-based radio aids are scattered or unavailable. TWA (Trans World Airlines), the company on whose planes the system has been installed, says that the system is "more reliable than any other means for long-range navigation over any part of the world."

The system works as follows:

Radar signals are beamed down from the plane and are reflected upward from the surface of the water or land over which the plane is flying. These signals are directed at angles ahead of the plane, to the rear, and on both sides.

The frequency of each returning signal varies with the movement of the plane over the surface below. Inside the plane, electronic computing devices continually analyze the variations in the frequencies of the signals from the time of transmission to the time of their return. This information is displayed in front of the pilot in terms of the plane's speed and course over the earth's surface.

Thus, any variation from the plane's present course can be observed at a glance. The remaining miles to be flown along that course are also automatically calculated, and the information is available at every moment of the flight.

The Doppler system is completely automatic, and makes it possibly for the first time to dispense with the ancient sextant for navigating a plane.

Significantly, the sextant is still carried by air crews on international flights, although they navigate primarily by means of ground radio aids. By noting the altitude of celestial bodies relative to the horizon at specific times, navigators using the sextant determine their plane's position. But computing what is recorded on the sextant, then relating this to the navigation charts, takes several minutes. And at jet speeds of over 600 miles (960 kilometers per hour), the plane is far from the point recorded by the sextant.

Like the sextant, radio aids show only what the aircraft's previous speed and course have been. If winds drift the airplane off course, the Doppler system indicates the amount and direction of deviation. The plane's speed over the ground is constantly computed automatically, and each mile is marked off on a meter.

The system incorporates a phenomenon first analyzed in 1842 by an Austrian mathematician and physicist, Christian Johann Doppler. He determined why a moving object, emitting a noise, sounds different as it approaches than it does when moving away. Observers hearing a train pass are conscious of this. The pitch of sound is higher in an object advancing than in retreating, although the sound volume from the source remains constant.

The new system will bring about a more efficient use of air space over the Atlantic, airline officials believe. Jet aircraft flying ocean routes today are separated 300 mile (480 kilometers) or more by route controllers. The expected widespread use of the Doppler system will safely permit doubling or tripling the number of aircraft that can fly in a given space.

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U.S. Surgeons Report New Success In Heart Operations

Stanford University surgeons report they have removed dogs' hearts for as long as two hours and replaced them without harm. Heart-lung machines kept the animals alive, and the hearts were preserved in salt solution.

The revolutionary experiment may open the way to successful surgery on thousands of patients and new-born babies with serious heart defects that are now inoperable.

This is the first time such experiments have been performed successfully, the university said, although doctors have been trying for 50 years to develop a technique.

Dr. Edward J. Hurley and three associates at Stanford's school of medicine in Palo Alto, California, reported the new development here to the annual meeting of the American Thoracic Society here.

The surgeons anticipate the operation might be used the next few years to treat a condition known as "transposition of the great vessels," a common cause of so-called "blue babies." At present there is no satisfactory operation for the disorder in which the vessels carrying blood from the heart to the lungs and body are reversed. The doctors feel that a large number of the 15,000 babies born each year in America with inoperable heart conditions might be helped.

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Atomic Power Plant For Use On Moon

A lightweight atomic thermo-electric power plant to generate electricity for instruments landed on the moon has been designed by engineers of the Westinghouse Electric Company in the United States. A demon-

stration model has been built which produces about 60 watts.

The power plant is designed to use the radioactive isotope curium is 242 as a source of heat. The heat given off by the curum is converted directly into electricity in thermo-electric components made of lead telluride.

Excess heat is removed from the device by circulating liquid sodium and potassium. The power of the little plant, which has a three-month lifetime, diminishes as the isotope's radioactivity decreases.

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Tiny Radio Reports Condition On Stomach

A tiny capsule radio device which can report on the acidity of the stomach after it is swallowed has been developed by physician at the University of Tennessee College of Medicine in the United States.

An electrode that is sensetive to acidity is connected to the capsule radio, and the radio signals the degree of acidity registered by the electrode.

"The signal is transmitted at 9.6 megacycles at a power of about one milliwatt," according to the report made by the Tennessee doctors. "Because of the very short range of the signal, a circular receiving antenna coil is worn like a belt by the person being tested. The signal can be picked up by a suitable receiver at distances up to three feet (one meter) from the antenna."

In its present state of development the device is still rather crude and requires considerable refinement the further miniaturization. However, the researchers say, it demonstrates that the principle is sound. The device was developed as a better method of determining stomach acidity, which has an important relationship to peptic ulcer and stomach cancer.

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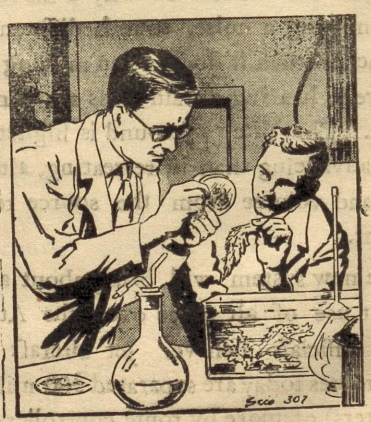
Heart Defects Found By Tape Recording Sounds

Unsuspected heart defects can be detected in nine out of 10 afflicted children by tape recording their heart sounds and later listening to them.

In a test of this method held in Chicago, in the United States, the tapes revealed heart abnormalities in 64 school children out of a total of 33,026. Most of the defects were inborn or were the result of rheumatic fever which scars heart valves and muscle walls.

The Chicago test was carried out with the aid of special tape-recording equipment. Each pupil's heart sounds were taped in about 25 seconds, an average of 250 children being accommodated in a single school day. The tapes were later read and interpreted by a team of two physicians.



In efforts to find a plentiful and reliable food supply for future and teeming world populations, and for space ship travelers, scientists have developed a new strain of algae. This algae, a nutritious and palatable form of seaweed, increases in quantity 1,000 times a day.

Articles

ELECTRONIC COMPUTERS AND THE 'INFORMATION EXPLOSION'

Electronic developments of the 20th century are opening a new world of possibilities for man. During the 1950s, this field provided television, transistors, and missile electronic systems. Some day, possibly, the present decade of the 1960s may be remembered for electronic probing of the universe and the establishment of world-wide satellite systems for telephone, radio and television communications and global weather forecasts.

These developments represent new and major applications of the knowledge gained in electronics. They are spectacular and of revolutionary impact, but they are by no means the only significant applications of electronics.

One of the big problems of the present-day is the handling of mass data, from the sorting and cataloging of rapidly multiplying library research materials to the filing and keeping of business records. The ever-increasing mountainous mass of data has been described as the "information explosion." But promising to solve this problem is another important new development of electronics: the electronic computer, variously described as the electronic "robot," the electronic "brain," and — more technically—the electronic "data analyzer."

Electronic computers are among the most intricate and ingenious mechanisms ever devised. Essentially, they are of two types—the digital computer and the analog computer. These two types work differently and yield different results.

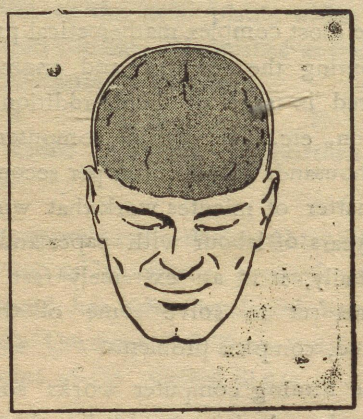
The most complex mathematical problems confronting the scientist and engineer are rendered in terms of simple addition, multiplication, etc. The **digital** computer, handling thousands of additions per second, does in a matter of minutes work that would require years of labour with paper and pencil. Essentially, it is an extremely fast adding machine, set to solve some of the most involved, complex problems.

The **analog** computer works somewhat differently. As its name implies, it produces analogs or parallels. The analog computer is an electronic device set up as a model analogous or similar to the process to be described or the problem to be solved. It deals with comparative values, not hard figures. Its results appear as lines on a graph or as voltages on a meter.

Both the digital and the analog computers must be "programed." This means they must be set up in such a way that they can produce a result from the information fed in to them, and the information itself must be organized so it can be handled by the machines. These devices, working by electronic impulses, perform at fantastic speeds. Moreover, they perform with a precision, an efficiency and a dependability that can only be described—when compared to human performance—as fabulous.

Approximately one-third of the computers in the United States are used by government and industry. These are organized or "pro gramed" chiefly to carry out scientific and engineering calculations. The remainder are designed to mechanize paper work and handle routine business operations.

In the field of data processing, for example, the William Wrigley Junior Company, a chew-



According to experts, the human brain has about 10,000 times the memory storage capacity of present-day electronic computers, but the machines operate about 10,000 times faster than the brain.

ing gum manufacturer, is using a computer system to handle all its record-keeping, from accounts receivable for 10,000 customers to freight bills and sales analyses. In San Francisco, an auto parts dealer is using a computer to take care of 26,000 inventory items and the records of 2,500 customers. The computer not only informs the company in the morning of the precise inventory the night before, but it provides an automatic check on a customer's credit, and withdraws the credit line and charges cash where an account is overdrawn.

And recently, a graduate student at Columbia University in New York City enlisted the aid of computers to analyze the metrical lines of Homer's "Iliad" in an attempt to ascertain whether the great Greek epic was the work of one poet or many. Through using computers he has been able to prepare in only four years the kind of study to which classical scholars used to devote 20 to 40 years.

Computers may even be put to work in diagnosing illnesses. Physicians have recently predicted that computers, programed with all the symptoms of diseases, may enable doctors, in the not too distant future, to feed a patient's symptoms into an electronic brain, push a button and receive a diagnosis, complete with suggestions for therapy.

Banks, whose operations involve the handling of millions of checks, are already finding the computer a boon. Recently developed computers are making it possible to sort up to 1,500 checks a minute. Checks of all sizes are automatically sorted and the amount posted to customers' accounts.

Another prime market for the electronic computer is automatic location of information in the field of technical literature, as distinguished from the data processing just described.

As in data processing, machines are being groomed to do a job that has become too great and too fast for manual methods and conventional office equipment. Each year, technical writers all over the world turn out 60,000 books, 100,000 research treatises, 1,500,000 articles. Scientists and engineers obviously cannot cover all the reports and journals. Computers are making it easier for them to keep pace by providing a practical method for assimilating the torrent of material, classifying it, and compressing it into an index.

Looking to the future, computer makers see no end to the things they would like to

accomplish. Until recently, computers were able to accept information only in specially prepared froms—usually from cards or tapes. Some of the new "character-sensing" check sorters used by banks mark the first step in simplifying computer input. The next big development is to build devices that can read ordinary typed or printed characters. This will eliminate the considerable time and human effort devoted to the "programing" of material for a computer.

A machine that promises to fulfill this prediction, at least in part, is the Farrington Optical Scanner recently developed by the Farrington Company of Massachusetts. Designed to read alphabetic and numeric information from typed original documents, it represents a considerable advancement over previous machines used, in that it recognizes the alphabetic characters and thus eliminates the need for using codes to represent alphabetic information.

The real operational significance of this machine is that, for the first time, it makes it possible to use original documents created primarily for business purposes in the field as direct input to a data processing system. These documents, after having served their purpose in the field, can then come into a central processing office, be fed through a scanner, and the information can be converted to any of the convenient business machine codes such as punch paper tape, magnetic tape or punch cards.

The scanner machine can also be used to eliminate key punching in a subscription and mailing list operation for large magazines. In this application, the final documents for processing by the machine are assembled by typists from coupons and handwritten subscription information. These typed documents are checked, then put in a page reader and the information transferred directly to magnetic tape.

Certainly one of the most important aspects of the optical scanner is its appetite for gobbling up the enormous amounts of data that result from the flow of information in any operation and converting it into machine codes at high speed. Applications now made possible will have a dramatic effect on reducing the lead time and increasing the precision and accuracy with which information is used to control the affairs of business and government.

While the computer revolution is bringing new benefits to society, it is at the same time creating new problems, both technical and human. Management and labor have acted jointly in many instances to help smooth the changeover to automation by giving displaced employes opportunities for reassignment or by setting up programs for their retraining. In addition, the executive and legislative branches of the U.S. Government have made and are making, comprehensive studies of the impact of automation on the nation's economy and labour force. These studies will be a major step toward solution of problems presented by automation and toward estimation of its potential benefits.

A GREAT NEED

By Nikolai Vanarov

The need for international co-operation stems from the fact that it is no longer separate regions of the world, the Earth as a whole, and the space around it that have become objects of exploration. The challenge calls for concerted scientific, technical and material efforts. Absence of co-ordination is bound to lead to a duplication of experiments and a needless waste of funds and materials. Reversely, well-organised international cooperation will promote more successful exploration of outer space.

The programme of cooperation is very broad. Let us view just some of its aspects.

Radio and TV Space Centres

The range of television broadcasts is limited by the height of the transmitting and receiving antennas. This is due to the fact that ultra-short radio waves spread in straight lines. The broadcasts of the Moscow television centre, for example, which has an antenna of 150 metres, are well received within a range of a mere 60 kilometres. The 500-metre tower now in the biluding stage will no more than double that range.

Radio relay stations, special cables and aerial rediffusion by means of planes and helicopters are employed today to increase the range of television broadcasting. It would take a great many of these auxiliary means to effect a television exchange between, say, the Soviet Union and United States. Further-more, it would not be easy at all to disposition then in the vast expanses of ocean that lie between the two countries.

Yet a system of several sputniks equipped with special instruments would facilitate extra-long-range television broadcast at considerably lower costs. Here, for example, is one solution of the problem. Three artificial satellites placed in orbit within the equatorial plane at an altitude of some 36,000 kilometres, could form an equilateral triangle, with the globe inside it. Moving with the Earth, the sputniks would as it were, "hung motionlessly" over the desired regions of our planet. Their instruments would pick up radio singnals from the Earth, amplify them, and rebroadcast them back to Earth.

Project such as these may bring about a considerable improvement in communications and television on Earth. People will get a reliable means of inter-course and fresh possibilities for greater contacts between peoples will arise.

Space Weather Bureaus

People depend a lot on the weather, but the world-wide meteorological service is not as yet able to furnish reliable long-term forecasts. This is due, firstly, to the fact that only one-third of the Earth has weather bureaus operating continuously. The other two-thirds, occupied by the seas and oceans—where, to be sure, the weather is formed—have no such bureaus. Secondly, we do not have sufficient knowledge as yet of the cause and nature of meteorological phenomena transpiring in the atmosphere. Sputniks may be useful in this field as well. They will inform us by radio of all the processes occurring in the atmosphere.

The sputniks equipped with special instruments will be circling round the globe at different altitudes and in different directions, completing a revolution in a matter of

90 to 120 minutes; they will furnish continuous information about the location and nature of clouds, the movement of warm and cold masses of air, the temperatures of the surfaces of water, land and air, and about regions of good and bad weather, etc. Meteorologists would then sum up these facts and produce precise weather forecasts for desired lengths of time.

A regular exchange among all countries of facts obtained from the world-wide network of weather bureaus and satellites would enable us to solve the problem of long-term weather forecasting. Precise and timely weather forecasts will be yet another important step towards man's conquest of the forces of nature. They will enable him to combat natural calamities with greater effect and will open new prospects for greater well-being.

Space Instruments and Magnetic Surveys

Many centuries ago the Chinese developed the compass and learned to use the properties of the magnetic field in navigation. Today, the problem of geomagnetism concerns geology, physics, medicine, biology, radio electronics, navigation and other fields of knowledge.

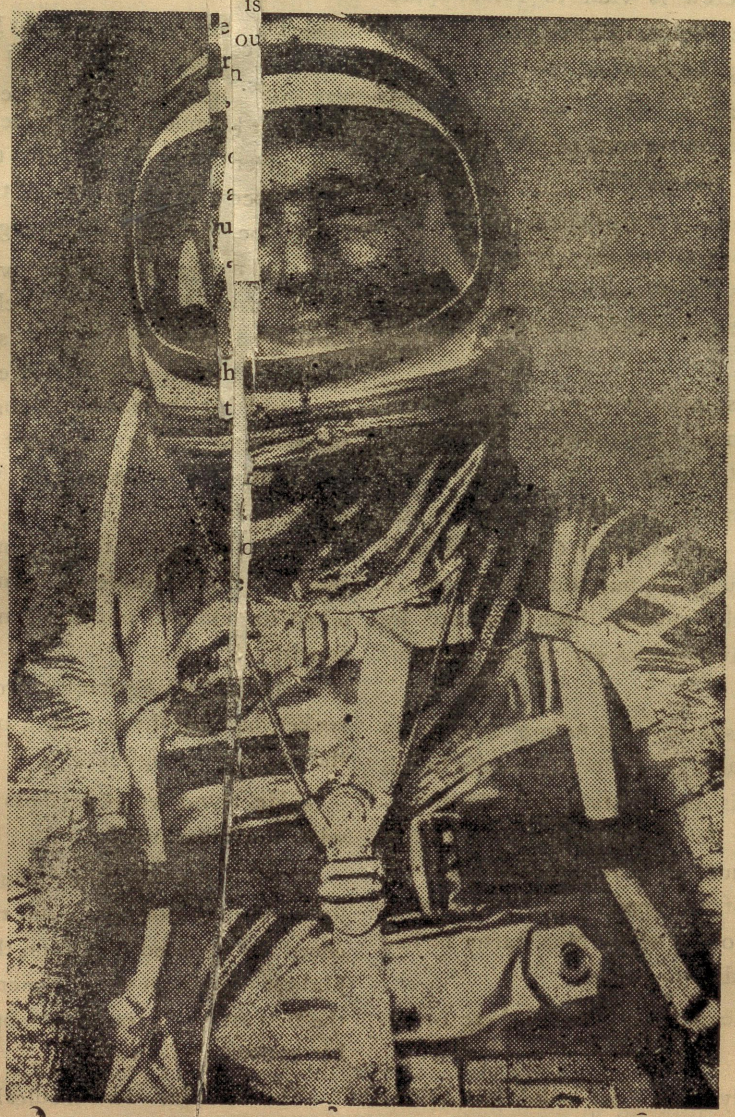
The Earth's magnetic field governs a number of physical phenomena in the atmosphere, on the Earth's surface and below it. Radio communications, the range of cosmic radiation concentrated in the Earth's radiational belts, the formation of earth currents, the origin of polar lights, etc., all depend on the states of the magnetic field. Radio communications, for example, suffer painfully from strong magnetic disturbances. Ships at sea and planes in flight cannot navigate with any degree of accuracy at the time of such disturbances, especially in the upper latitudes. But to forecast the state of the magnetic field one must know its nature. So far, however, we have no knowledge of its origins. There are several hypotheses to explain it. One of them associates the origin of the magnetic field with powerful circular currents originating in the Earth's core through physical and chemical processes.

What can the sputniks do to help us in the matter? To begin with, they will enable us to accomplish magnetic surveys all over the Globe. There are still many empty spots on our magnetic map to today. Sputniks with orbits crossing the geographycal poles, will be best suited for the task. The polar regions, the most difficult to survey, will then be covered with a dense network of magnetic measurments. What is more, the sputnik will considerably speed magnetic surveys. The United States, for example, conducted magnetic surveys in the oceans from 1900 to 1929. Survey ships covered something like 800 thousand kilometres over that period, while a sputnik would cover the same distance in something like 24 hours.

Researchers of the magnetic fields of Earth and Moon made by Soviet scienists, have been a good start. Space rockets have established that there is no magnetic field to speak of on the Moon. Further investigations in that field will enable us to produce a map of the magnetic fields of the Earth and other planets and will furnish a conclusive answer to the exciting riddle about the origin of the magnetic field.

As you see, to solve these and many other problems in the exploration of outer space, we need international cooperation. Yet pro-

Brainerd Holnes, head of NA' s manned space programmes, told the he ring that "God willing, we are going t he moon and back and we well on our vto explora-tion of space." He said the planned lunar landings by 1970 are "truly a national goal for those who choose to work, sweat and dare."



Astronaut Scot Carpenter, 37-year-old U. S. naval flyer who successfully orbited three times around the world in his Aurora 7 Spacecraft on Thursday, May 24

Scientific Know How

WHY CHILDREN GROW FASTER TODAY

New theory on problem of growth acceleration—Drinking water the reason for accelerated growth ?

