ASSOCIATION OF SCIENTIFIC WORKERS OF INDIA

(*Registered under the Indian Trade Union Act 1926*)
Founder President : Shri JAWAHARLAL NEHRU

8/60, ARYANAGAR
POST BOX No. 388
KANPUR (U. P.)

23rd October, 1962

'AN APPEAL TO SCIENTIFIC & TECHNICAL PERSONNEL'

Since we earned our independence 15 years ago we have been striving to build ourselves into a prosperous and progressive nation. The very safety and integrity of our beloved motherland has now been threatened on its Northern borders. Although the clouds of vague danger were looming for quite sometime, the peace loving citizens of India realized the gravity of the situation when our dear Prime Minister conveyed to the Nation the account of ruthless and shocking violence with which our unscruplous neighbour across the borders has chosen to outrage our integrity, honour and safety.

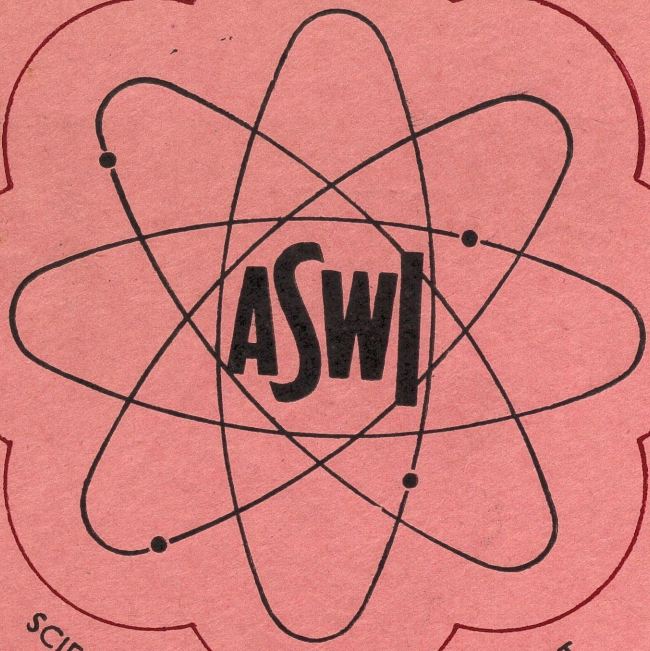
The call for National support and unity has no doubt affected everyone of our citizen—professionals, businessmen and the men in-the-street alike. To us, connected with scientific/technical professions and vocations the moment of emergency is more than significant. Not only the development and prosperity alone of the country depends on our efforts but also by the very nature of our calling we must provide the necessary confidence in the citizen by our material efforts and strengthen the hands of our beloved Prime Minister by active and geared up cooperation.

The Association of Scientific Workers of India, therefore, appeals to all its members in various walks of life whether at the bench or high up in chanceries and policy rooms, as well as people in scientific and technical professions throughout India to respond to the call of the Prime Minister by girding up their loins and exert to the last bit of their talent and efforts in keeping the integrity and honour of our revered motherland intact at this hour of crisis. On us lies the larger share of responsibility, and let us demonstrate at this occasion that the prime value of Indian Science lies in its usefulness to the Nation, in the times of peace as well crisis.

The Association is fully confident that its members as well as other scientists/technologists of India will not linger behind at this hour of grave danger and give that additional confidence to the Nation which it has a right to call upon its citizens.

As a symbol of solemn pledge which we take at this occasion to stretch to all possible limits our capacity to do constructive work for the Nation we also request the members to donate their one day's earning to be utilized for the welfare and boosting up the morale of our Defence Forces—to indicate that along with the entire Nation, the scientists and technologists upon whose shoulders lies much greater responsibility, are also with them in fighting for the honour of the Nation.

An emergency fund for this purpose has been created by the ASWI and we request all the scientific/technical personnel to send their contributions to the Treasurer ASWI, Sri J. S. Yadava, C/o Defence Research Laboratory (Stores), Napier Road, Kanpur.