School children grow so fast that ever more parents will complain of the fact that their children have grown so "that they are much taller than their father is." This anxiety does not refer to a precocious maturity of young people, but simply to the greater physical length of young people of the 20th century, as compared with former generations. These phenomena described by scientists by two scientific terms are : "acceleration" and "longitudination." These phenomena may be due to various causes which have recently been studied intensively by scientists, without final clarification having been reached. Scientists and parents are not the only people worrying about the accelerated growth of young people. The education authorities, too, have their headaches, as pupils and students will no longer fit in the old school furniture. The demand for small-sized class-room furniture for school beginners has rapidly dropped. In Munich, for example, it was found that class rooms for school beginners today require only one third of the formerly requirdd small-sized desks : and for almost all of the 17-year-old pupils the traditional 76-centimetre desk is no longer sufficient.

The causes of the faster growth of young people have given rise to various scientific theories. One group of scientists holds the greater exposure to light responsible for longitudination, their argument being that light will influence the growth-regulating hormones. Others say that nutrition is better today, than in former times. This view has somehow or other been confirmed by the fact that the young people who were in their decisive growth years during the war, and had not beeen sufficiently nourished then, had not grown as fast as their younger brothers and sisters after the war. Particularly in the 20th century, however, which has been called by researchers and educators the century of the child, another factor has been held responsible: migration tendencies. The strong migration of the population from rural districts to the large cities, and the fact that modern people have become more mobile both geographically and sociologically, are phenomena which the West-German professor Thomas has intensively studied in that context: although it cannot be proved that intellectual mobility is necessarlty combined with acceleration in growth, one thing appears to be clear: that lagging behind in mental development will very often be coupled with slow physical development. In addition, modern transport causes an ever stronger mixing of the most various elements of population, which by the cross-breeding of the various inheritable strains, may also have contributed to the accelerated growth of young people.

A new theory on the problem has recently been developed by a French researcher.

It is different from all previous views. This French scientist thinks that the faster growth of young people is due to the increasing contamination of waste waters. The great quantity of hormones discharged by human beings is recircled, because in the treatment of potable waters from the rivers and lakes the hormone contained therein will not be filtered out again by the processes applied. Should it be that moder drinking-water supply really is the cause for accelerated growth? At any rate a new approach has been opened here for scientists, medical researchers and educators to find a cue for the discovery of that fascinating secret of the acceleration of growth. (Peter Ebstorfer)

MILK PROVIDES NATURAL PROTECTION AGAINST RADIO-ACTIVITY

Manifold dairy product made out of milk—Milk a versatile staple food for thousands of millions of people

The very fact that all living beings of the higher order of mammals during their initial stage in life will be nourished exclusively by milk is not without profound biological reason and significance: for as nutrition experts and development biologists have clearly found, milk truly is a very special food, a "juice of life", as it has sometimes been called, which protects man to a high degree against civilization diseases, disturbances and defects of modern life.

A book of the well-know Austrian nutrition expert and medical researcher Professor Halden, has recently underlined the great effectiveness of milk as a preventive means against all kinds of disturbances, defi ciencies and illnesses, which have arisen in many countries after the introduction of industrialization, which brought them contamination and pollution of the atmosphere and water by chemical substances and by radio-activity. Professor Halden States in his book that never has any greater influence of chemical substances in the atmosphere and in human environments been more apparent than at present. Many of these substances are highly poisonous or at least very detrimental and the populations of the highly industrialized areas—the Federal Republic of Germany included as one of the particularly densely populated areas—are exposed considerably to these detrimental influences.

Against these evil and in jurious effects milk to a certain degree provides a natural protection by the very fact that the protective substances contained in milk will relieve the total metabolism of the human body, but above all the metabolism of the liver, thereby accelerating and improving depoisoning processes in the organism. In accordance with clinical experiences made, curdled milk (also colled Yoghourt), and the cottage cheese produced therefrom, are particularly suitable for any dietetic treatment of liver disturbances; but also in the treatment of patients with sulfonamides, penicillin and streptomycin have milk and curdled milk products proved to be highly successful, due to their contents in high-quality proteins and numerous valuable vitamins.

In the new field of labour medicine, too, research results have revealed that the pro-

vision of milk for the workers in manufacturing plants, particularly those working with lead, and using organic solvents, substances that pollute and contaminate the air in a particularly high degree, has been highly advantageous. In Munich traffic policeman who during their long hours of traffic point duties will be exposed particularly to the detrimental fumes of motor cars, will now also be issued milk regularly as a means of preventing poisoning of the organism.

Latest research results found in this field have even made it appear that milk, due to its high calcium content, also provides a certain natural protection against radiation, particularly against the radiation of the highly dangerous Strontium 90. Also damage that has been due to protected X-ray and Rontgenological treatment will in future be remedied by the prescription of much milk for the patient. Milk the "juice of life" since the days of yore has proved to be a kind of effective protection even against the most recent dangers of modern civilization.

(Fritz Wahl)

AN ALMOST UTOPIAN HOSPITAL

Electronic brains will replace physicians—Medical exhibition in Munich

Recently in Munich the foundation stone was laid for the construction of a large clinic which after its completion in ten years will certainly be one of the most modern and largest hospitals in Europe. The latest knowledge of medical science and engineering will be applied in equipping and furnishing this hospital. But as this clinic will also serve as a training facility for medical students who are to learn their profession there also by practical work, a number of automatic devices will not be installed, which according to the present state of science could well have been used.

An exhibition held in Munich gives the public a fascinating view of what this hospital of the future looks like. The show will then travel to London; it has been organized by an international surgical association called the International College of Surgeons, which was founded in 1935 in Geneva by Professor Dr. Max Thorek.

The exhibition indicates what the most expediently built and equipped hospital of the future will be like. Another development shown is the hospital off the assembly line: a hospital that can be put together from prefabricated parts In cases of catastrophes and emergencies additional hospitals can thus be erected speedily and located on the spot. Experts say that these relatively cheap hospitals of the future will be so equipped as to have every patient controlled electronically. The patients will have electrodes attached to various parts of their bodies; the electrodes will continuously transmit data on temperature, heart activity, frequency of breathing, and other reflexes to electronic measuring, control and monitoring equipment; the information at the very same time will also be recorded on magnetic tape. If these transmitted reactions of the patient will in any way deviate from what is normal or expected or present on the monitors, an alarm will be triggered off in the central room so that the duty nurse can call in the physician immediately.

In this central control room physicians and nurses can at any time see each patient

by switching on television screens, while at the very same time reading the electronically stored fibre curves as well as data on heart activity and breathing frequency and so on. By this degree of automation physicians will be set free from much time-consuming routine work and will be able to devote their energies to really serious cases.

Another help to hospital staffs has arisen in the form of an electronic diagnostic computer. This electronic brain stores the manifold symptoms of all known diseases. A screen before the eyes of the patients will display questions, such as for example, "Do you suffer from headache?". The patient will then push a button corresponding to the standarized answers : "Yes", "No", "Several", "Little". The electronic brain will automatically work out a diagnosis from all these answers in a split of a second. Finally the physicians will check the diagnosis of their "electronic colleague" and confirm it by a few control questions. Blood and urine analyses, studies of metabolism and other chemical research can be made by means of automatic analysis machines within a few minutes.

Hospital beds of the future will be so designed as to be converted in a moment into a tub, an operating table or a bed pan. By this means the often dangerous transport of seriously ill patients to bathrooms, toilets, or the operating theatres can be avoided. Bed sheets, towels, and plates and cups will be thrown away in the hospital of the future, and burnt. This is more hygienic and cheaper than cleaning or washing. Modern plastics industries supply all these items so cheaply that cleaning would be more expensive than the purchase of new sterile material. There will be neither large kitchens in the hospital of the future; every patient will be given his special diet taken from special individual ration tins warmed up by the nurses at the bedside, to be eaten by the patient from the plastic container which is thrown away afterwards. —The latest development shown at the Munich exhibition is the "radiation-safe hospital" whose patients will survive even nuclear contamination of the outside atmosphere. One such hospital is already being built : in Montgomery, Alabama, U.S.A. In 1964 this first fully automatic hospital will be completed. Automation, as in many other fields of modern life, has also come to the hospitals to stay.

(Fritz Wahl)

(*Courtesy German Features*)

ASSOCIATION NEWS

A BRIEF REPORT OF THE ACTIVITIES OF THE CFRI BRANCH JEALGORA

During the period since the present Executive Committee took over charge in April 1961 to date, there were 4 meetings of the BEC viz. on June 7, Oct. 7, Dec. 6 1961 and on March 15, 1962. The General Body met on Dec. 28, 1961.

Since taking over charge the present BEC made drive for increased membership. The membership which had gone down as low as 34 in March 1961 rose tc 60 in September 1961. The present membership is about 54, the resignations are mainly due to members leaving this Institute.

During the period under report the following five lectures were arranged all of which were interesting : (1) 'Reservoir Engineering' by Prof C. W. Snell, UNESCO Visiting Professor in Petroleum Technology at the Indian School of Mines & Applied Geology, Dhanbad, on April 13 ; (2) 'Life, Matter, Atoms & Molecules' by Dr. S. N. Chatterjee, SSO (Gr. II), member CFRI Branch. on June 20; (3) 'Fuel Cells' by Mr. P. N. Mukherjee, SSO (Gr. I), member CFRI Branch, on July 12 ; (4) 'Earthquakes In India' by Father F. X. McFarland, S. J., Principal De Nobilli School Digwadih, Dhanbad, on August 31 ; and (5) 'Atomic Energy & Coal' by Mr. Ritchie Calder, a well known science-writer of England. Another lecture, by Sri Dilip Bose Gen. Secretary Interplanetary Society Calcutta, on the 'Conquest of Space' scheduled to be delivered on Sept. 15 was postponed at the eleventh hour at the request of the speaker.

The following films were displayed during the period : 'Industrial Bihar', 'Cave Temples of India', 'Hullo Everbody' 'Wealth of Our Waters', 'Life of Academician Pavlow', 'Long Flight', 'Instruments of Orchestra', 'Kariba Power for C. Africa', 'Powers for Uganda', & 'Waters of Life'.

Some of the important problems which this Branch tried to tackle during the period under report are the following :

Discrimination between Research & Technical Staff

The BEC felt that such a discrimination in pay and age of retirement beween the research and technical staff was unjustified due to 3 reasons, viz. (i) it creates a sense of disappointment and frustration among the scientists (ii) the manner of classification of scientific staff in the two categories was arbitrary and (iii) since modern research is a cooperative effort effective contributions are made possible only by bringing together scientists of various disciplines. Therefore such a discrimination should be done away with.

The General Body meeting on December 28 adopted a resolution to the effect that

consideration at the annual meeting of the ASWI at Cuttack in January 1962.

A note on the subject was prepared and communicated to the General Secretary, ASWI and to the Secretary, ASWI Publications Directorate (CSIR) Branch.

Holiday Homes at Cheap Rates

The BEC felt the need for fully furnished holiday homes for the CSIR staff at health resorts in different regions. It prepared a detailed note.

A resolution was adopted at the General Body meeting on Dec. 28 for consideration at the forthcoming annual meeting of the ASWI.

Discrimination beetween External & Internal Candidates

The General Body meeting of this Branch held on Dec. 28 adopted unanimously the following resolution for consideration of the Council of the ASWI which was adopted at the annual meeting of the ASWI held in Cuttack in Jan. 1962 : "It is unjust to discriminate between an external and an internal candidate by a Selection Board. In many cases the Selection Board is hesitant in giving advance increments to an internal candidate while it easily recommends advance increments to an external candidate of equal merit. There should be no such discrimination.

Relaxation of Rules for Training Abroad

The above General Body meeting also adopted the following resolution, which was later also adopted at the Annual Meeting held at Cuttack :

"The CSIR and other Government organizations should relax rules for sending meritorious scientists for training abroad. While the present rule is that unless a scientist has served for at least 5 years, he (or she) cannot be recommended for training abroad, this Branch resolves that this minimum period be reduced to 3 years.

During the pariod under report steps were made and are still persued for transforming the local Branch to the Association pattern.

A poll was taken in the middle of March 1962 on the suggestion of the Legal Adviser CSIR for deleting the following 2 clauses from the Aims & Objects of the Constitution of the ASWI : (i) to improve the professional and economic status of the scientific workers, (ii) to see that the practice of science for remuneration be restricted by law to those possessing adequate qualifications. Out of about 54 members, 3 were in favour of retaining at least the first clause. 12 members could not be contacted.

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A lecture was delivered by Major (Dr.) H.C. Mullick, Vice-President, Indian Medical Association, on May 10, 1962 at the Central Fuel Research Institute under the auspices of the Association of Scientific Workers of India (CFRI) Branch Dr. (Mrs.) S. Z. Ali Vice-President A. S. W. I. (CFRI Branch) Presided. The subject of the talk was "Hidden Science." Below is the summary of the talk.

By 'Hidden Science' the speaker meant 'Sex'.

All the animate objects, including those of the vegetable kingdom have sex. Even in our epics and in the mythology, sex finds its due recognition, so much so that even rivers and mountains have been assigned sex. Our ancient Sages and Rishis had knowledge of sex in a primitive sense. It is said

that both Siva and Vishnu used to change their sex. Even the Nature has been given a sex; it is denoted as feminine in one context and as male in another.

Although in the human species every newly born must have a mother, yet in the lower animals or insects the same is not always the case. A male crab may give birth to many crabs—all male. An earthworm, which is a conglomeration of several sections, is also male. So, a male can also have an offspring without the help of female partner. When an off spring comes out of a female, we think of her consort as Providence, a Superhuman Being or God.

Man is supposed to be one sex and woman the other. But actually, this is not so. The human race is hermaphrodite like the plants which give out both the male and female microscopic life. Both man and woman have hormone of both sexes. These hormones are secreted internally from some ductless glands. Different qualities are assigned to some particular glands and their secretions which can influence the generative organs to function differently. Some internal secretions activate male generative organs in their development and useful function while other such secretions activate male organs to make them fuction to suit their purposes.

With the expanding knowledge of science, we are now more conscious and have more knowledge on sex, and cases of sex change are now being probed scientifically instead of giving these some mystic or magical explanations.

At the end, the speaker ably answered questions put forward by the members. Mr. A. Ghosal, Secretary of the A.S.W.I. (CFRI-Branch) proposed a vote of thanks to Major Mullick which was unanimously adopted.

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Shri Raman & Shri Misra

Shri M. R. Raman and J. N. Misra stalwarts in our ASWI organization at Kanpur have been transferred to Delhi to work in the Scientific Research cell. Their presence was of immense help to the head-office of ASWI located at Kanpur. By their transfer other workers will lose the benefit of their valuable advice at short notices. However, it is envisaged that their presence at Delhi the central place of all activities will be of immense help to scientific workers in general and ASWI in particular.

SCIENTISTS ASK FOR INTERNATIONAL DISCUSSION BEFORE HIGH-ALTITUDE TESTS

The World Federation of Scientific Workers is disturbed about the proposal to explode a nuclear device with a great release of energy at a high altitude above the earth. Expert opinion suggests that this explosion may interfere with the radiation belts around the earth, and that it may be a long time before they are restored to their present condition. The Federation is also concerned with the proposal again to inject large numbers of needles into orbit about the earth as a means of assisting long-range communications.

It appears certain that both these tests will have some effects on the environment of our planet, and they may make more difficult investigation in astronomy and space research. Their effects have not been accurately assessed in any scientific publications generally available to the scientific community and many scientific academies and institutions have already expressed their opposition to such experiments.

We believe that, since peoples of all countries inhabit this planet, it should be an agreed principle that no nation has the right unilaterally to alter the environment of the earth. We therefore call urgently for the setting up by the United Nations of an international scientific committee to assess the effects of experiments of this kind. We suggest that nations contemplating such experiments should be required to present to this international scientific committee sufficient information about the proposed experiments or tests to enable a proper and independent assessment to be made of their probable effects; and that they should refrain from making such tests until after the presentation of report by the scientific committee and its full discussion and approval by the appropriate organ of the United Nations.

INDIAN YOUTH IS "GUEST EXPLORER"

A "guest explorer" on a British schoolboys' expedition to the Arctic recently was 19-year-old Charanjeet Singh from India, who is at present working in the London factory of Associated Electrical Industries. Here, Charanjeet is seen with one of his friends, who works with him in the switchgear assembly shop at AEI. With "guest explorers" from Southern Rhodesia, Sweden and Norway, he accompanied some 63 British schoolboys and their leaders on their attempt to discover an uncharted mountain lake in the Blaamanseisen Glacier area in the far north.

W·F·S·W News

SCIENTISTS CALL FOR ALL TESTS TO BE STOPPED AND FOR FURTHER EXPERT ASSESSMENT OF TEST IDENTIFICATION

Professor C. F. Powell publishes the following statement in his capacity as President of the World Federation of Scientific Workers. Copies are being sent to Heads of States already in possession of nuclear weapons, to the United Nations and to the Heads of all Delegations to the Geneva Conference on Disarmament.

"The World Federation of Scientific Workers, which links together 200,000 scientists in 32 countries, has since its foundation fifteen years ago consistently worked for an international agreement on general and complete disarmament; and, in particular, for the abolition of nuclear and all other weapons of mass destruction. On many occasions it has expressed the opinion that the cessation of tests of nuclear weapons would represent an important first step toward these goals.

The Federation is therefore gravely concerned that nuclear tests in the atmosphere have been resumed. It seems now to be generally agreed that all nuclear weapon tests, with the exception of certain small underground tests, could be detected without elaborate inspection arrangements on the territory of the nuclear powers. We cannot understand how the possibility which still remains of concealing the smallest underground nuclear tests can rationally be used to justify tests which certainly cannot be concealed.

The resumption of atmospheric tests gravely prejudices the possibility of progress on the more important problem of general disarmament, facilitates the acquisition of nuclear weapons by powers not at present possessing them, constitutes a biological hazard through dangers from fall-out; and is likely to lead to a further deterioration in international relations and an intensification of the cold war.

We welcome the initiative of the representatives of the neutral powers at the Geneva Conference in suggesting a compromise solution to the differences between the Anglo-American and Soviet positions on nuclear tests. In view of the advances that are said to have been made recently in the identification of small underground explosions, we call, as an urgent measure, for the setting up at Geneva of another conference of scientific experts to assess the present position with regard to the possibility of the detection of nuclear tests, using only national detection systems supplemented by international monitoring stations on the territories of uncommitted powers willing to accommodate them. Pending the presentation of the report of such a conference, we urge all nations to refrain from any further nuclear tests of any description, in the atmosphere, under ground, under water or elsewhere."

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SEVENTH GENERAL ASSEMBLY

REPORT OF THE SECRETARY GENERAL

Date of the Seventh General Meeting

The Sixth General Assembly of the Federation was held in September 1959 in Warsaw. It was during this Assembly that an amendment to Article 15 of the Constitution was adopted, which aimed to give Executive Council the possibility of increasing to a maximum of three years the interval between two consecutive Assemblies. This enabled the Executive Council to decide at its Twenty-first Meeting, in Budapest, to convene the General Assembly in 1962, at the same time as a Symposium on educational problems. Affiliated Organisations were consulted in accordance with the Constitution, and they ratified this decision.

Meetings of Leading Bodies

(a) Financial difficulties imposed strict limitations on the number of meetings of leading bodies. One meeting of the Bureau, in 1962, and the meeting of the Symposium Organising Committee had to be cancelled.

It proved possible, however, in accordance with the Constitution, for the Executive Council to meet at least once in each year when there was no General Assembly

(b) The Executive Council met therefore as follows :

21st Meeting—Budapest—(from 23 to 25 September 1960)

Very fundamental and lively discussions took place on the general policy for the activity of the W. F. S. W. and on problems of disarmament.

Important decisions were taken regarding the Symposium of 1962 and the Seventh General Assembly. A suggestion that an international conference should be organised later on planning and education in science in countries in the course of development was held over.