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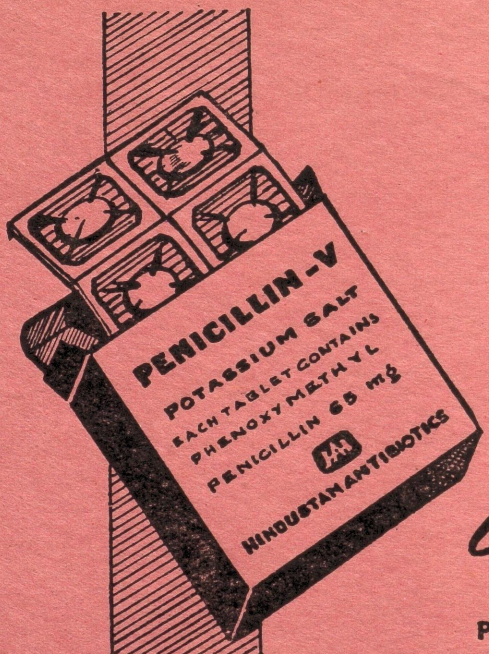

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Vol. XIV | SEPTEMBER, 1962 | No. 9

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KANPUR

Editorial

In our last month's issue we had indicated the necessity of reorientation in the main planks of our planning for obtaining a sufficient number of scientific/technical personnel to husband various aspects of our five year plans. We want to again emphasize the two psychological factors that have to play major role in creating true "scientific outlook" not only in those who are to drive the planning cart ahead but also in those who are going to be materially affected by the resultant economic growth i.e. The INDIAN MASSES.

The scientific/technical training has to be planned so that the dual objective of quality with quantity is served properly. The training schemes have to be modelled to get cooperation from all categories of (i) financial groupings in the country--poor, lower middle, upper middle and rich class as well as (ii) intellectual groupings—top most students, middle group and those of the lower ladder. The educational curriculum must have a practical bias so that the outgoing trained personnel gets more enjoyment in the laboratory and the factory rather than only in the office chair or at specialised conferences.

We had pointed out in our last issue that technical training particularly of a high quality-graduations in engineering and post-graduate studies in scientific field—should be brought within the means of common man. It is not a rare sight that a really deserving candidate with a good academic record or after having successfully competed for selection, when offered admission in scientific/engineering studies, has to forego such a career because of lack of funds. Even among the fortunate students who have been selected and admitted for the training, a wide difference in their living standards creates an unhealthy attitude towards life. The psychology of the student who got the training under relatively adverse conditions and lacked many of the comforts his other colleagues were getting, is distorted in favour of mere material gains. This becomes his guiding principle in his life and he forges all his energies to get the comforts which he lacked at earlier stages. It is not surprising that most of the scientific/technical staff trained thus would not mind leaving their specific field—or should we say they don't 'have' any specialised sphere—if they can get better material prospects in other fields.

But what is the way out of this predicament ? Loans, stipends, scholarships, Governmental help or aid from private industry in these forms cannot be obtained at a scale sufficient to embrace so many students. Another suggestion that has been put forth—to have a pattern of free technical education—is neither a proper nor a practicable suggestion. Apart from the heavy financial burden envisaged by such a suggestion which the society or state cannot bear, an undesirable psychology is also developed by education without paying for it. The seriousness attached to studies—for that matter, any activity—when one has to pay for these, cannot be obtained with 'free' education. Moreover, the difference in standard of living of stu-

dents/trainees is not diminished in any way and may create the distorted psychology as described above.

The only solution in such a case is to start compulsory "earning while learning" schemes. It will take some time for such educational/training institutions with production units to enforce a regulation that no student will be permitted to depend on his family for his routine subsistance. It may not be an absolutely perfect solution for the problems raised above but it will definitely go a long way in helping their solution. On the job hours spent by the candidate will not only make him self-sufficient but will provide him with the essential practical bias to his training. Is it not a pity that the trainee who is going to play a vital role in increasing the industrial output and national wealth in coming years, is not in a position to himself earn sufficient to make two ends meet during the training period and have to depend upon sources which are many times beyond his reach ? He also has to forego contacts with practical aspects of his training and is not able to take into account the earning capacity of his enterprise when he is on a job at the end of his training. This earning capacity has to be looked into by another set of people—far removed from the intricacies and complicities of theoretical scientific/technical approach.

Such a scheme has not been so far explored in details—may be due to the fact that we in our cuntry are mostly planning our training schemes on the pattern of institutions of highly industrialised countries. There it will be a rare chance that a student has to forego his scientific/technical career for lack of financial resources. Furthermore, the economy of such countries has reached a stage when the standard of living of different students in the same almamater does not vary too much. We on our part, though have to look to these countries for quantum and grade of training but should not necessarily be guided for the selection cum financial aspects of trainees in India.