22nd Meeting—Geneva—(from 22 to 23 September 1961)

This meeting was also dominated by the gravity of the international situation (disarmament, test explosions of nuclear weapons, problem of Berlin). As at the 21st Meeting, unanimous agreement was achieved.

The day after the meeting ended a Press Conference was held in Geneva. Many journalists were present, from both socialist and capitalist countries, and reports appeared in several newspapers.

(c) The Bureau has also held a certain number of meetings :

13th Meeting—Prague 26 and 27 March 1960
14th Meeting—Budapest 22 September 1960
15th Meeting—Sofia 31 March-2 April 1961
16th Meeting—Geneva 21 September 1961

Matters concerning Publications were dealt with at the following meetings :

(d) *Full Meetings of the Editorial Board* :
in Budapest—23 September 1960
in Geneva—21 September 1961
Smaller Meetings :
in Prague—15 March 1960
in Sofia —31 March 1961

(e) The Committees responsible for the organisation of the Symposium have also held several meetings :

in Zurich—28 and 29 January 1961

in Prague—24 and 25 June 1961
in Geneve—24 September 1961
in Moscow—13 and 15 January 1962

Another meeting of the Organising Sub-Committee is planned for 10 and 11 April 1962 in Vienna Austria).

Implementations of the Resolutions of the General Assembly

The General Resolution

Drawing the lessons of the Warsaw Symposium on "Science in the Development of the Economy and Welfare of Mankind", the Symposium on "Planning" held earlier in Prague and the work of the Sixth General Assembly, Professor J. D. Bernal defined our mission in this way :

> "We have mapped out the way in which science can help humanity; let us now get down to the task of seeing that science really does it."

The spirit in which the tasks of the Federation had to be tackled was set out in the General Resolution (published in the Bulletin 1960, page 4). The growth of international tension, the intensification of the arms race, in both conventional and nuclear weapons (with the resumption of test explosions of the latter), have led the Federation to take a stand on several occasions, either in public statements or in latters addressed to Heads of States or to the United Nations Organisation.

The references given below make it possible to analyse this activity over the three years which have passed since the General Assembly in Warsaw.

2 December 1959

The President sends the text of the Resolutions of the General Assembly to the Heads of Government of the four great powers.

11 February 1960

Texts of the reply from Chairman N. Khrushchev and the acknowledgements from President Eisenhower and M. Michel Debre.

9 March 1960

Letter from the President to Heads of the three Delegrtions to the Geneva Conference on the cessation of nuclear tests.

1 April 1960

Telegrams to President Eisenhower, Mr. Khrushchev and Mr. Macmillan. Publication of the Resolution adopted by the Bureau in Sofia.

9 May 1960

Letters from the President to General de Gaulle, President Eisenhower, Mr. Khrushchev and Mr. Macmillan.

23-25 September 1960

Resolution of the Executive Council.

23-25 September 1961

Telegram sent by the President to the President of the General Assembly of U.N.O.

3 February 1961

Letter from the President to General de Gaulle.

27 February 1961

Text of the telegram from Professor Li Sze-kuang about the murder of Prime Minister Lumumba.

16 May 1961

Telegram to the Affiliated Organisation in Cuba and the latter from the President and Secretary General to the President of the General Assembly of U. N. O. about Cuba and Laos.

8 September 1961

Texts of telegrams sent to Presidents de-

Gaulle and Kennedy and Mr. Khrushchev about test explosions of nuclear weapons.

22/23 September 1961

Resolution of the 22nd Executive Council.

17 November 1961

Personal letter from the President to Mr. Khrushchev.

It will be for the General Assembly to say whether the recommendations adopted at Warsaw in 1959 have been appropriately applied was not approved by the Council. Similarly, the Resolution adopted at the 22nd Executive Council was met with reservations on the part of the Affiliated Organisations of Denmark, France and the United Kingdom, as to the necessity of specifying the method of resolving peacefully the crisis in Berlin.

The W.F.S.W. and Nuclear Problem

The Sixth General Assembly adopted three texts :—

—Resolution on Nuclear Hazards
—Resolution on Biological Warfare
—Report of Commission 2.

Professor E. H. S. Burhop has been good enough to provide the following report of activity in his field since the Sixth General Assembly :

"The work of the W.F.S.W. in the field of disarmament and on nuclear problems during the past three years has been guided by the Resolution of the 6th General Assembly and of the recommendation of the Commission on nuclear weapons, biological warfare and the militarization of science.

Resolutions dealing particularly with disarmament and nuclear weapons were passed at the 21st and 22nd Executive Council Meetings and widely publicised. On numerous ocassions also the President has written to the leaders of the nations possessing nuclear weapons urging the vital importance the Federation attaches to disarmament and the cessation of nuclear tests.

Four issues of a Nuclear Hazards News letter have been prepared, containing important statements or accounts of actions connected with nuclear weapons. These have been intended particulariy for the use of Affiliated Organisations but they have also aroused considerable interest in other quarters and many requests for them have been received. The number of copies of each issue circulated has usually been 200. Unfortunately it is difficult to ensure the continuation of this compilation since very little material has been supplied by Affiliated Organisations in spite of repeated requests. Approaches to members of the Nuclear Hazards Committee for help in obtaining material for the Newsletter have also failed to meet with much response".

The Federation and Economic Problems

The five points of the Resolution adopted at the Sixth General Assembly included recommendations that an investigation should be made of the employment of technicians, and that Regional Conferences should be held.

A questionnaire on conditions of employment of technicians was prepared by the Association of Scientific Workers (U. K.) and on 9 June 1961 it was sent to Affiliated Organisations. Replies have been sent in to the W.F.S W. by Professor I. Grivkov, Dr. E. G. Edwards and two colleagues in Australia The Association in Britain, which is collecting and studying the replies, has received about twenty altogether and is analysing their contents.

It should be noted here that the Federation ought to pay more attention to economic problems, since the majority of the Affiliated Organisations are in effect of trade unions. In particular, it was not possible, through lack of time, even to discuss these problems at the 21st and 22nd Meetings of the Executive Council.

Publications of the Federation

A separate report will be prepared by the Central Editor. We should however note the appearance of "Science and Health" and emphasise the improvement achieved in the content and distribution of *Scientific World*. The comment made by the Treasurer in his report regarding publications is, in its brevity, highly encouraging.

Finally, we can never repeat often enough our gratitude to the Regional Centre in Prague for the considerable responsibility it assumes for the printing of our publications. We must now add our thanks to our Affiliated Organisations in Rumania and Cuba, who have now undertaken the production of the French and Spanish editions respectively of *Scientific World*, as well as China for the rapid appearance of their edition.

The W.F.S.W. and International Scientific Co-operation

Representations within the International Scientific Unions

A circular was sent to Affiliated Organisations in order to make clear the conditions under which the Chinese scientists are wrongly deprived of their rightful representation.

International Governmental Organisations

(a) U. N. O.

On various occasions the President and the Secretary General have sent letters or resolutions to the U. N. O. These documents have been regularly acknowledged and have been brought to the attention of the General Assembly. This was the case, in particular, when the Resolutions adopted at the 21st Executive Council were sent.

Further, the Secretary General enquired about the possibility of taking part in the forthcoming "Conference on the Applicctions of Science and Technology for the Benefit of the less developed Areas", but it was made clear that this conference is reserved exclusively for the specialised agencies of U.N.O.

(b) International Atomic Energy Agency

All possible steps have been taken and documents supplied in support of our request for consultative status. The consideration of this request is periodically postponed by the Board of Governors.

(c) UNESCO

Relations of our Federation with this specialised agency of the United Nations have shown important progress.

In response to the joint invitation from the organisers of the Symposium the Director General has appointed a representative from UNESCO, Professor A. V. Baez.

The Director General has informed the Secretary General that he has proposed to his Executive Board that the Federation be classified in the category of relations called "information and consultation" (category B.). The decision has been postponed to the meeting in May 1962. A complete set of documents was sent to several members of the Executive Board.

Finally, the Director Geneaal on 13 March 1962 invited the W.F.S.W. to send an observer to the meeting of the Special

Committee of Experts which will meet from 25 June to 7 July 1962 to draw up a draft Recommendation on Technical Education.

(d) International Labour Office

Our organisations were informed of a Questionnaire on the exchange of trainees ('stagiaires'). Quite recently, as a result of this activity, a request for information has reached us from India.

The Federation was also registered as a participant in the Congress in Paris organised jointly by the I. L. O. and the International Information Centre on Occupational Safety and Health.

International Non-Governmental Organisations

(a) The "Pugwash" Committee

As the article by Professor E. H. S. Burhop in *Scientific World* (Vol. 3, 1961) clearly showed, the W. F. S. W. has been closely associated through several of its leading members with the birth and development of this Committee, whose aims and perspectives are very near to its own. On many occasions, we have also published, in *Scientific World* or separately, the texts adopted during "Pugwash" meetings. The result is that in several circles there is a certain confusion as to the advisability and necessity of the existence of two groupings of scientists working in the same direction and with certain of their most influential members common to both.

It is worth pointing out in this connection that, while the activity of the W. F. S. W. and of "Pugwash" are parallel in many respects, their structure is very different: one links organisations, the other individuals. Their fields of action coincide at certain points. On others—all those of a trade union nature for instance—the W. F. S. W. alone up to the present has raised the problems of scientists themselves on the international level. We must therefore work towards a more or less loosely organised form of co-operation, defining the various fields of activity. It is essential that the General Assembly should pay great attention to this question.

(b) Union of International Associations

Exchange of information.

Mr. Th. Nemec represented the W. F. S. W. at the Congress on "Congress Science"

The W. F. S. W. has been invited to a further Congress of this type which will be held in Rome from 12 to 16 November 1962. The Bureau will have to decide on this.

(c) International Medical Association for the Study of Living Conditions and Health

The W. F. S. W. was officially represented by our Czechoslovak colleagues at the Conference held at Saint Vincent (Valle d' Aosta) from 29 September to 1 October 1961. Several members of the W. F. S. W. also provided interesting suggestions for the agenda of this Conference, which was a great success. It is interesting to see that the final appeal of this Conference declares :

> "the most dangerous (factor) is the threat of a third world war and continuing atomic experiments because they threaten the whole of humanity."

(d) Japan Council Against A and H Bombs

The W. F. S. W. attempts each year to be present at the great international domonstrations organised in August for the anniversaries of Hiroshima and Nagasaki.

In 1960 Professor H. Tuge, and in 1961 Professor Chou Pei-yuan represented our Federation.

(e) International Federation of Teachers' Unions (F.I.S.E.)

The W. F. S. W. was represented by Mr. Th. Nemec at the Conference at Conakry (July 1960.)

(f) International Association of Democratic Lawyers

Professor G. Nadjakov represented the W. F S. W. at the VIIth Congress of this Association (Sofia, 10-14 October 1960).

(g) Franco-African Cultural Exchange

The W. F. S. W. was invited to send an Observer to a group discussion which was due to be held in Paris in March 1962 on this subject. The U. T. S. had agreed to send a delegate who was to be accompanied by a colleague from a non-affiliated organisation. However the French Government banned this discussion.

(h) International House of Scientists

The generous initiative of the Union of Scientific Workers of Bulgaria is making progress and a large number of Affiliated Organisations have already made known the contributions which they intend to make.

(i) Others

Finally let us recall the steps taken with regard to Brazilian Centre for Physical Research and the catastrophe in Chile.

The W. F. S. W. and National Organisations

A. Affiliated Organisations

(a) We should mention first the telegrams and messages of congratulations which were sent to our Affiliated Organisations in the U. S. S. R. and the U. S. A. on the occasions of the space flights of Gagarin, Titov and Glenn.

(b) The practice of "fraternal delegates" attending Congresses or Councils of Associations, which provides opportunities for friendly exchanges, is not yet very widespread. However, we may mention that at the Annual Councils of the Association of Scientific Workers (U. K.) the W. F. S. W. was represented in 1960 by the Secretary General and in 1961 by Madame Mathieu-Faraggi, Assistant Secretary of the U. T. S. In 1962 an Italian Corresponding Member will represent the W. F. S. W. at this Council.

In addition, the Association in Britrin has exchanged delegations with the Educational and Scientific Workers' Union of the U. S. S. R. and in 1960 sent a delegation to the German Democratic Republic.

Our President represented the W. F. S. W. at a Conference on "Science and Education" held in London on 11 March 1961.

At the 1961 Congress of the Union of Scientific Workers (U. T. S.) (France) the Secretary General represented the Federation and it is planned that an Italian colleague will be the representative in 1962.

On 4 April 1962 the Secretary General sent a message on the occasion of the Congress of the Education and Scientific Workers' Union of the U. S. S. R. .

(c) Denmark

Our Affiliated Organisation has been reorganised, its membership is increased and our Vice-President, Dr. G. Noregard, has been elected President.

Within the Executive Council of the W. F. S. W., Dr. A Rasch has been replaced by Dr. Knud Vejlby.

(d) Japan

The Association of Democratic Scientists of Japan celebrated its fifteenth anniversary in 1961. The President and the Secretary General sent messages of greeting.

(e) Viet-Nam

Foreign intervention, primarily from the U. S. A., in South Viet-Nam gave rise to great anxiety and the Vice-President of our Affiliated Organisation drew the attention of the Federation to this on 30 May 1961.

The Secretary General replied on 5 June 1961 that the letter sent to U. N. O. which was of a general character, was concerned with this type of threat.

(f) Czechoslovakia

Apart from the activity of the Prague Regional Centre, which will appear in a special report, we should recall the messages sent :—

(a) on the occasion of the tenth anniversary of the Biological Institute of the Academy of Sciences;

(b) on the occasion of the IInd Congress of the Federation of Educational and Cultural Workers;

(c) to the Academy of Sciences to associate the W. F. S. W. with their country's loss on the death of the great humanist, Zdenek Nejedly, President of that Academy.

B. Countries where there is no organisation affiliated to the W. F. S. W.

(a) Netherlands

The Secretary General went to Amsterdam to meet some of the leaders of the organisation V. W. O. Any decision as to a re-affiliation has been postponed to a later date because of the problem of assessing the respective roles of the W. F. S. W. and the "Pugwash" movement. The journal of the V. W. O. has published reports of the Sixth General Assembly and information on the Moscow Symposium.

(b) Portugal

A co-operative association for scientific activity "Dialogo" was created in 1961. Its aim is defined in its constitution as "the development of scientific activity both by working for the planning of research and by establishing relations with individuals and corporate bodies in Portugal, abroad and internationally."

(c) Sweden

A new organisation, "Sveriges Akademikers" has recently been created At the request of the Secretary General of the Dutch organisation, a complete set of documents on the W. F. S. W. has been sent.

(d) Cyprus

In response to a request, full information on the W. F. S. W. has been sent to an organisation created recently in Nicosia.

(e) Pakistan

Exchange of information with the new organisation, "Association of Scientists and Scientific Professions", created in 1958.

(f) Canada

Documentation on nuclear hazards provided for "La Voix des Femmes" in Quebec.

(g) Ghana

Exchange of publications and information with the central Trades Union Congress and with the Science Association of Ghana. It is possible that a representative from the latter will attend the Symposium.

(h) Mexico

Exchange of publications with the Trade Union of Educational Workers and with the Mexican Academy of Education which invited the W. F. S. W. to be represented at a large conference on educational reform on 21 March 1962.

(i) Indonesia

An organisation has been created recently which is studying the possibility of affiliating to the W. F. S. W.

Extension of the Federation

(A) New Affiliations

At the 21st Meeting of the Executive Council, the Association of Scientific Workers of the Centre of Cuba was admitted to membership of the Federation.

In addition, the Executive Council was consulted by correspondence and also admitted.

The Association for the Diffusion of Science and Technology of the Democratic Republic of Viet-Nam and The Union of Scientific Workers (France). These three admissions will be submitted to the General Assembly for ratification.

A new organisation of scientific workers has just been set up in Cuba. The Executive Council and then the General Assembly will also have to reach a decision on the affiliation of this body.

It is quite clear that this record of new affiliations in three years is too small. At the request of the Bureau the Secretary General sent out a circular on 26 April 1961 to all Affiliated Organisations asking them for a report on their activities related to the extension of the W. F. S. W. Only one reply, from Albania, has been received to date.

It is undeniable that if the structure, the aims and the activity of the Federation were better known and better understood, further organisations of scientific workers would come to join us or would be set up in order to do so. Among the actions that may be envisaged, are :

(a) the personal efforts of all members of the Federation (correspondence, travel, attendance at conferences etc.)

(b) wider distribution of our publications;

(c) tours of visits and meetings by officers of the Federation. This last method, without doubt the most effective, implies financial resources which we lack completely.

(B) Corresponding Members

There has been distinct progress in the nomination of Corresponding Members.

While at the time of the 21st Executive Council they were 23 in number and at the time of the 22nd Executive Council they were 32, at the opening of the Seventh General Assembly we shall have 46 Corresponding Members belonging to 11 different countries : Africa—1 country; North America—1 country; South America—4 countries; Asia—1 country; Europe—3 countries; Oceania—1 country.

They ara distributed as follows :

Argentine (8)

M. Bunge
A. Levialdi
A. Monteiro
I. Novizki
O. Nunez
E. H. Rapoport
M. Sadosky
M. Schoijet

Australia (6)

W. N. Christiansen
J. W. Legge
R. E. B. Makinson
C. B. O. Mohr
R. L. Oliver
S. E. Wright

Brazil (2)

J. de Castro
H. Moussatche

Canada (1)

Cyrus Eaton

Ceylon (1)

B. A. Baptist

Finland (1)

G. von Bonsdorff

Italy (20)

M. Aloisi
A. Buzatti-Traverso
L. Chersovani
M. Cini
G. Cortini
D. Demarco
(E. Boeri, deceased)
A. Donini
R. Fieschi
P. Fortunati
C. Franzinetti
S. Giannini
A. Gozzini
L. Lombardo-Radice
M. Maestro
G. Montalenti
C. Mussa
G. Occhialini
A. Pesenti
C. Rossi
A. Vescia

Mali (1)

A. Hampate-Ba

Peru (3)

C. E. Cuadros y Villena
A. Mendoza Diez
C. Nunez Anavitarte

Portugal (2)

J. Seabra-Dinis
G. Teixeira

Uruguay (1)

F. Cernuschi

We should draw attention particulary to the large number of Italian Corresponding Members. A first meeting between them was held in Florence in 1961 with the assistance of Mr. Pringle. Another meeting is planned, and the translation of our Constitution and Charter into Italian is under way.

Also, Professor C. Franzinetti agreed to be a member of the Organising Committee for the Symposium and he has given great help in its preparation.

Taking into account that the Federation has Affiliated Organisations in 21 countries; we have therefore organic links with 32 countries altogether in one way or another, but very much remains to be done with regard to a large number of countries.

The Bureau and the Executive Council have discussed on several occasions the recruitment of Corresponding Members and their position within the Federation.

The proposals for amending the Constitution which were worked out as a result of these discussions are based on the idea that Corresponding Membership should represent a transitory, temporary form of co-operation between the W. F. S. W. and the scientists of any country, the final aim being the establishment of an Affiliated Organisation.

The Preparation for the Symposium On Higher Scientific and Technogical Education

(a) At the Thirteenth Meeting of the Bureau, held in Prague on 26 and 27 March 1960, it was decided in principle, following the wish of the 6th General Assembly, to organise in 1961 an international symposium to Mark the 400th anniversary of the birth of Francis Bacon.

A Sub-Committee composed of Professor J. D. Bernal, Dr. E. G. Edwards, Dr. W. A. Wooster, Dr. F. Netter and Mr. Th. Nemec proceeded to a preliminary consideration of the event and their conclusions were sent for information to all Affiliated Organisations and to Corresponding Members. Following comments received and after discussion, the Executive Council decided at its meeting in Budapest (23-25 September 1960) that the Symposium planned for 1961 could only be held in 1962, at the same time as the General Assembly, and that it should deal with certain aspects of higher education.

In January 1961, Preparatory Sub-Committee met in Zurich.

On March 2, 1961, Professor Petrowsky, Rector of the University of Moscow, Professor Lazarev, Director of the Bauman Institute of Moscow and Professor I. Grivkov expressed their wish that the Symposium should be held in Moscow and they offered to organise it jointly with the W. F. S. W.

This step was warmly welcomed and since then preparatory work has been actively proceeding.

Meetings have been held on 24 and 25 June in Prague, and 13 and 14 September 1961 in Geneva, and on 13, 14 and 15 January 1962 in Moscow.

Unfortunately, for financial reasons, it has not been and will not be possible to convene the large Organising Committee which was appointed and it is a Sub-Committee of four (S. M. Lisichkin, E. G. Edwards, Th. Nemec and the Secretary General) which has assumed responsibility for the preparations, the central organisation being in the hands of Professor S. M. Lisichkin assisted by Mr. Th. Nemec.

Finally let us re-iterate that the Symposium is being convened by the :

—Lomonosov University (Moscow)
—Bauman Technological Institute (Moscow)
—Lenin Pedagogical Institute (Moscow)
—World Federation of Scientific Workers.

The spirit in which this Symposium is conceived has been set out in two articles which have appeared in Scientific World (VI, No. 1, 1962, by S. M. Lisichkin—VI, No. 2, 1962, by F. Netter).

(b) As much as the actual Symposium proceedings, the preparation for it in individual countries has very great value. A recommendation was made that National Committees should be created and National or Regional Preparatory Conferences held on as wide a scale as possible.

National Committees have been set up and have met, notably in Czechoslovakia, Great Britain, India, Poland, the U. S. S. R. and the German Democratic Republic.

In addition, and this is the most important, successful conferences have already been held :

in July 1961, Cambridge (U. K.), on the initiative of the Association of Scientific Workers (U. K.), a Regional Conference on the trainig of technicians in Western Europe;

in September 1961, in Krakow (Poland), an international conference of socialist countries.

The Union of scientific Workers (Poland) has planned a one-day conference on Scientific Research during the first half of 1962.

Reports of the work of these Conferences have appeared in *Scientific World* and other articles are planned.

General Remarks

(a) To anyone associated at all closely with preparing or carrying out any aspect of Federation activity it is at once clear that one of the limiting factors—not the only one of course—is financial. A superficial examination of the bedget of the W. F. S. W. could give the impression that the expenditure is out of proportion to the results obtained. Such a judgment would not take into account the intrinsic costs imposed by the world-wide character of our organisation. In fact, meetings of leading bodies have not been able to be held and many individual journeys have not even been considered even though they would have made possible either more effective links or an expansion of the Federation.

The Office in Paris is functioning in conditions which are absolutely absurd considering the importance of the W. F. S. W., the amount of correspondence, the number of visits etc.

It would be desirable for the General Assembly to decide to appoint a special Commission to examine problems of organisation and finance. The experience of the "group of four" in preparing the Symposium has shown the efficiency and relatively small cost of restricted meetings. It might be considered advisable to empower the Secretary General, with the agreement of the President, to convene restricted meetings to study current problems between meetings of the Bureau or the Executive Council. Moreover, these working commissions could not in any case be a substitute for the Bureau or Executive Council whose powers are laid down in the Constitution.

(b) The past three years have been characterised by a growth of international tension, by threats of war, by a sharpening of the arms race. It is all the more important and encouraging to realise that our Federation has pursued its activity, maintained its unity and modestly increased the number of scientists whom it links together. It is concern to safeguard this unity without making the activity ineffectual which has been the aim of discussions on the application of Article 26 of the Constitution and the proposed amendment to this Article.

We should find in these facts further proof of the need for the existence of our Federation, a body which is unique of its type in the variety of organisations affiliated to it and in the range of problems which it tackles,

This should also stimulate us to develop our activity in a more thorough going fashion. We are helped more and more in this direction by our publications, and particularly by *Scientific World.* Yet we must seek for ways of associating more closely than in the past in the life of the Federation all our member organisations all our Corresponding Members. We must also find forms of activity which will interest a wider public (public campaigns, public enquiries, series of conferences, programmes for radio and television films etc.).

It is quite legitimate to think that the Symposium on "Higher Scientific and Technological Education" and the Seventh General Assembly will mark an important stage towards a world Federation of Scientific Workers ever more active and ever stronger.

P. Biquard
Secretary General

8. Lektion

Dear friends !

There are three personal pronours, corresponding to the three genders : The masculine "er", the neuter "es" and the feminine "Sie." Er und sie must also be used for inanimate objects.

Walter : Hier habe ich ein Kursbuch. Ich lese auf Seite 312 den Fahrplan.

Köln—Koblenz—Mainz—Frankfurt

Zug—Nr.		1284	E 722	D 514
Köln	ab	5.14	8.58	9.44
	an	6.01	9.31	10.09
Bonn	ab	6.06	9.32	10.11
	an	7.47	10.32	11.08
Koblenz	ab	8.21	11.02	11.13
	an	11.10	12.29	12.53
Mainz	ab	11.50		12.55
Frankfurt	an	12.47		13.32

Walter : Ich finde drei Züge; einen Personenzug, einen Eilzug und einen Schnellzug. Der Personenzug fährt um 5.14 Uhr von Köln ab und kommt um 12.47 Uhr in Frankfurt an. Prem, wie lange fährt der Personenzug ?

Prem : Er fährt in sieben Stunden und dreiund dreissig Minuten nach Frankfurt.

Krishna : Hat der Zug Aufenthalt ?

Walter : Ja, er hat in Bonn 5 Minuten Aufenthalt, in Koblenz 34 Minuten und in Mainz 40 Minuten Aufenthalt.

Prem : Wann fährt der Eilzug von Köln ab ?

Krishna : Der Eilzug fährt um 8.58 Uhr von Köln ab, aber er fährt nicht nach Frankfurt, sondern nur nach Mainz.

Walter: Der Schnellzug fährt um 9.44 Uhr von Köln ab und kommt um 13.32 Uhr in Frankfurt an. Die Fahrt dauert also nur 3 Stunden und 48 Minuten.

Kursbuch	the time table
lesen	to read
die Seite/n	the page
an . .—ab	arrival . .—departure
finden	to find
der Zug/die Züge	the train
der Personenzug	the passenger train
der Eilzug	the Express train
der Schnellzug	the mail train
abfahren (fährt ab)	to leave the station
ankommen (kommt an)	to arrive at the destination
fahren	to travel by train, to drive a car to ride a bus or cycle
Aufenthalt	a stop on the way
wann	when
nach	to
also	in fact
halten	to halt/to stop

Travelling can be very enjoyable. Without a ticket, however, even the best time-table will be of no avail. Walter tells his friends: "Herr Breuer ist mein Freund. Herr Breuer nimmt immer den Schnellzug. Die Fahrkarte kostet 24,— DM. Herr Breuer steigt ein und geht in ein Abteil. Dort ist ein Platz frei. Viele Leute fahren nach Frankfurt. Here Breuer kauft eine Zeitung und eine Illustrierte und liest. Der Zug fährt über Bonn, Koblenz und Mainz. Herr Breuer nimmt seinen Koffer und seine Tasche und verlässt den Bahnhof."

nehmen/nimmt	to take/takes
die Fahrkarte/n	the ticket
einsteigen (steigt ein)	to board (a train/a bus)
das Abteil/e	the compartment
der Platz/Plätze	the seat/the place
frei	vacant

die Leute	people
die Zeitung/en	the newspaper
die Illustrierte/n	the illustrated magazine
über (Bonn)	via (Bonn)
der Koffer	the suitcase
die Tasche/n	the bag
verlassen/verlässt	to leave/leaves
der Bahnhof	the station
das Taxi	the taxi
wohnen	to reside/to live/to stay

9. Lektion

Dear friends !

As we have already discussed, any part of a sentence in German may stand at the beginning; the verb, however, always comes second in the sentence. If the sentence does not begin with the sebject the latter is placed immediately after the verb.

The inversion of the parts of a sentence does not change the meaning in any way, the only effect of the inversion being to lend special emphasis to that part of the sentence which is placed in front.

The demonstrative pronoun "das"

The demonstrative pronoun "das" is not declinable. It should on no account be confused with the article "das". The demonstrative pronoun "das" is always an independent unit in the sentence, whereas the article "das" is always attached to its noun.

Besides the figures, which we have learnt already, we must know the days and months, as they are equally important. Should I want to meet a friend and fix a date I shall have to tell him on what day I would like to see him. And now we shall follow the conversation of our three friends :

Walter : Ein Tag hat 24 Stunden. Die Tageszeiten heissen : der Morgen, der Vormittag, der Mittag, der Nachmittag, der Abend and die Nacht.

Krishna : Wieviele Tage hat eine Woche ?

Walter: Sieben Tage hat eine Woche. Montag, Dienstag, Mittwoch, Donnerstag, Freitag, Sonnabend, Sonntag. In West-und Süddeutschland heisst der Sonnabend auch Samstag.

Prem: Wieviele Wochen hat ein Monat ?

Walter Vier Wochen hat ein Monat; ein Jahr hat zwölf Monate.

Krishna: Wie heissen die Monate ?

Walter: Die Monate heissen : Januar, Februar, März, April, Mai, Juni, Juli, August, September, Oktober, November, Dezember.

Prem: Wieviele Tage hat ein Jahr ?

Walter: Ein Jahr hat 365 Tage. Manchmal hat das Jahr auch 366 Tage, es heisst dann Schaltjahr ! Ein Jahr hat auch vier Jahreszeiten. Sie heissen : der Frühling, der Sommer, der Herbst und der Winter.

Krishna: Gibt es auch Feiertage in Deutschland ?

Walter: Ja, es gibt viele Feiertage in Deutchland. Zum Beispiel : Neujahr, Ostern, Pfingsten, Weihnachten

die Tageszeiten	times of the day		
heissen	are called, are named, are known as		
der Morgen	morning		
der Mittag	mid-day (noon)	Mai	May
der Nachmittag	afternoon	Juni	June
der Abend	evening	Juli	July
die Nacht	night	August	August
wieviele	how many	September	September
die Woche	week	Oktober	October
Montag	Monday	November	November
Dienstag	Tuesday	Dezember	December
Mittwoch	Wednesday	manchmal	sometimes
Donnerstag	Thursday	das Schaltjahr	leap year
Freitag	Friday	die Jahreszeiten	seasons of the year
Sannabend/		der Frühling	Spring
Samstag	Saturday	der Sommer	Summer
Sonntag	Sundy	der Herbst	Autumn
der Monat	month	der Winter	Winter
ungefahr	approximately	Feiertage	official holidays
das Jahr	year	zum	for instance
Januar	January	Neujahr	New Year
Februar	February	Ostern	Easter
März	March	Pfingsten	Whitsun
April	April	Weihnachten	Christmas

(Translations of Lessons 5, 6 & 7)

Lesson 5 (above infinitive)

I go to the school. Walter & I work; We work together. Prem asks : "Do you (Dost thou) also learn German ?" Prem and Krishna learn German. I ask "Do you work much" ? The teacher says "you learn fast".

Walter dictates the sentence now :

Asia is big but Europe is small. Prem & Krishna write the sentence. Prem does not understand one word. He asks Walter.

Prem : What is the meaning of the word 'Klein' ? I do not understand that word.

Walter clarifies the word. He writes the word and an example on the blackboard. "The child is small."

Prem and Krishna learn many words and form sentences. But, yet they make many mistakes. Walter corrects the mistakes. The lesson (instructions) lasts an hour. Then Walter says, "The instruction is over. Good bye (see you again)".

Lesson 6

Walter : We have many fingers

Krishna : We count the fingers

Walter : One, two, three, four, five, six, seven, eight, nine, ten.

Prem : We have ten fingers.

Krishna has much money. He counts the money. He has coins and bank notes. First he counts the coins—Eleven, twelve, thirteen, fourteen. fifteen, sixteen, seventeen, eighteen, nineteen and twenty.

Prem : How much money have you now ?

Krishna : I have twenty rupees now.

Walter : Now you count the notes.

Krishna : Thirty, forty, fifty, sixty, seventy, eighty, ninety, hundred, hundred and ten, hundred and twenty.

Prem : You have a hundred and twenty rupees. Krishna has yet (still) small change too but these are only Naye Paise; the naye paise he is not counting.

Prem : How many Marks are (make) a Rupee.

Walter : A Mark is a rupee and twelve naye paise. Now we calculate. Prem has to buy a fountain pen, a book, two copy-books, two pencils and a stationery paper. The fountain pen is costly. It costs 13.50 Marks. The note books are cheap. One note book costs 0.25 Mark.

(DM means German Mark i. e. Deutsch Mark)

The book costs 7.20 Marks. One pencil costs 0.33 Mark.

The stationery paper costs 1.80 Marks. How much, count Prem ?

Krishna : Prem counts 23.66 Marks.

Lecture 7

Walter : The day has twenty-four hours, an hour has sixty minutes, and a minute has sixty seconds. I have a watch. Prem, have you (in singular) also a watch ?

Prem : Yes, I have a watch.

Is it eight O'clock now ?

Mr. Muller is coming at nine O'clock.

Walter : We have an hour's time yet. The work begins at nine O'clock.

Krishna : I have a lesson (class) today. It lasts for 3 hours, from nine to twelve O'clock. From two to three O'clock I (am to) do home task.

ANNOUNCEMENT

COTTON LINTERS UTILIZATION

The Regional Research Laboratory, (Council of Scientific and Industrial Research), Hyderabad, will be holding a 'RESEARCH AND INDUSTRY MEET' on 6th and 7th SEPTEMBER, 1962, to discuss the various aspects of the effective utilization of indigenous cotton linters and their upgrading. This 'RESEARCH AND INDUSTRY MEET' will provide a forum for a free exchange of views on the subject between research scientists, technologists and producers and consumers of cotton linters. Further details may be had from the Director, Regional Research Laboratory, Hyderabad—9.

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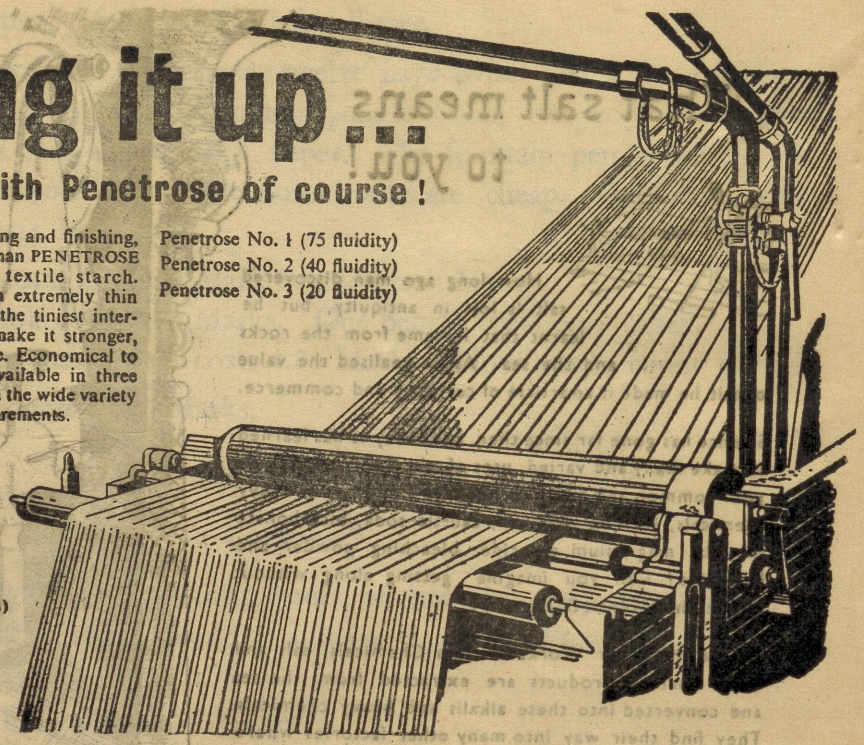

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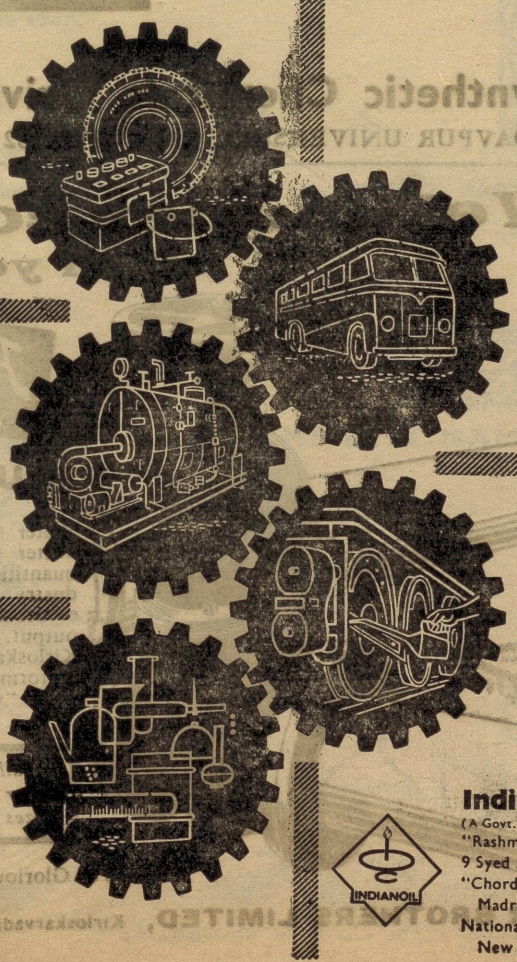

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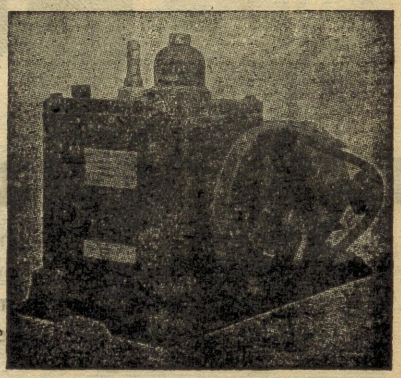

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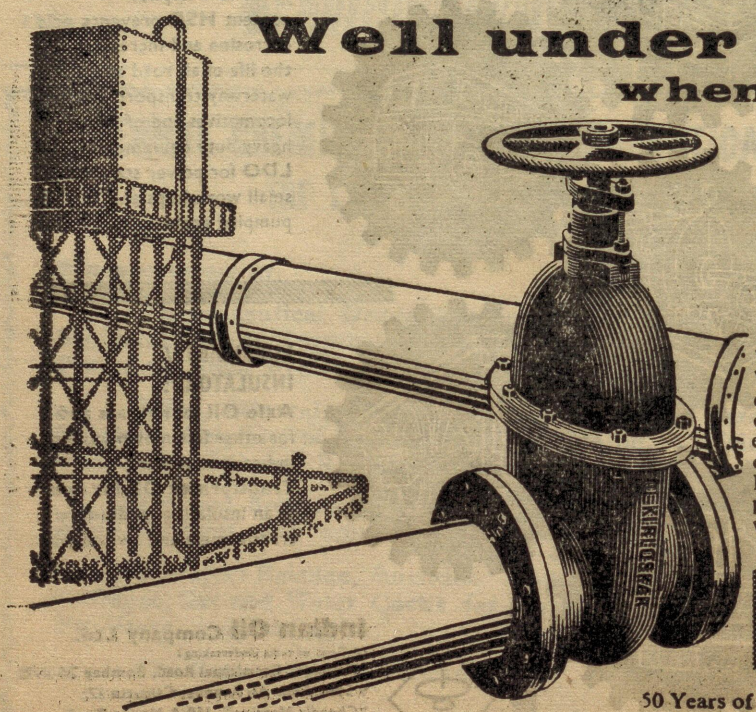

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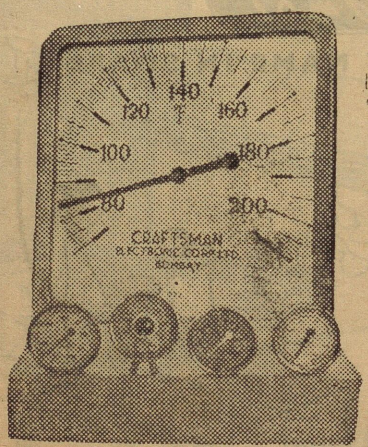

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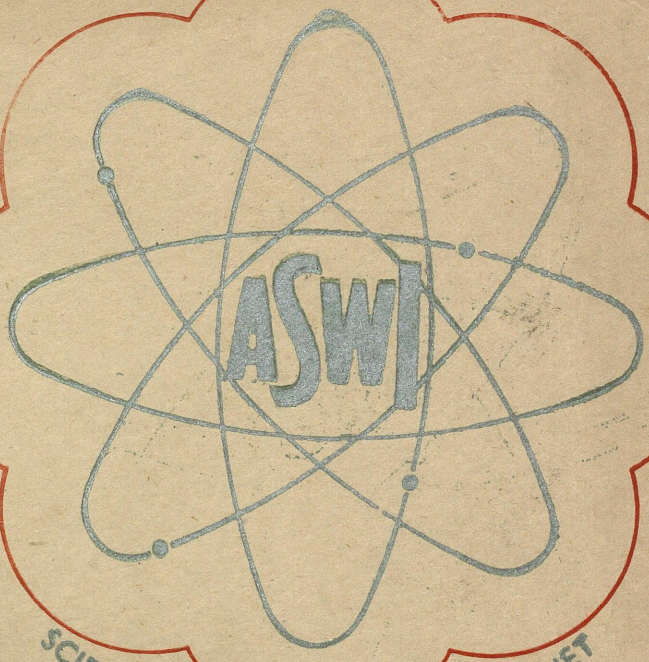

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(Founder-President : Shri Jawaharlal Nehru)

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KANPUR

Editorial

Learning of science culminates in development of an attitude towards life—its index lies in 'being' and not only in 'having'. Only fostering of such an outlook can carve out a scientific individuality. The industrial revolution that our country is entrenched in at present will be incomplete without scientific and technical personnel with a scientific bias in their general life. Taking up science merely from the point of view of economic stability and social security will not get the best of a person in his field of work. Equally true is the fact that ignoring the economic and social factors will not attract the top talent towards scientific career. It is in this context that ASWI emphasises the necessity of improvement of financial and social status of scientist/technologist on one side and the importance of changing general atmosphere engulfing the education and service of scientist or a technologist on the other. The factors that mould a young student's behaviour and let him develop an individuality that will awake a true scientist in him at early periods of education have been enumerated in the past issues. The important aspects that have to be given due weightage during training of a specialised and advanced nature are being briefly dealt in this issue and the next.