Editorial News

PUBLIC SAFETY & SCIENTIFIC OPINIONS

In several spheres of life scientific opinion, particularly the educative propaganda associated with it, comes as the foremost factor responsible for public safety. Naturally, the opinion of the scientist as a specialist and also as a professional is, more often than not, in conflict with group pressure from organized business, and at times the State also.

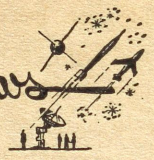
As an instance the controversy which is still rampant regarding certain modes of inhaled tobacco as a consertive factor for cancer, the highly controversial position of industrial effluents and atmospheric contaminants, radioactivity levels in floods and atmosphere are issues on which even expert opinion is at times divided. Similar is the case with even some of the very well established clinical issues—B.C.G. for instance or the furose about Salk vaccine. In most of these cases, luckily for the humanity at large, these controversies orginated in countries where the level of science as well as the State organization was of a level which could take prompt action to ward off the worst.

Where such issues concerning health, food hygiene etc. take crucial importance are the areas designated technically underdeveloped. These countries have a peculiar problem to face. State patronage becomes indispensable if the technological standard has to be brought at par with advanced countries, at a pace warranted by planned economy. Even a few unsurplus moves here or there can play havoc with public life and safety. The State is in an uncuvi:ble position. As an example we can quote the hue and cry which the press has raised regarding the standard of drugs and pharmaceuticals recently in this country. A similar but of slightly different nature is the controversy which came up in the matter of food contamination. In these and similar issues of intellectual debate the worst but is the consumers, the layman on the street.

The scientist whether he is a specialist, adviser to the State or is a professional, has an important duty in these matters. A clear cut, understandable opinion from professional organizations like the Medical Council can go a long way in allaying fears in public mind.

An example of where and how exactly science can be of help in these issues is the illuminating instance of the drug phthalidomide. The promptness with which the side effects of this durg were spotted, advertised and steps to ban the drug for public use were taken in the countries concerned is an illustration of scientists professional conscience, and the cooperation of State machinery with it. In countries like that of ours such attitude is all the more miscapable.

Science News



A NEW RESEARCH SHIP LAUNCHED

The new research ship *Discovery*, which was launched at Aberdeen (Scotland) on July 2, is to carry out investigations which may lead to increased food supplies for countries bordering the Indian Ocean.

The Discovery is the latest of nine research and exploration ships to bear this name since the first was built in 1601. She is driven by Diesel-electric machinery which also provides the power for research operations on board. There are eight laboratories, and the vessel is equipped with air-conditioning for work in the tropics and with steam-heating for Arctic voyages.

The Discovery will play a leading part in the international Indian Ocean expedition, and will work for 15 months in 1963-64 in the Arabian Sea.

The Indian Ocean is surrounded by underdeveloped countries which have the problem of feeding rapidly growing populations. There are already indications that the Arabian Sea is an exceptionally fertile area for fish, and the *Discovery* will devote a large part of her time to testing this fertility and to finding new fishing grounds.

Experiments to learn more about the geological history of the Arabian Sea and studies of current movements will also be made.

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POWDER SOIL STERILISER FOR TOMATO GROWING

A new soil steriliser in powder form, which needs no specialist equipment, has been developed for tomato growers by a British firm of chemists. It is believed that the new chemical method of sterilising glass-house and market garden soils is the first to give the tomato grower the application advantages of a soil steriliser in powder form.

It has been proved effective against soil fungi, nematodes and weeds. As a soil fungicide, the soil steriliser is recommended for use against Verticillium, Fusarium and Corkey Root of tomatoes, and the firm says that as a herbicide it is effective against many weeds, among them chickweed and oxalis. Another of its successful applications is against potato root eelworm.

The use of a steriliser in powder form greatly simplifies application, since there is no need for the specialist metering equipment that is necessary to ensure accurate use of liquid soil sterilisers.

Because the powder is visible, even distribution over the whole soil surface is more easily ensured and there are no objectionable fumes when the powder is applied. The need for strict adherence to the recommendations for usage is strongly stressed by the firm.

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NEW SHIPS WITH AUTOMATIC MECHANISM

A new freighter left recently the dock of the Krasnoye Sormovo Shipyard for factory trials. It was designed by the chief designer's office for the White Sea-Baltic Canal (with calls at Leningrad and Belomorsk) as well as for the Volga River with its storage reservoirs.