Technical education as a general term may be defined as instruction in the sciences and skills required for the practice of trades and professions especially involving use of machinery or scientific equipment. In the language of experts in this sphere, sometimes a distinction is made between technological education and technical education. The former is taken to mean attainment of higher level at which advanced knowledge of theory is important and the latter is directed primarily at the acquirement of skill in techniques. Though there is considerable variation in the entrance requirements of technical degree—graduating colleges in different countries and even in different institutions in the same country, in general, in foreign countries a high school education is considered to be sufficient. Aptitude tests in many countries play a prominent role in selecting the personnel for study in institutes of higher technical training. Unfortunately, such a test which should form a bed rock in our country to select candidates for admission in technological institutes is given the least importance—it is actually given little place. A selection of personnel with no aptitude towards scientific/technical fields and guided solely by future prospects of financial, social and employment considerations willl never yield the technical staff necessary for an under-developed country like India to march ahead industrially. A properly orientated education system at specialised stage may equip the student thoroughly but can not by itself create the urge of becoming a scientist of a technologist in the true sense of the term.

That this is a very important step and we in India cannot afford to lose it can be well gauged by the results. It is not a rare sight that a scientist or an engineer prefers a

cushioned chair to an uncomfortable laboratory or a factory. Even while working in a laboratory, or a factory he always looks after a job which puts him in the position of a table worker rather than a bench worker. Most of the time of talented and highly trained personnel is taken up by administrative work and in many cases even when the scientist/technologist protests against this type of paper work, it is not very hard to find out that in the depth of his mind he prefers it to the hard and the more responsible work on a machine.

It is a well known fact that the shortage of technical and vocational education in the developing countries is acute. These countries are faced with the enormous task of closing the ever-widening gap between a slowly changing traditional way of life and a twentieth century technological society dominated by the fact of successive change and consequent need for flexibility. They have come to freedom at a time when the rate of change in knowledge especially in the science is the fastest mankind has ever known.

What type of scientific and technical staff do we then need to catch up with the rest of the world? Is our method of selection and training upto the mark? Are our institutions able to turn out a good number of trained people always cherishing the discomforts of machine and laboratory and despising the comforts and charms of administrative work or do they require a overhaul in their system of selection, education and training? These are important questions and we cannot and should not evade these.

ASSOCIATION OF SCIENTIFIC WORKERS OF INDIA
8/60, Aryanagar, P. B. No. 388, Kanpur

Ref. No. CO/5/CEC/62/ASWI Kanpur, Dated : 11th July, 1962

To ALL MEMBERS OF THE C. E. C.

Subject :—2ND CEC (1962) MEETING—ASWI

Dear Friends,

In consultation with the President, Professor M. S. Thacker, the 2nd (1962) CEC Meeting of the Association of Scientific Workers of India, will be held on Monday the 30th July, 1962 at 5-30 P. M. in the C. S. I. R. Conference Hall, New Delhi.

You are requested to positively attend.

Thanking you,

Yours faithfully,
A. K. Singh
General Secretary (Org.)

Editorial News—D

THE SCIENTIST AND THE MANAGERS

Modern socio-economic structure depends upon management for its continued functioning and expansion. On the other hand the essence of science is the packing up of change and the increase of novelty. Of course, the change as well as novelty are factors whose kinetics is largely governed by local conditions and opportunities, implying both men and materials. Stable growing economics are increasingly aware of the very significant role which science (that includes technology) plays in modern management. An explicit account of the analysis of this aspect of impact of science on society has been surveyed by M. ZVEGINTZOV (IMPACT, Vol. XI (1961), No. 1, UNESCO PUBLICATIONS).

The growth curve of an economy or enterprise has the usual characteristics of a biological growth curve. The initial progress is rapid, the curve then attains limiting values, becoming almost flat, to indicate stability, stagnation, and ultimately perhaps decline. Effective growth at this point, as all progressive managements realise, depends to a large extent on departure from the norms of former management, in terms of management policies, processes, execution and so on. This step may be termed *'break-through'*. Often *'break-through'* implies advance in kind rather than in degree. The creation of these break-points depends on human element, and the correct decisions taken in formulating these departures. This is where science and technology come in the modern management practice. The traditional concept of management is that of decisions on the basis of 'reference' information, rather constant cross-reference. A scientist by his training and aptitude is the person who can give rigorous treatment to 'reference data' and can arrive at correct logical conclusions. Often the higher ups in the management have an aversion to the idea of, no doubt, time consuming process of information-processing. Decisions tend to be more of inspiration rather than a logical outcome of study of trends and factors.

On the other hand a scientist or technologist to be of use to the management, must be more catholic in his approach, whether in terms of social effects like unemployment, cultural-impacts of innovation or purely mundane factors like taxations, profits etc. Experience which has largely been accumulated during the Second War and of late in technologically more advanced countries like UK, USSR show that managerial efficiency can be happily united with scientific methodology. To a great extent, the success of such conjugal union depends upon specialised managerial training which must blend in one person both the qualities of a first rate manager and a scientist, at least a respect and tolerance towards the latter.

Not all the aspects of this exhaustive study can be touched here, but those applicable to newly industrialised countries or countries

in the process of industrilisation like India and others loosely categorised as 'under-developed' need some urgent attention. The political structure as well as its socio-cultural back-ground are of primary importance in the industrialisation of a country. A very powerful argument has been put forward by the author ZVEGINTZOV that the ideas and structure of western managerial practice cannot be transplanted as such to these 'under-developed' areas. Not only the administrative structure, but social, political econonic and cultural factors play an equally important part. For instance building of a dam may be a necessity to boost up agriculture in a particular area, but the mass upheavals from the site of building, considerations of preservation of antiquities deriving benefits out of it are some of the aspects which an executive has got to keep in mind.

A comparative study of projects in our plans shows that short-sightedness as well as ignorance or non-considerations of local factors have retarded to a great extent the pace of progress which theoretical considerations show, at least in some of the projects.

Recently, the 'Menon-Committee' on management of public enterprises has focussed attention on some aspects of management in the back-ground of Indian conditions. Much advantage would accrue if the impact of science with managerial training is also taken up at the State level. The school of public management as well as managerial training at various levels would do well to imbibe scientific methods in programming as well as community development. A safe principle in accelerated and projected development is that of 'make-do and mend' instead of aiming at immediate results.

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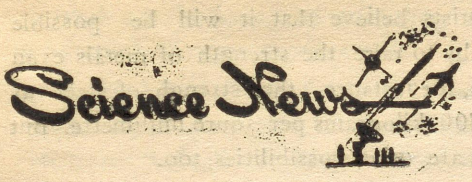

Use of Nuclear Techniques Increasing For Treatment of Cancers

The use of nuclear reactors and atomic particle accelerators to treat various types of cancer is steadily becoming more important in the United States.

The first reactor designed specifically for medical use was built at the Atomic Energy Commissions's Brookhaven National Laboratory near New York City. It became operative March 15, 1959. The relatively new atomic device provides a neutron beam to treat patients with brain tumors. This socalled neutron capture method of therapy uses energy released by the prompt decay of radioisotopes created in the tumor or lesion.

Nonradioactive elements are introduced into the patient's body and become localized in tumor. A beam of neutrons then causes the nonradioactive elements to become radioactive. The prompt decay of these radioisotopes destroys tumor cells.

Only three elements now available have a large enough thermal neutron capture ability and the property of rapid disintegration into energetic particles to make them usable in this form of therapy. Of the three elements—lithium 6, uranium 235 and borno 10—the last has been employed in studies of brain tumors. The application of this neutron therapy has been limited to lesions associated with a brain cancer.

In addition to the work being done at the Brookhaven laboratory, the Massachusetts General Hospital in Boston, Massachusetts, is doing similar work. It plans to start work soon with cancer sufferers, using the medical part of a new reactor installed recently at the nearby Massachusetts Institute of Technology.

Medical use of atomic particle accelerators began 25 years ago when radioactive isotopes became available. Today, the use of electron or positive ion accelerators in biomedical research is widespread, and the use of such accelerators for the treatment of cancer is steadily increasing.

High-energy X-rays and ions created by accelerators are currently employed in therapeutic investigations of known, deep-seated, localized tumors. This techique is being used by physicians and others who are using the Atomic Energy Commission's 70 Mev (70 million electron volt) synchrotron-type accelerator at the University of California School of Medicine in San Francisco.

At the Cancer Research Hospital of the Atomic Energy Commission's Argonne National Laboratory, near Chicago, a recently completed 50 Mev Linear accelerator is fitted with an electron beam scanner. It automatically covers a predetermined skin area of irregular contours. Atomic particles penetrate to any desired deapth up to the full range of their electrons.

The use of accelerators for radiation hypophysectomy (destruction of the pituitary gland) has deeply interested medical researchers, particularly since experimental rats showed a lowered tumor incidence after their pituitary glands were destroyed.

Physicians have long known that destruction of the pituitary gland provides dramatic temporary relief for many cancer patients. Surgical removal of this gland, however, is difficult and dangerous. The gland is now destroyed by the radioactive isotope, yttrium 90.

Five years ago radiation hypophysectomy was performed with an accelerator on patients with advanced cancer of the breast. Since the early experiment, many patients have been treated with the atomic accelerator. Signs indicating complete destruction of the pituitary gland appear generally within three month. To date, the results have been beneficial in nearly 50 percent of the cases treated.

× × ×

Discovering the Secrets of Metal

Will synthetic materials oust metals altogether ?

It is more likely that they will exist side by side with metals, supplementing them. Metal are acquiring new properties. Let us take a look into the past, just a few decades back.

Forty to fifty years ago pig iron had a total strength of 8 to 10 kilograms per squre millimetre. Today the figure is 7 to 8 times greater; approximately the same has happened with other metals.

How have the metallurgists done this ? First of all, by creating new alloys; secondly, by heat treatment, whice gives rise to changes in crystalline structure of materials. Scientists believe that it will be possible thereby to raise the strength of metals even more, for instance, the strengh of steel to 300-400 kilograms per squre millimetre. But there are other possibilities, too.

Some years back Soviet scientists Y. I. Frenkel, and the English physicist, Taylor, came to interesting conclusions independently of each other.

In metals, in their crystalline structure, there are certain imperfections, known as dislocations, when the actual structure of a metal does not correspond to the theoratical ideal. These imperfections account for the low strength of metal.

The conclusions drawn by these scientists were confirmed by theoretical deductions. And then it became possible to see the dislocations with the aid of an electronic microscope, and even to film them.

The dislocations arise when metal is being cast. Then during subsequent treatment—forging, rolling, and drawing—their quantity is increased. When it has a definitely known number of dislocations metal is at its minimal strength. But there are ways and means of cutting down the quantity of dislocations. This is not easy to achieve but the results more than justify the efforts. By working on these lines it will be possible to create materials of unbelievable strength.

The first samples of dislocation free metals have already been obtained by Ivan Oding, Corresponding Member of the Soviet Academy of Sciences. A pillar of pure iron withstood a tensile force of 1,400 kilograms per square millimetre as is the case with our present-day "pure" iron. This is almost fantastic strength.

Today Soviet scientists are endeavouring to work out the industrial technology for the production of super-strong metals.

Reality is out-doing fantasy. It certainly is difficult to distinguish the borderline between the "today" in which we live and the "tomorrow" to which we are speeding.

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New Ideas in Industrial Cooling

A new type of heat exchanger, claimed to be 25 times more efficient than the conventional air-cooled exchanger, has been developed at a laboratory of Britain's Department of Scientific and Industrial Research. The equipment, which uses an air-water froth as the cooling medium, is described as having a performance comparable with that of a water-cooled exchanger.

Air cooling has hitherto had the disadvantage of needing a great deal of space owing to the size of the heat-exchangers required. In the froth-contact heat exchanger develoved at the laboratory, tubes containing the material to be cooled are immersed in an air-water froth created by blowing air through a sieve plate in the bottom of a water tank.

Cooling occurs in two stages : in the first the tubes to be cooled are covered by a thin, frequently renewed film of water to which heat is transferred at a high rate. In the second stage, the film is carried from the tubes into a constantly-moving froth, where, although the rate of heat-transfer is lower, the area over which heat-transfer occurs is very large.

Although the amount of water required is roughly equivalent to that used with cooling towers. the high-powered pumping equipment which forms an important part of the cost of the cooling tower system in not needed.

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Sealant for Mine Safety

A latex sealant has been developed in Britain to seal off areas of coal mines where there is a risk of spontaneous combustion, or where toxic fumes have been detected. It has been approved by the National Coal Board for use in Britain and by the French Coal Authority for use in all French coal mines.

The latex material, which was developed by Dunlop Chemical Products Division in collaboration with the West Midlands Division of the National Coal Board, is sprayed on to sand bag and stone wall stoppings erected underground to seal off smoke and fumes. It is also used to improve pit ventilation efficiency by sealing porous wall and rock faces.

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Research into Animal Virus Diseases

A research officer of the Indian Veterinary Research Institute at Mukteswar, Uttar Pradesh, is now in Britain studying the latest techniques for the production of vaccine to protect cattle against virus diseases. He is Dr. N. S. Dutt, whose one-year stay in Britain has been made possible by the award of a travelling fellowship from the Nuffield Foundation.

Dr. Datt will be spending most of his time between now and next spring at the Research Institute concerned with animal virus diseases at Pirbright, Surrey.

Asia has so far been largely dependent on vaccine prepared from virus collected from artificially infected cattle. This is a very expensive method, and in recent years

the Pirbright institute has studied methods of producing relatively cheaper vaccines from tissue culture. But Dr. Datt said that more was involved than the "know-how" for producing tissue-culture vaccines. It was first necessary to discover the right kinds of vaccine for the types of disease to be controlled.

He explained that cattle in India might be attacked by various kinds of foot-and-mouth diseases, not only by the three main types which affected cattle in Europe, but by a further type—Asia 1—which was recognized in 1950 and which existed all over Asia and in many other areas. There were, moreover, several sub-types of these main varieties. A vaccine which was successful against one type might well be useless against other types.

"It is necessary to determine one's enemy before one can choose the appropriate weapon," Dr. Datt said. That is what he is now doing, and he will be fully occupied in the next few months assisting in the work of surveying the various types of foot-and-mouth disease to be found in India. He will also be observing the other general research work now being undertaken at Pirbright.

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Colder Winters Forececast
(But Hotter Summers, Too !)

Colder winters and hotter, drier summers are forecast for the near future by Pulkovo astronomers studying the Sun.

It has been clear for sometime that the level of solar activity has a major effect on weather conditions.

In the northern hemisphere a pattern of wind circulation is established which brings drought and a fall in the level of the Caspian at the same time as the Arctic ice cover is thinned down. The opposite is also true.

Recent work has revealed that there is a cycle of about 100 year's duration in the Sun's activity as well as well-known 11—year cycle.

This longer variation consists of two periods of high and low activity—one lasting 33 years and the other 66 years.

The last period of low activity ended in 1932, since when the increased solar activity has led to a rise in temperature in the northern hemisphere. The level of the Caspian has fallen in this period.

This spell of high activity will come to an end in 1964-65 and then there will be more cold and snow in winter, while summers should be hotter and drier.

The level of the Caspian will cease to fall and the ice of the Arctic will become thicker.

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More on the Canals on Mars

A conference on the problems of astrogeology that has continued for a few days closed in Leningrad recently. Young astronomer Alexander Suslov made an interesting contribution on the Martian canals.

After many years' research the scientists has established that the so-called canals on Mars—thin and long straight lines of dark colour observed in telescopes—are natural features similar to ravines or creaks that had originated as a result of a prolonged geological development of that in many respects puzzling planet. The dark colour is due to the vegetation growing apparently primarily along the canals.

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Water on Mars

A sensational news has come from Leningrad. Professor Nikolai Kozyrev, the well-known Soviet scientist who has already discovered a volcanic erruption on the Moon claims that there is water in the form of snow and ice on Mars. He has established this fact studying the spectrograms obtained by him during the position of Mars in 1954, 1956, 1961 on the 50 inch reflector at the Crimean Astrophysical Observatory, Kozyrev informed the press of his finding based on the direct observation and experiment.

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Machine Library for Chemists

Prediction of the properties of chemical compounds before they have been made will be possible with aid of a new chemist's information machine, now being built at the Soviet Institute of Scientific and Technical Information.

The machine will also store information on the flood of new compounds—about 50,000 a year—now pouring out from the world's laboratories.

So difficult is it to keep up with this flood of information that it is quicker to make the compound and rediscover its properties than to find the appropriate reference in reports already published !

The new machine will have a much more capacious memory than any built so far, and will retain information fed into it for many years to come.

By using parallel channels, it will be able to tap its memory and find the required information in about a third of the time needed by existing machines.

Principles of universal application are being used in the construction of the machine, so that it can be adopted easily for work in any branch of science or industry.

One use of such machines will be the replacement of existing journals of abstracts.

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'Snow Roads'

A machine which in an hour can lay an efficient mile-long road across the snow has been designed by Arkady Nikolayev, a Gorky inventor.

As it rolls forward, the machine lifts the snow and then tamps it down with a vibrator.

The tamped snow is so compacted that it provides a surface which will take even a heavy truck.

The unit, which looks like a bulldozer is drawn by a tractor. Nikilayev's machine promises important economic effects. Used in the Soviet North, it will bring thousands of trucks into winter use which are at present immobilised by deep snow.

Avkady Nikolayev, a veteran of many polar expeditions has been both to the North Pole and to Antarctica. At present he heads a Gorky laboratory which is concentrating on the mechanisation of heavy work on ice and frozen grounds.

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Bacteria Help Miners

Admixtures of sulphur greatly reduce the value of coal. Coke with high sulphur content for instance, can not be used for smelting. When such grades of coal are used as fuel they contaminate the atmosphere. The removal of unwanted admixtures is taken care of by the dressing mills.

On many occasions acid water has been known to originate in the mines and damage the equipment greatly. Subsequently, research revealed that specific bacteria which live on coal sulphur are largely responsible for the originatiatin of the acid water. "Sulphur-phages" proved also instrumental in the mining of nonferrus metals and of copper in particular.

Articles

ENZYMES—NEW WEAPONS AGAINST DISEASE

One of the major subjects which medical researchers in the United States are studying today is the use of enzymes for the treatment of disease. Some enzymes have already been made available to physicians by American pharmaceutical manufacturers and are proving of great value.

Enzymes are large protein molecules that are present in all living things, from bacteria to plants, animals and human beings. As a result of recent research, it has been found that they play the supreme role in all the processes of life—digestion, growth, muscle contraction, reproduction and nerve conduction, to name but a few.

Acting as catalysts, enzymes produced by the body's cells make possible the combining of molecules into new substances by inducing chemical reactions that could not take place without their being present. Practically all the foods for example, cannot be digested until enzymes work on them and break down complex foods into simpler substances which can be absorbed into the blood stream. If it were not for enzymes, we could gorge ourselves with food, and yet obtain no nourishment whatever from it.

In the process of digestion, as in other life processes, enzymes perform thousands of chemical transformations in a fraction of a second—transformations which in many cases would require many hours of work in a laboratory.

Enzymes do not only break down substances they; also create new types of matter. For example, they take from the blood stream amino acids derived from steak, and use them to build human muscle—quite a different substance. They change sugar into glycogen, which the liver can store to supply energy needs as they arise.

Enzymes are molecules that "play a supreme role" in all of the human body's life processes. Their absence or malfunctioning is now believed to be a prime cause of many illnesses. Production of enzymes for the use of physicians by U. S. pharmaceutical manufacturers is now in the beginning stages and may lead to results of great importance in the treatment of numerous ailments and diseases.

Researchers have determined that there must be several thousand different enzymes in the human body. "Apparently there is a different enzyme for practically every body reaction," says Dr. David E. Green of the Wisconsin Enzyme Institute.

Incredibly small quantities of enzymes are amazingly potent. Pepsin, an enzyme of the stomach, which digests meat, was isolated by a researcher at the Rockefeller Institute for Medical Research. The institute says that one pound (.45 of a kilogram) of pepsin would digest 30 tons of meat in about two hours, and that the same amount of the

enzyme would clot one million gallons (3,800,000 liters) of milk in a few minutes.

Some of the enzymes are oxidants, or fuel burners, which take a minute piece of food and transform it by a series of chemical reactions into one of the most extraordinary substances known to scientists. This is adenosine triphosphate, or ATP for short. ATP is, in effect, a tiny storage battery which releases stored energy to contract muscle fibres. Every time a person's heart beats, his eyelids blink, or he takes a breath ATP provides the energy required.

American pharmaceutical manufacturers are now extracting enzymes from plants, molds, becteria and human blood, and are making them available in convenient forms to physicians.

The Lederle Laboratories are marketing an enzyme which is extremely effective in dissolving blood clots which might cause fatal heart attacks. The Ortho Research Foundation at Raritan, New Jersey, has isolated another enzyme from human blood, which is proving to be a highly effective dissolver of blood clots in leg blood vessels. Clinical work done at New York University and at Washington University in St. Louis, Missouri, indicates that the use of these enzymes has "enormous promise."

Researchers have discovered that a number of different enzymes increase the efficacy of antibiotic drugs used to treat bronchial asthma, pneumonia, and other lung conditions. Another enzyme is now widely used by eye doctors in cataract extraction operations. It simplifies the operation and has already proved of extreme value in hundreds of cases.

A single injection of an enzyme called hyaluronidase is effective in quickly reducing painful swellings in such cases as sprained ankles. As the swelling is reduced, so is the pain. The same enzyme is of value in treating kidney stones, and already has often eliminated the need for surgery to remove them.

Today, many medical research workers are convinced that virtually all diseases are caused primarily by missing or faulty enzymes. They theorize that there is a specific gene to govern production of each enzyme in the body. When the gene is missing or defective, so is the enzyme.

Diabetes, many researchers now think, may be due in part to the lack of enzyme governing the production of insulin in the pancreas. And there is increasing evidence that leukemia and other cancers may be caused by faulty enzyme behaviour.

These discoveries point in an obvious direction. If enzymes are deficient or lacking, it should eventually be possible to substitute synthetic or man-made enzymes. Or, on the other hand, if one group of enzymes is too active, it should be possible to offset their activity with chemical controls.

This reasoning suggests "some extraordinary conclusions," says J. D. Ratcliff, writing in *Today's Health*, published by the American Medical Association. "Cancer cells are just as dependent on enzymes as are healthy cells", he points out. "Once their enzyme requirements are known, a means may be found to curb the ones which permit the cancer cells to thrive. When and if this is accomplished, a cure for cancer will be at hand.

"With the solid accomplishments already achieved, and with such encouraging goals ahead, enzymes appear to represent medicine's brightest hope and the medical research worker's greatest wave of the future."

GEOGRAPHERS IN THE BATTLE AGAINST NATURE

By Academician Innokenti Gerasimov

Director of the Geographical Institute of the USSR Academy of Sciences

One of the most important problems facing Soviet geographers is to maintain the level of the Caspian Sea, which is growing shallower due to the tremendous evaporation of water from its great surface. The fluctuation in the level of the Caspian Sea affects the work of ports, oil fields, and the fishing industry. The evaporation of water from the Caspian Sea can be reduced by some fairly simple hydrotechnical construction, first of all construction of dams to separate the Kara-Bogaz-Gol, Komsomolets and Kochak bays from the sea. This will save 30 to 35 cu. km. of water annually.

A second aspect of the problem is to transfer to the Caspian Sea some of the discharge of Northern rivers. Soon three dams and reservoirs will be built. Some 40,000 million cubic metres of water will flow. This mighty flow of water will reach the dry zones of the trans-Volga country and the semi desert areas around the Caspian Sea, making it possible to irrigate them.

This is an immense job, and earth-removal work alone is estimated at 700 million cubic metres.

Reclaiming Deserts of Central Asia

It is not only around the Caspian Sea that the job of transforming desert or semi-desert areas is to be tackled. The deserts of Central Asia have to be reclaimed as well. In fact the irrigation of Central Asia is a very important problem facing the workers of our institute. At present irrigated land there constitute less than two per cent of total arable land.

All the rivers of Central Asia watering its desert plains flow from high mountains, where they are fed mainly from glaciers, eternal snows and rain, and discharge their waters into the Aral Sea.

We think it will be possible to increase atmospheric precipitations in the mountain regions. A project is currently being considered at the institute under which the discharge will be regulatd through regulation of the melting of glaciers and the erection of big water reservoirs in mountain valleys. In this way the Amu-Darya and Syr-Darya rivers will be used completely for irrigation.

The utilisation of the riches of West Siberia is another major problem facing the institute.

The West Siberian lowland is a huge territory, extremely moist at the centre. The annual excess of water is approximately 135 cu. km. The plan is to direct part of the river discharge to the arid regions of West Siberia and Kazakhstan. Soviet scientists are currently working on a project for turning the flow of Siberian rivers, in particular diverting the Ob and Yenisei to Central Asia. It has been estimated that these two Siberian rivers can supply no less than 300,000 million cu. m. of water annually.

Draining of the West Siberian lowland would create favourable conditions for a large-scale lumber industry in the very centre of the country, in an area with extensive inland waterways.

Controlling snow and frost

Of the many plans of the transformation of nature in our country, the most interesting

in my opinion are those of "reconstructing" East Siberia. These plans are closely linked with the control of eternal frost and surface ice.

The control of the snow layer is also an extensive geographic problem. It is extremely important because the total moisture accumulated in the form of snow comes to about one-half of annual atmospheric precipitation. If you can control the snows, you can control also the discharge of rivers, the reserves of soil and sub-soil moisture and other natural processes of extrme importance to the economy.

There are several ways of controlling the snow layer, some of which are simple and well-known measures such as snow fencing, tree and shrubbery strips, stubbled fields, etc. Among more complicated are the acceleration of thawing by darkening the surface of snow or altering its structure and other properties by physical and chemical methods.

I should also like to mention another immense task, a task of principle, in my view. I am speaking of the artificial liquidation of the Arctic icecap. Put into a nutshell, this problem is as follows: Geographic research of recent years carried out at drifting stations make it possible to assert that the existence of the Arctic icecap is due mainly to the fact that the large expanse of icebound water possesses tremendous reflective power. It has been found that the surface of the earth, even in the extreme North, would be much warmer if it were not for this "mirror" of unmelting ice. Estimates indicate that the average annual temperature in the Arctic, if there were no icecap, would correspond to that of Syktyvkar and Arkhangelsk and would be only four degrees below that of many places in the central area of the European part of the Soviet Union.

If we were able by modern technical means to melt the icecap covering the Arctic Ocean it would probably never form again. This radical transformation of the Arctic would lead to a number of geographic changes, such as the warming of the extreme North and the freeing of seaways from ice. True, this gives rise to other problems. Disruption of the existing general heat and moisture balance would lead to climatic changes in vast areas of Eurasia and North America. Novertheless this big task has to be tackled.

THE IMPROVEMENT OF SCHOOL TEXTBOOKS

School textbooks are becoming more attractive and more varied. Today, most of them not only have more eye-appeal, but their content is likely to hold the interest of young readers to a greater extent then in the past.

Although these changes are little known to the general public, they are undoubtedly important. They are important because a school textbook, used by girls or boys between 7 and 18 years of age, is obviously a fundamental influence in a child's early life and, psychologists argue with some reason, the kind of textbook which a child or older pupil learns from during this formative period of his life can affect not only his whole attitude towards learning, but has a real bearing on his subsequent education, as well as on his character, ideals and career.

It is obvious that, while a dull book is likely to discourage the reader, an attractive book helps to arouse his interest. This applies particularly to textbooks for schools in the emergent countries and in underdeveloped regions.

Last summer, Unesco organized in Geneva a meeting of educational publishers from 22 countries. The object of this meeting which was the first of its kind, was to examine these change and development, to discuss ways of promoting mutual knowledge and understanding between countries and to provide advice and guidance for the further development of activities by Unesco and the International Bureau of Education in this field, particularly in regard to the work to be accomplished in the emergent countries in Africa and Asia.

The revolution taking place in textbook production and composition manifested itself half-heartedly before the second world war and started up again soon after that war, but it is only during the last four or five years that it has really gathered force.

Nowadays, fewer and fewer children learn their lessons from old-fashioned, dull and unatttactive books with plain or conventionally decorated covers, with dismal-looking print that is often too small, and with poor-quality or greyishyellow paper, the pages usually adorned only with uninspiring and badly reproduced photographs and pictures or ugly line sketches. Today, textbooks look better and brighter, their contents are more readable and more in line with modern life.

This improvement is due mainly to greater use of photographs (often in colour), different coloured print for purposes of emphasis, interesting charts and diagrams, folding maps and even colour transparencies. They are not costly, *de luxe* publications, but ordinary textbooks designed for everyday use.

A recent edition of Caesar's *Gallic War*, for example, contains not only a map showing how Gaul was divided at the time of the Roman Conquest, but detailed diagrams of Caesar's battles and campaigns and of the route he followed for the invasion of Britain, as well as photographs of contemporary armour; the book has an attractive cover in four colours.

Not only have the covers and pages been made more attractive, but the text has been modernized. For example, in grammars and other dooks designed for the study of foreign languages, old traditional phrases such as *la plume de ma tante* and lists of classroom objects have been replaced by facts from everyday life, examples of customs and usages in the country concerned, practical and useful

hints on how to ask one's way in the langage studied; in one French book for learning Engligh there are even indications concerning the proper way to make tea. With regard to history textbooks, efforts are being made to present facts more objectively and, it might be said, less chauvinistically than in the past; this latter question was dicussed at length at the meeting of educational publishers.

In some cases, title of textbooks have been altered, presumably in order to render the subject dealt with less forbidding to pupils. An *Arithmetic Primer*, for instance, has become *Playing with Numbers*, while a textbook on geometry has the title so tilted against a coloured background that it could well be mistaken for a book on Cubist art.

In addition to the improvements now being introduced into textbooks, books for teachers are being published as companion volumes to the pupils' textbooks, as well as supplementary work books; and audio-visual aids such as slides and gramophone records are being used in order to stimulate the pupils' interest in the subjects under study.

Durring the Geneva meeting, the International Bureau of Education organized an exhibition of some of these new textbooks with the corresponding audiovisual aids, chosen from its collection of some 20,000 textbooks from 81 countries.

It is not sufficient, however, to publish more interesting and more attractive textbooks; it is also essential to ensure that they will be as resistant as possible to everyday wear and tear; this point was discussed by the publishers at the Geneva meeting, as well as the opposite argument in favour of paperbound textbooks which, although less resistant are cheaper to produce and can therefore be revised more regularly.

According to Dr. Austin McCaffrey, Executive Secretary of the American Textbook Publishers Institute, which represents 150 publishers, interesting research on this subject, begun in the United States of America three years ago, is nearing its conclusion: some 5,000 textbooks on the most varied subjects have been coded and placed in different grades in schools all over the country. Each year, inspectors examine these books to assess the wear and tear they have received. So far, it seems that mathematics books used by intermediate grade pupils between 10 and 13 years of age have received the roughest handling. Books which have suffered the least have been those to do with music, the arts, literature and English.

Further, publishers in the United States have regularly carrird out the following experiments: textbooks are placed in washing machines without water and tumbled about for an hour or so in order to see if they have any weak spots in the binding, covers, paper used for the pages or the ink. This process can also indicate whether any economies can be made through the elimination of certain unnecessarily costly methods of production.

All this research is particularly important for the more elaborate and colourful new textbooks. It must be borne in mind that the preparation and production of one of these books can sometimes entail three years work owing to the careful, long and painstaking collaboration that is necessary between the author or authors, on the one hand, and the teacher-advisers, psychologists (for they also play a part in the compilation of modern textbooks), editor, illustrator, cartographer and printer, on the other hand; and it must

also be remembered that it can cost up to $200,000 to publish a single textbook and up to $ 1 million to publish a graded series of six books, as has been the case in the United States. Obviously, great care must be taken in advance to ensure wide acceptance and high demand for the book. Choosing the illustrations alone is a long job and, according to Mr. Michel Foulon, one of France's best-known textbook publishers, nearly 10,000 photographs in black and white as well as in colour had to be studied before it was possible to make the final selection of the 150 that appear in a 220-page volume forming part of a series or geography books.

The position, of course, is not quite so complicated nor so competitive in countries where textbook publishing is handled by the government, as for example, in the socialist government counties. In the Soviet Union, for instance, Mr. Mikhail Riskin, Director of the Central Government Taxtbook Publishing House, which issues about 250 million copies of textbooks per year and which, in co-operation with 33 other State publishing houses, will produce 110 new textbooks during the next two years, said that he has to publish books in 46 different languages used within the Union of Soviet Socialist Republics. These publications include a complete series of textbooks for the 80 to 100 childern of the Koryaks, a population of less than 1,000 persons living in the Kamchatka Peninsula in the Bering Sea.

One of the primary purposes of the Unesco meeting was to make possible an exchange of views concerning the improvement of the new school textbooks and their ancillaries, but underlying most discussions was the matter of how these textbooks can best further international understanding. There were many polite and general reforences to inaccuracies and distortions of history and geographyin some textbooks, which can often do much to create, aggravate and foster ill-will and antagonism between nations.

In this respect, the topics most frequently brought up were: (a) ways in which Unesco might further the exchange, between countries, of up-to-date and accurate information for authors and publishers of textbooks, chiefly in the field of history, geography and science, in order to promote international understanding and friendship; and (b) ways in which adequate supplies of good, suitable and reasonably-priced textbooks could be made available to the new and developing countries of Africa and Asia and the Arab States.

Unesco is already preparing an international directory of educational publishers; it is also compiling, with the assitance of 140 national centres of educational documentation lists of textbooks widely used in secondary schools. Unesco experts are already advising governments of countries in Africa, Asia, Latin America and the Arab States on textbook production and adaptation. Befor 1962, an African Regional Textbook Centre is to be opened, with Unesco advice and co-operation, in Accra, Ghana. Unesco is also helping—by making available staff, equipment and fellowship—to set up a textbook printing centere at Yaounde in the Cameroons, which should start to operate towards the end of the year. While encouraging textbook improvement, recent efforts have been directed at promoting the Unesco Major Project on Mutual Appreciation of Eastern and Western Cultural Values.

One of the suggestions made at the Geneva meeting was that Unesco should promote the exchange of textbook manuscripts between

publishers in the different countries before publication, and should also promote study tours abroad by textbook writers. These tours could also be organized in the form of exchanges; an experiment of this kind was successfully made last year between Poland and France, for the benefit of geography book writers.

Textbooks have become more attractive; their authors are using ways of capturing and holding the interest and attention of schoolchildren. This changs cannot be ignored by Unesco, whose work should be aimed, in particular, at promoting the implementation of Article 26 of the Universal Declaration of Human Rights: 'Education shall promote understanding, tolerance and friendship among all nations, racial or religious groups, and shall further the activities of the United Nations for the maintenance of peace".

Exploring the Nature and Essence of Life

THE CELL

By Gleb Frank

Corresponding Member of the USSR Academy of Sciences

One of the most exciting problems of present-day natural science is the pursuit of knowledge about the nature and essence of life. The solution of this problem will offer us unprecedented opportunities to transform nature and to arm us in the fight for better health for man. In this article, I shall touch upon only one aspect of this problem—the vital activities of the cell.

The Unknown World

The cell may be considered to be the simplest living system. However, the word "simplest" is basically inaccurate for use in a description of the characteristics of a cell. In a living cell, there are more than 100,000 chemical substances of various natures. But the most important thing is that the cell is not simply a "store-house" of chemical reagents. These substances are in constant motion, take part in hundreds or thousands of chemical reactions, are constantly being renewed, and are broken down and synthesized over and over again. The metabolism of these substances forms the basis of support for both life and growth.

The processes of metabolism are controlled and directed by hundreds and thousands of enzymes and catalysts. If we were to compare a cell with any automated chemical factory, we would find that the cell is far more complicated with respect to the number of processes carried on, stability and self-regulating features. But even more important is the fact that all of these processes take place in the cell at a far faster rate than we had previously thought. We have been able to have a look at the genuine chemical "whirlwind" of metabolic processes which are the basis of life.

For many years, the structure of the cell was thought to be relatively simple. It consisted of a nucleus, protoplasm and very tiny granules—protoplasmic inclusions. But the electron microscope upset our ideas, which had accumulated over decades, about the pattern of the living cell.

When living cells were magnified a million or more times, it became clear that their structure was not that which we had formerly supposed. We were able to observe numerous membranes usually consisting of two layers of molecules of one type with one or two layers of molecules of another type "fitted in".

It has now been determined that the protoplasmic inclusions mitochondria—are a sort of cellular chemical "factory". The enormous magnification provided by the electron microscope enabled us to see that they have a structure, as we mentioned above, which consists of many plates. It would appear that the complicated chemical activities in the mitochondria are distributed amongst these "shelves" or plates.

But this is not all. It was found that various parts of the cell are connected with one another by endless numbers of previously invisible canals—canaliculi—the walls of which are made up of one or two layers of large molecules. By means of these canaliculi, the

cell nucleus is connected with the multi-membranous structures of the protoplasm and, in some cases, with the mitochondria as well. In the membranes of the cell nucleus there are openings or apertures which open and shut in much the same manner as windows or locks. All of these features together make up a sort of submicroscopic "circulatory system" of the living cell about which we formerly never suspected.

Substances within the cell are in motion, but this motion is not a simple shift as a result of the flow of protoplasmic currents. The hitherto invisible submicroscopic system of canaliculi, the nucleus, the mitochondria and other structures "drive" these substances, according to a difinite pattern, by means of opening and closing the necessary canals.

System of Control and Information

In a multicellular system of a living organism, the nervous elements—nerve cells and their extensions, nerve fibres—have special significance. Cells of the central nervous system are constantly exchanging signals--nervous impulses—with one another and with the peripheral nervous elements. It is precisely this system of signals which lies at the basis of the control of functions and the receiving of information by the central nervous system about all the things which go on in a living organism.

It has been shown that, at the very moment a nervous impulse arises an "electric element" discharges at that spot where the impulse arose. This is caused, in particular, by the following phenomenon: an infinitesimal quantity of potasium ions, present in the nerve fibre in increased amounts, instantly moves to the external surface of the nerve fibre. Waves of "discharge"—that is, the movement of potassium to the external surface—move along the fibres.

This process has recently been observed in a very interesting manner. In several marine animals, there are gigantic nerve fibres with a thickness up to one millimetre instead of the usual one—one hundredth mm. Experimenters were able to carefully squeeze out the contents of one of these millimetre—thick fibres—the protoplasm—and to fill the fibre with a solution of potassium. This means that only the tubular membrane of the nerve fibre remained—the membrane and a layer of of protoplasm attached to the wall. And this tube, filled with a solution of potassium, transmitted nervous impulses quite normally !

However, the matter is really not quite so simple. In my laboratory, it has been observed that, in addition to electric signals and bursts of chemical processes, a nervous impulse is accompanied by an instantaneous change in the ultrastructure. This change is observable as rapid, microscopic oscillations in the nerve fibre.

Muscle As a Motor

The phenomenon of mobility is extremely closely connected with the phenomenon of stimulation. In complex organisms, movement is accomplished by means of a special muscular apparatus which consists of a vast number of modified and specialized cell fibres. Much has been written and said about the surprising motor power of muscle fibres. To artificially reproduce this motor power is an idea which has been growing and ripening in the minds of many investigators.

Once again, however, matters turned out to be a great deal more difficult than was thought. Various methods of submicroscopic

analysis of muscle fibres showed that the matter is by no means only that of shortening of the fibre. Here we observe a regular alteration in structure—the so-called "transverse stripes"—made up of extremely thin molecular threads, differing in the chemical properties of their proteins. Threads of one type lie somewhat between the threads of another type. They seem to slide in one another's interspaces. This can be compared with two inflexible combs, the teeth of which enter the interspaces of one another.

Obviously, this last scheme is not a final one. As we have recently demonstrated, here we are actually meeting with even greater complexity—a kind of a combination of the two processes, "shortening" and "sliding". But even an unexpected complexity, which was discovered recently, brings us nearer to an understanding of the manner in which phenomena take place.

First Conclusions and Plan of Research

If we make use of modern technical terminology, we can say that the living cell is a system which automatically regulates itself to achieve the most advantageous manner of working under changing conditions of the external environment. We think that now the first glimmer of understanding of this self-regulatory mechanism in the living cell have appeared. In a gross and schematic way, we can picture it as being made up of three elements. Probably, in actual fact, matters are a good deal more complex.

The first element is connected with the presence in the living cell of macromolecules of quite definite chemical structure.

The second element is connected with the regulation of the speed of the processes which go on in the cell. The products of synthesis or the products of break-down reactions which are carried out with the help of enzyme-catalysts are themselves capable of acting, in their turn, on these same catalysts. And so, if the speed of any "glow-out" occurs—then the excess amount of products formed influences the catalysts at work, acts to brake their activities and stabilizes the process.

The third and final element, which appears to us to be the most flexible instrument of regulation, is the intracellular mobility of the structural elements. The submicroscopic canaliculi, the membranes and the contractile elements "divide" and "drive" the products which take part in metabolism in the required direction and at the required speed.

It has been established that only the presence of a definite, complexty organized "supramolecular" organization can ensure the proper course of chemical processes. On the other hand, the chemical processes involved in the metabolic of substances support and maintain this organization. were the metabolic processes to be disrupted or stopped in any manner for several minutes, let us say, by depriving a living cell of oxygen, then the internal molecular organization begins literally to fall to pieces.

The author of this article has proposed a hypothesis which states that a derangement in any one of these three elements in the processes of metabolism, the development of "blow-outs" in separate reactions, has a telling effect on the structural organization and that this will have consequences for the processes of metabolism itself. In effect, if the chemical processes of metabolism support the structural organization, then changes in their course will disturb this organization to a greater or lesser degree. On the other hand, as we have already said, this disturbance in

structure must lead to a shift in the course of the chemical processes. The author sees a powerful and universal regulatory mechanism in structural and celluar mobility. In favour of this might be mentioned the close connection between the mobility of the intracellular structure and vital activity. It is apparent everywhere. In addition, a stoppage—as it were, a freezing—of intracellular mobility is a characteristic sign of the death of a cell.

All of the above is evidence of new unexpected findings in the field of study of intracellular processes. It would appear that these very findings have given rise to even more questions. But, on the other hand, they have determined the road to their solution.

The pursuit of knowledge about the nature and essence of life is a magnificent task. It requires the efforts of a huge group of scientists, the working out of new methods, the mastery of techniques, the exchange of ideas arguments and discussions.

Every step in this pursuit of knowledge promises a great deal in the struggle for health, longevity, and the creation of the basis for material well being.

There can be no doubt that discussion and the experimental working out of this fascinating and noble task—the pursuit of knowledge about the nature and essence of life—offers a wonderful field for international co-operation among scientists from various countries. It is a wonderful field of activity not only because it can serve to unite the efforts of scientists in various spheres—biologists, chemists, physicists, and technicians-but, what is most important, because this activity serves a noble aim, the dearest to the heart of man—life.

Scientific Know How

Men Behind Scientific Space Research

PROFESSOR SIR HARRIE MASSEY

A number of leading British scientists have contributed to the successful launching of the "S-51" international ionosphere satellite. Among them are Professor Sir Harrie Massey, Mr. M. O. Robins, Dr. R.L.F. Boyd, Professor J. Sayers, and Professor H. Elliot.

A distinguished nuclear physicist and Quain Professor of Physics in the University of London, Sir Harrie Massey has in recent years played a leading part in Britain's space research. Chairman of the British National Committee on Space Research, he was formerly chairman of the Gassiot Committee of the Royal Society, formed to conduct research into the upper atmosphere, which co-operated with the then Ministry of Supply in the early stages of the Skylark (rocket) project. Skylark No. 9 fired on the occasion of the International Geophysical Year World Rocket Interval, reached a peak altitude of about 103 miles.

When early in 1959 a new committee was formed to take over the upper atmosphere research programme, Sir Harrie became in turn chairman of this body, the British National Committee on Space Research. In this capacity he has already gained experience in co-ordinating the scientific activities of different peoples, for the British National Committee not only co-ordinated British research activities but co-operated with the Committee on Space Research (COSPAR), formed by the International Council of Scientific Unions. Sir Harrie also visited the United States at the head of a team of experts, discussed collaboration on space research on a wide basis, and reached an agreement with American scientists whereby instruments designed in British could be included in Anglo-American satellites. He attended a Space Symposium in Canberra, Australia, in April 1960, and later in that year convened a conference on space research, held at University College, London, and attended by scientists from many parts of the Commonwealth. In March 1961 Sir Harrie accepted an invitation to become chairman of the preparatory commission set up in Geneva to prepare the scientific programme for a European space research organization.

Harrie Stewart Wilson Massey is an Australian. He was born at Melbourne in 1908, and educated at the University High School, Melbourne, and Melbourne University, where he took his B. A. and M. Sc. and was awarded a two-year Aitchison Travelling Scholarship. He went in 1929 to Trinity College, Cambridge, as a research student in physics, and carried out research at the Cavendish Laboratory, then reaching the height of its fame under Lord Rutherford. During his four years there, several other noted scientists were carrying out some of their most important work. Chadwick proved the existence of the neutron, Cockcroft and Walton were the first to split the

atom by artificial means, and Blackett, with the young Italian scientists Occhialini, confirmed the existence of the positron through the study of cosmic rays.

After taking his Ph.D. at Cambridge, Massey spent five years at Queen's University, Belfast (Northern Ireland), where he was lecturer in mathematical physics. In 1938 he was appointed Goldsmid Professor of Mathematics in the University of London, the Chair being attached to University College. He held this appointment, with secondment to Government service during the second World War, until 1950, when he was appointed to his present professorship, also attached to University College.

During the war Professor Massey joined the Admiralty Research Laboratory, and by 1943 had become Chief Scientists in the Admiralty's Mine Design Department. From 1943 to 1945 he served as Technical Officer with the Department of Scientific and Industrial Research mission to the research establishment at Berkeley, California.

Professor Massey's work has added greatly to the knowledge of collision processes between electrons. neutral particles and ions. Sir Cyril Hinshelwood said of him in 1958. "Massey has paid particular attention to negative ions. His writings on this subject systematized our knowledge and stimulated much research. He discussed for the first time why only some atoms can accommodate additional electrons to form negative ions, listing the various mechanisms by which these ions may be formed and destroyed...Massey was the first to apply the theories of etectron attachment and recombination to problems of the ionosphere and he led the way in reviewing the results of experiments in this field and in trying to explain them. The difficulties in the way of any entirely satisfactory explanation led him to investigate and discuss a wide range of atomic and molecular processes which might be operative in the upper atmosphere.

"It is not surprising that with the advent of the rocket as a means of upper atmospheric exploration, Massey should have made himself the pioneer British worker in this new field. Besides developing equipment for this work, he is heavily engaged in assembling more powerful apparatus for the laboratory investigation of collision processes. His personal contributions to our knowledge of ionospheric physics are already considerable : the preparatory work going forward in his department at University College makes it more than likely that the future contributions of the research team which he directs will be of equal importance."

Professor Massey is author or joint author of several important works : *Atoms and Energy*; *Theory of Atomic Collisions* (with N. F. Nott); *Negative Ions*; *Electronic and Ionic Impact Phenomena* (with E.H.S. Burhop; and *The Upper Atmosphere* (with R. L. F. Boyd); and he has contributed a number of papers on atomic physics to the *Proceedings of the Royal Society* and other scientific journals.

He has written and lectured during recent years, at home and abroad, on space research by the use of rockets and artificial satellites. He carried out a lecture tour in Australia in 1952, and three years later returned there to discuss the joint Anglo-Australian programme. He was chairman of the conference between American and British scientists held in London in Novem-

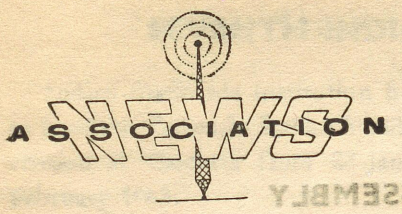
ber 1958. He has written and spoken of the present joint programme with the U. S. A., saying that it is so vast that there is no possibility of its being exhausted in the foreseeable future: its range includes the opportunity for studying, from outside the earth's atmosphere, the radiations not only from the sun, but from the whole universe around us; the development of ultra-violet astronomy, X-ray astronomy, and the investigation of charged particles impinging on the atmosphere; the study in detail of the outer fringes of the earth's atmosphere; the study of the earth's magnetism and the nature of gravitation.

Professor Massey is actively concerned with the work of a number of important scientific institutions. He has been a Fellow of the Royal Society since 1940, and is a member of its Council. He is a past President (1953-57) of the Atomic Scientists' Association, a member of the Council and past President (1954-56) of the Physical Society, and a former Vice-President of the Royal Astronomical Society. For 10 years (1947-57) he served on the Scientific Advisory Panel of the British Council. Since its foundation in 1957 he has been a member of the Governing Board of the National Institute for Research in Nuclear Science (the object of which is to provide, with the aid of Government grants, facilities and equipment which are beyond the scope of individuals and scientific institutions carrying out research in nuclear physics), and he is also a member of the Radio Research Board (the governing body of the Radio Research Station, one of the world data centres for collecting information from earth satellites), of the Bureau of the Committee on Space Research, and of the Advisory Council of the Science Museum.

Sir Harrie—he received his knighthood in the New Year Honours of 1960—was awarded the Royal Society's Hughes Medal in 1955 and the "A" Royal Medal in 1958 for his contributions to physics, and particularly for his experimental and theoretical studies of collision phenomena in gases. He holds honorary doctorates of Belfast and Melbourne Universities.

Sir Harrie Massey is married and has one daughter; Lady Massey also is an Australian. Their home is at Esher, in Surrey. Sir Harrie's recreations include a number of games—cricket, tennis, billiards and snooker—travel and, as he—says in *Who's Who*, the study of other sciences.

(*Courtesy British Information Service—Delhi*).



Association of Scientific Workers, Lucknow

The General Body Meeting of the Association of Scientific Workers, Lucknow Branch held on May 14th, 1962 at the Central Drug Research Institute, Lucknow.

The following were elected as office-bearers for the year :—

Dr. B. Mukerji	President
Dr. Nitya Nand Dr. Narendra Singh	Vice-Presidents
Dr. P. R. Das Gupta	Secretary
Sri S. C. Misra	Jt. Secretary
Dr. N. M. Khanna	Treasurer

A condolence resolution on the death of Dr. B. B. Bhatia, Retired Professor of Medicine, K. G. Medical College, Lucknow was adopted.

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

The annual meeting of the U.P.P.W.D. Research Institute Scientific Workers Association, Lucknow was held in the premises of the Institute on 21/6/62. The Hony. Secretary in his report summarized the activities of the last year and thanked Dr. B. Mukerji and the Association of Scientific workers of India for taking keen interest in getting the restrictions on forwarding of applications removed. The following were elected office bearers for 1962—63.

President—	Sri Manohar Lal.
Vice-President—	Sri J.P. Bhatnagar.
Hony. Secretary—	Dr. T.N. Chojer.
Asstt. Secy.—	Sri U.C. Gupta.
Treasurer—	Sri C.M. Nagar.

Members of the Executive Committee—Sarvasri B.L. Dhawan, R.S. Dixit, S.P. Kumar and B.B. Lal

Auditors—Sri S. Zair Husain and Sri B. N. Vaish.

W·F·S·W News

SEVENTH GENERAL ASSEMBLY

Amendment to the Constitution proposed by the Secretary General with the approval of the President

Explanatory Note

The development of the activity of the Federation in new regions makes it desirable to increase slightly the number of members of the Executive Council.

At present the Council includes 8 Regional Representatives (two of these posts have not been filled).

It would be an advantage to be able to nominate a Regional Representative for Latin America and a Regional Representative for Africa.

Further, the members elected on an individual basis, whose total number according to the Constitution at present is 17, comprise 11 officers; 1 President 6 Vice-Presidents (one position is vacant) 1 Treasurer 3 Secretaries and 7 individuals. It would therefore be correct in any case to increase this total by 1 to regularise the situation.

However it would also seem desirable to allow for the nomination of two further individual members, 1 from Italy and 1 from France. The number of individual members should therefore be increased by three.

PROPOSAL

New version of Article 24

The Executive Council shall consist of 30 members: 10 Regional Representatives and 20 members elected on an individual basis. The members ..... (continue without further change).

P.S.

On close examination it appears that there is confusion about the ratification by the Sixth General Assembly of the amendments to Articles 24 and 32. As a result, in Article 32 the English edition of the Constitution gives five Vice-President while the French edition gives six.

It will be for the VIIth General Assembly to correct these errors.

P. Biquard,
Secretary General.

SEVENTH INDIAN STANDARDS CONVENTION

Indian Standards Institution has decided to hold the Seventh Indian Standards Convention at Calcutta from 28 January to 2 February 1963.

The Convention will have eight technical sessions dealing with subjects of topical interests, namely, Food Purity and Food Quality Standards; Aluminium in Electrical Technology; Standardization in Automobile Industry; Informative Labelling; Standardization in Multi-purpose Projects; Export Promotion and Standardization; Consumers' Organizations and Standardization and Promotion of Company Standardization in India.

Apart from the technical sessions, some technical visits to industrial concerns of special interest to delegates will also be arranged.

A Reception Committee consisting of leading industrialists and citizens of Calcutta for making the necessary local arrangements for the proper conduct of the Standards Convention is being formed.

Besides inviting its 2300 and odd sustaining members and over 12000 committee members for participating in the Convention ISI will also be inviting all other organizations likely to be interested in any of the subject chosen for the Convention. In addition, invitations will also be extended to the Standards Organizations of the neighbouring countries to send their representatives to the Convention, with the object of implementing Indian Standards and enlarging the scope of our trade and commerce with those countries.

In the context of the rapid economic and industrial development of the country aimed at by our national development plans, standardization has assumed a special significance for producing quality goods, maximizing production, achieving all-round industrial economies and competing in the foreign markets. Standards Conventions have been found to be a very effective medium for achieving these objectives. They afford invaluable opportunities to scientists, technologists and industrialists to share their knowledge and experience with others; create standards-consciousness; promote implementation of standards; and enable the delegates to establish contacts in industrial and commercial activities in the country.

Standards Conventions, the first of which was also held at Calcutta in 1954, have now become an annual feature of ISI activities. Other Conventions have been held with great success, in Bombay, Madras, Delhi, Hyderabad and Kanpur respectively.

ADVISORY COMMITTEE ON IMPLEMENTATION OF INDIAN STANDARDS

The Indian Standards Institution has so far issued over 2000 Indian Standards, each of which is the result of agreement reached on its technical content between Indian producers, consumers, technologists, testing authorities and others concerned with the subject of the Standards. Related to Indian manufacturing and trade practices, these standards, which fall under the categories of specifications, method of test, codes of practice, glossaries, etc, have been formulated with due consideratation to the need for national as well as international co ordination, and thus they constitute ideal solutions to various recurring problems, such as technical basis of contracts, manufacture, purchases; supply and testing. Considering that thousands of technicians and experts have extended their invaluable co-operation in terms and advice, technical knowledge, experience, data, etc, in preparing these standards it is but fair that Indian Standards are implemented to the fullest possible extent, that is, whenever they are found applicable.

It is with this view that the Executive Committee of the Indian Standards Institution set up an Advisory Committee for Implementation of Indian Standards the scope of which includes promoting adoption of Indian Standards by manufacturers, organized, consumers and all others concerned. The propagation of company standardization activity among manufacturers is also included among its terms of reference.

The Committee held its first meeting in Manak Bhavan, ISI, New Delhi, under the Chairmanship of Shri N. E. S. Raghavachari, Director General of Supplies and Disposals, Government of India, on June 5, 1962. Representatives from various purchase departments of the Government of India, such as D. G. S. D , Ministry of Defence, Posts and Telegraphs and State Trading Corporation; the State Governments of Bihar, Mysore and Uttar Pradesh; Consumers' Association of India; All India Manufacturers Organizations; etc. attended the meeting.

Welcoming the members Dr. Lal C. Verman, Director, ISI explained, that Indian Standards were voluntry instruments and have no legal force behind them. They were not binding even on its members, but to get the maximum productivity at economic level it was important that they are made full use of by the manufacturing concerns of the country. Shri Raghavachari, Chairman of the Committee referred to the need of all consumers to base their demand on the basis of national specification for facilitating their adoption by manufacturers. While reviewing its composition the Committee decided that it should be made more broadbased and the following Organizations were co-opted for this purpose :

(a) Director, Railway Stores;
(b) Federation of Indian Chambers of Commerce and Industry;
(c) Senior Industrial Advisor to the Government of India (Engineering);
(d) Senior Industrial Advisor to the Government of India (Chemical);
(e) Engineering Association of India; and
(f) The State Governments of Maharashtra, Madras, Kerala and Punjab.

The Committee discussed various steps to be taken for propagating the use of Indian Standards among the manufacturers, both in the public and private sectors, and the perchasing organizations. It was the general feeling that there is need to make the consumer more conscious about quality and purchase of certified goods.

10. Lektion

Dear friends !

To-day we start with a little bit of grammar and after that we shall try a few exercises :

Prefix and Verb

Words or particles are often prefixed to German verbs to form new verbs, whose meaning is then in many cases quite different from that of the original verb. Such verbs, however, are always conjugated in the same way as those from which they are derived.

It is necessary to distinguish two categories of these compound verbs. The first comprises those with a stressed prefix. These are known as separable verbs, which indicates that the prefix is detached from the verb proper and placed at the end of the clause when the verb is in a finite form.

The second category comprises the compound verbs with an unstressed prefix, i. e. with the stress on the verb proper. These verbs are described as inseparable, to denote that the prefix always forms one word with the verb. It is very important to learn the correct way to stress the verb, as this enables one to distinguish between separable and inseparable verbs.

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abfahren

Der Zug *fährt* um 6 Uhr von Köln *ab*.

Der Zug *fährt* ..... *ab*.

The verbs : abfahren, ankommen, einsteigen, are separable. The prefix is stressed.

The verbs : beginnen, erklären, verbessern, verlassen, verstehen, wiederholen, are inseparable. The prefix is without stress—not stressed.

Conjugation

There is a certain group of verbs, classified as "strong" verbs, whose stem changes its vowel in the 2nd and 3rd persons singular of the present. It is advisable to learn the 3rd person singular together with the other parts of such verbs.

Infinitiv :	fahren :	nehmen :
—	—	—
	ich fahre	ich nehme
Präsens :	du fährst	du nimmst
	er fährt	er nimmt
	wir fahren	wir nehmen
	ihr fahrt	ihr nehmt
	sie fahren	sie nehmen

The verbs : fahren, halten, nehmen, lesen, verlassen, are strong verbs.

Exercises

No. 1 : *pleass complete the sentences !* (er, es, sie)

(*a*) Hier ist Peter.....ist mein Freund.
Ist Frau Meier eine Lehrerin ? Ja, ...ist eine Lehrerin.
Wo liegt das Buch ? .. liegt hier.
Kommt Peter auch aus Köln ? Nein,.....kommt nicht aus Köln.

No. 2 : (du, ihr, sie)

(a) Peter ist mein Freund. Ich frage Peter : "Geh- ..... in die Schule ?"

(b) Paul ist auch mien Freund. Ich frage Peter und Paul : "Geh— .....in die Schule ?"

(c) Herr Müller, der Lehrer, fragt Peter : "Geh- .....in die Schule ?"

No. 3 : Verbs

(a) Wir arbeit—viel.
(b) Arbeit—ihr auch viel ?
(c) Lern— Sie Deutsch ? Ja, ich lern—Deutsch !

(d) Peter komm—dort.
(e) Der Lehrer frag— und die Schüler antwort—.
(f) Wann fahr—die Züge von Köln ab ?
(g) Die Mutter fragt : "Nehm—ihr das Mittagessen mit ?"

No. 4 : (sein)—to be

(a) Hier ..... Peter.
Er .....mein Freund.
Ich .....Peter, du.....Paul.
Ich ..... fleissig, du.....faul.
Der Lehrer sagt : "Ihr ...fleissig."

II. Lektion

Dear friends !

What we have learnt till now—the figures, the money, the weeks and months—are all part of our day-to-day life. It will be so for many of us spend a good many hours in offices, colleges or any occupation for that matter. However, we all do spend considerable time at home. To-day's lesson brings you a story, told by Walter to his friends, about Mr. and Mrs. Brown, who have a guest.

Ein Freund kommt !

Der Briefträger klingelt. Frau Braun öffnet die Tür. Der Briefträger gibt Frau Braun ein Telegramm. Fräu Braun geht in ihr Zimmer zurück. Dort sitzt ihr Mann und arbeitet.

"Hier ist ein Telegramm, Paul ! Es kommt von Frankfurt," sagt sie. Herr Braun öffnet das Telegramm und liest. Dann sagt er seiner Frau : "Heute kommt Besuch. Mein Freund Walter fährt nach Hamburg und unterbricht seine Reise hier in Köln. Sein Zug kommt um 3,45 Uhr an !" —"Oh, dann kommt er bald. Ich koche jetzt Kaffee.", Frau Braun geht in die Küche. Herr Braun hilft seiner Frau und kauft Kuchen.

Um vier Uhr kommt der Freund. Herr und Frau Braun begrüssen ihren Gast herzlich : "Guten Tag, Walter ! Was machst du ? Wie geht es deiner Frau und deinen Kindern ?"—"Danke, danke ! Meiner Familie geht es gut. Mein Sohn studiert jetzt in Frankfurt, und meine

Tochter geht noch in die Schule. Ich mache gerade eine Geschäftsreise und komme von Stuttgart. Ich fahre heute abend nach Hamburg weiter." —"Schade ! Dein Besuch ist sehr kurz," sagt Herr Braun und führt seinen Freund in das Zimmer. Seine Frau bietet ihrem Gast Kaffee und Kuchen an. "Möchtest du eine Zigarette ?" fragt Herr Braun seinen Freund. Er lehnt aber ab : "Danke, nein ! Zigaretten schaden meiner Gesundheit."

Walter erzählt seinen Gastgebern viel, und die Zeit vergeht schnell. Der Freund sagt schliesslich : "Leider fahrt mein Zug schon um 7 Uhr. Wo finde ich hier ein Taxi ?"—"Du brauchst kein Taxi," antwortet Herr Braun, "wir nehmen unser Auto. Es gehört meiner Firma. Ich fahre schnell in die Stadt, und du erreichst deinen Zug pünktlich."

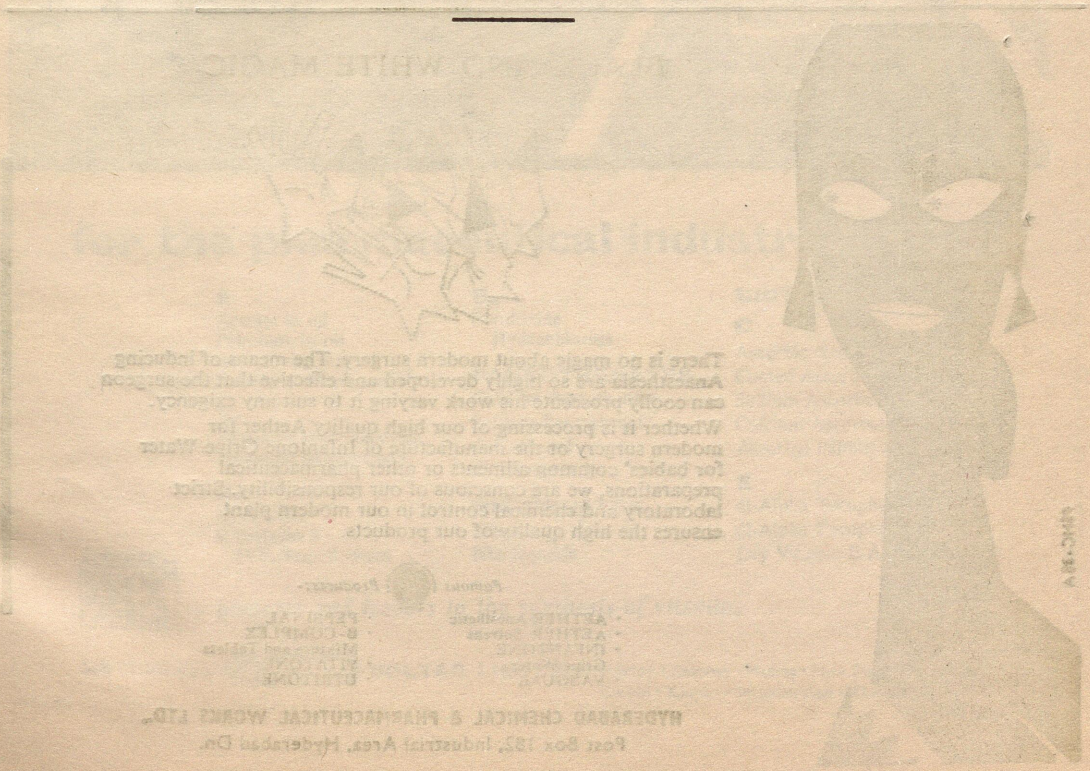
Frau Braun gibt ihrem Gast die Hand und sagt : "Auf Wiedersehen, Walter ! Hoffentlich kommst du bald wieder !" —"Ich hoffe es. Auf Wiedersehen !"

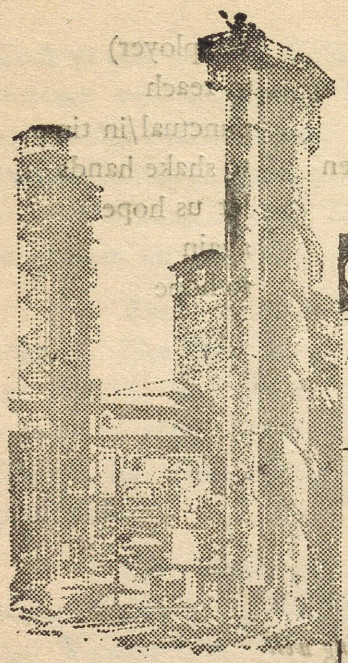
Der Briefträger	the postman	sehr	very
klingeln	to ring the bell	führen	to lead
Frau	Mrs.	anbieten	to offer
öffnen	to open	mögen	to like
geben	to give	die Zigarette	cigarette
das Telegramm	telegram	ablehnen	to decline
zurück	back		to refuse
sitzen	to sit	schaden	to damage
ihr Mann	her husband		not good for
Paul	Paul	Gesundheit	health
seine Frau	his wife	erzählen	to tell
Besucher	the visitor	Gastgeber	host/s
unterbrechen	to interrupt	vergehen	to pass by
die Reise	journey	schliesslich	at last
bald	soon	leider	unfortunately
kochen	to cook	schon	already
Kaffee	coffee	brauchen	to need
die Küche	kitchen	das Auto	motor car
helfen	to help	gehören	to belong to
der Kuchen	cake	Firma	firm

begrüssen	to greet		(employer)
	to welcome	erreichen	to reach
herzlich	heartily	pünktlich	punctual/in time
	warmly	die Hand geben	to shake hands
Guten Tag	good-day	hoffentlich	let us hope
der Sohn	son	wieder	again
studieren	to study	hoffen	to hope
die Tochter	daughter		
gerade	at present		
die Geschäftsreise	business-trip		
weiterfahren	to proceed to		

Idioms

Was machst du ? How are you ?
Meiner Familie geht es gut—My family is keeping well.





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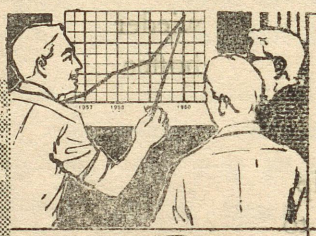

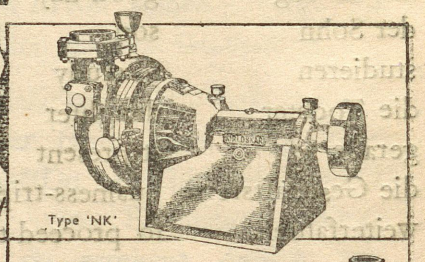

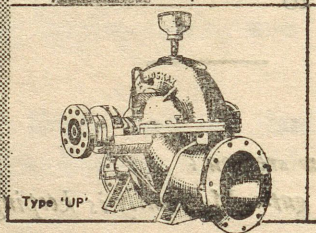

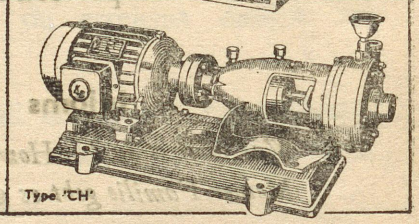

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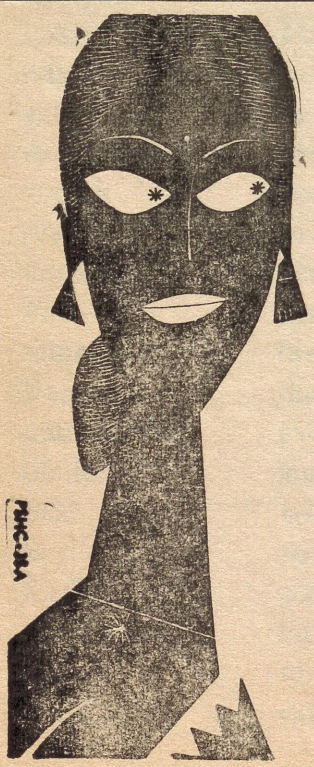
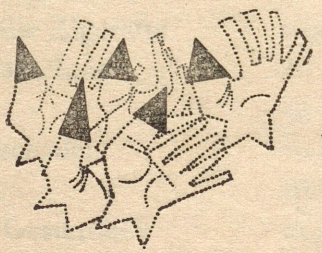


BLACK AND WHITE MAGIC



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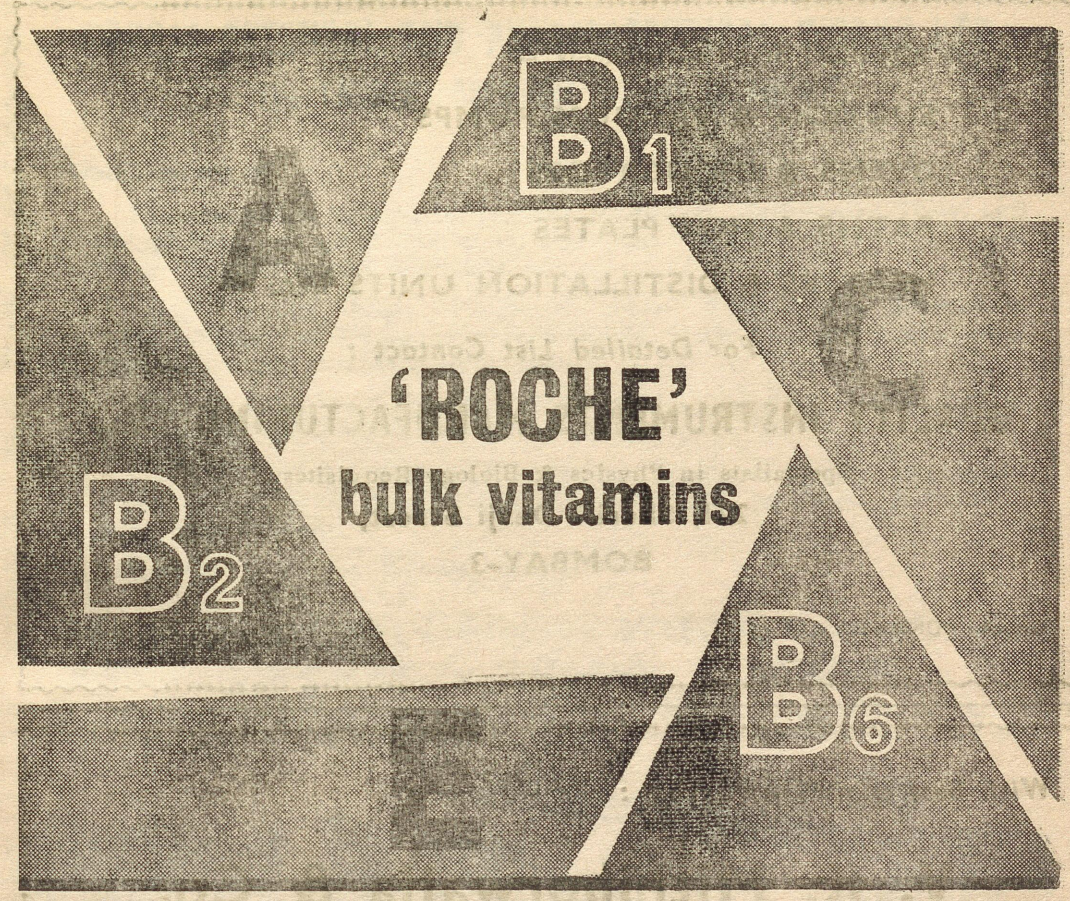

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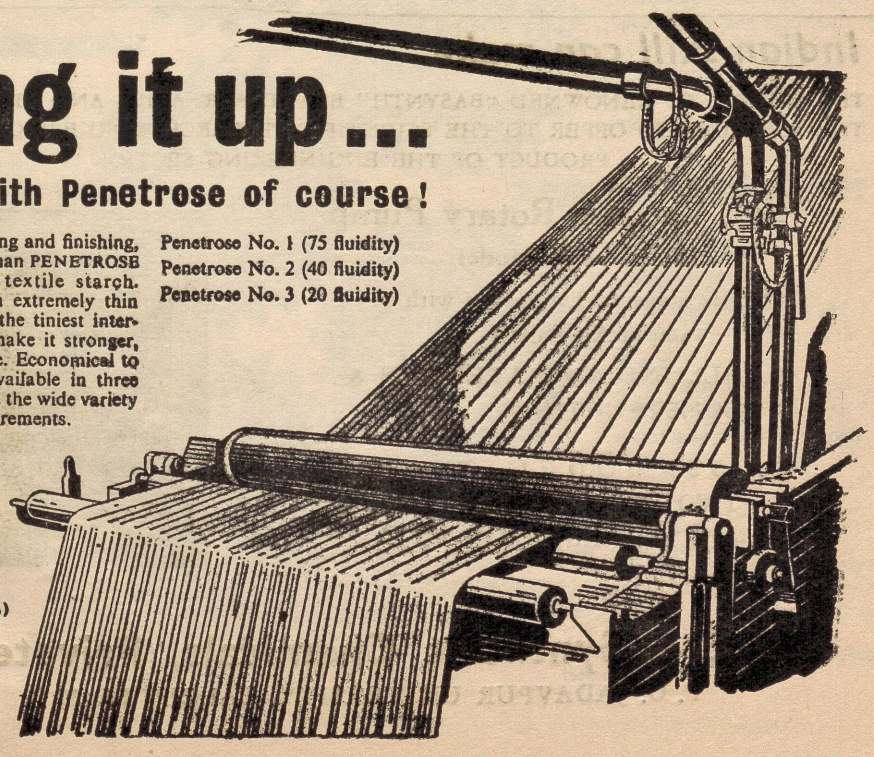

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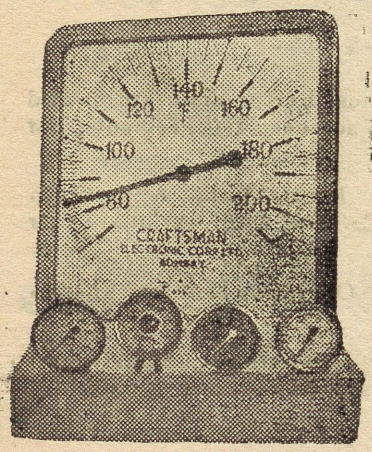

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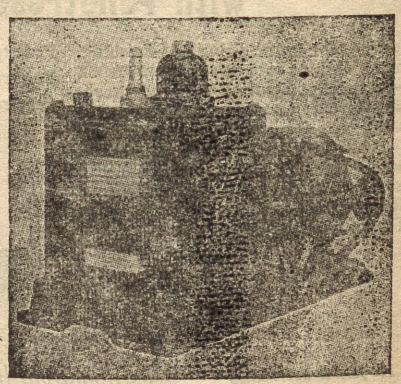

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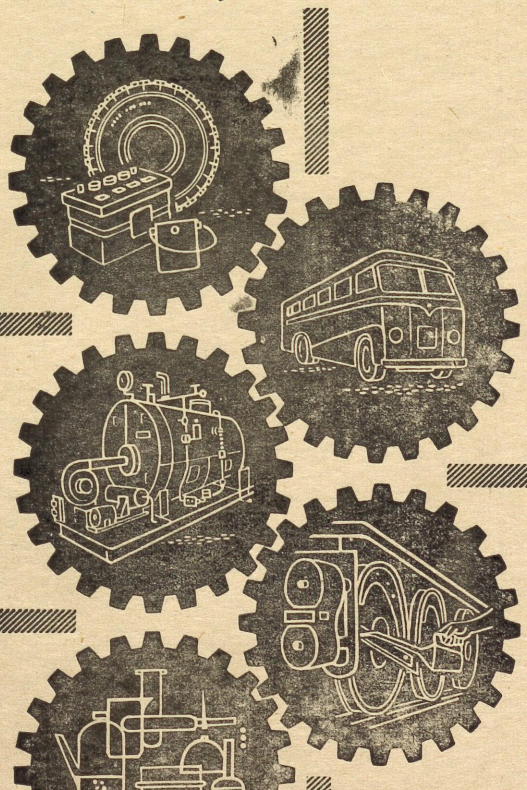

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