The ship can operate on all inland waterways as her strenght, stability and other qualities provide reliability in any stormy weather. It will be provided with all necessary navigation instruments, including rader and echo sounder.

The freighter has been named *Professor Kerichev* in honour of the late Vyacheslav Mikhailovich Kerichev, cheif designer of the Krasnoye Sormovo Shipyard. One of the eminent Soviet designers, he had dedicated all his life to the development of shipbuilding and the education of new cadres of shipbuilding engineers.

The freighter has a lenght of 114 m. width of 13 m. and 3.3 m. draught. The carrying capacity is 2,700 tons.

The ship is planned to transport any kind of cargo (grain, coal, apatite concentrates, ore, containers). The speed under load will be around 20 kph with two 600 h.p. engines.

In this freighter the shipyard has for the first time introduced a complete automatisation of all mechanisms of the machinery room, thereby solving a number of serious problems: the ship's crew has been reduced by six to eight men, the labour of the machinery attendants has been eased and navigation facilities improved.

It is no longer needed to do constant duty in the machinery room because the controls are in the wheelhouse, looked after by the navigator and the helmsman. From the wheelhouse it is possible to set going both main engines, change their speeds and carry out all necessary manoeuvres.

The ship's power plant, water purification station, boiler plant and compressors are also automated and need not be under observation from the machinery room when the ship is on the go.

Wide use has been made of corrugated sheet and bent section steel to built the hull and superstructure. This led to a reduction in the weight of components, economy of labour spent on welding and assembly work and a saving in costs and metal. Low-alloy steel was used for the more important braces of the hull.

To prolong the terms of navigation, anti-ice reinforcements are provided and the service and living accommodations are heat insulated. The ship is capable of operating at a temperature below zero and in broken ice.

The designers have given attention to easing handling operations. The hatches are 9.3 m. wide and equipped with watertight mechanical covers.

The crew accommodations are of one-berth cabins finished in ornamented plywood and provided with radio. The washbasin has cold and hot running water. There are a canteen, a recreation room, a galley with an electric range, a laundry with the "Volna" washing machine, storerooms with refrigerators, baths and other facilities providing comfort for the crew.

The ship will be accepted into the operating fleet after it passes through the factory and state trials.

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REMOTE CONTROLLED COAL CUTTING MACHINE

A remote controlled coal cutting machine which operates in thin seams without a man at the coal face, is being tested by the East Midlands Division of Britain's National Coal Board. It is claimed that, manned by 29 men for three shifts, the machine could produce 1,000 tons of coal a day—the normal output of 300 miners.

The machine consists of a train of special vehicles on rails running into an underground railway. A remote controlled boring machine is launched into the seam; it thrusts forward like a mole, feeding the coal back to an extending conveyor belt which is drawn into the seam behind it.

Fully extended, the cutter will excavate a passage 100 yards long and six to seven feet wide. As each passage is cleared, the unit moves forward leaving a narrow section to support the roof. Top working speed is 7 ft. a minute.

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AUDIO INTER-COMMUNICATION EQUIPMENT

A new, fully transistorised, protable intercommunication system which can be used either as a permanent installation, or in the field as a temporary system, has been introduced by a British firm.

The equipment has numerous applications, but is particularly suitable for use where team work is essential and where visual or audible communication is difficult. The whole operation can be controlled by one man who is in two-way communication with each of his team. At the same time complete coordination is assured by the fact that all the team are also in touch with each other. The system uses the "hands free" principle which enables operators to pay full attention to the job at hand without obstruction or constant stopping in order to speak.

Two versions of the equipment have been developed—a 2-wire and a 3-wire system. Similar performance is obtained with either system, the basic difference being in the power feeding arrangements.

With the 2-wire system individual miniature batteries are fitted inside the compact personal amplifier carried in the pocket by each operator. The only connecting wire is therefore a two-core lead to each operator.

The 3-wire system employs a central battery and is more suitable for permanent installations, when power can be taken from a large capacity battery or a mains rectifier.

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BOX FURNACE TREATMENT FOR STAINLESS STEEL

The box type furnace which can be used for various industrial heating operations requiring processes such as hardening, stress relieving, stabilising, or vitreous enamelling is now being put to a new use.

A British firm has recently designed and built a batch furnace for the heat treatment of a special type of stainless steel developed for the new V.C. 10 airliner. The furnace, with its effective heating chamber dimensions of 12 ft. long (3.6 m.), 6 ft. wide (1.8 m.) and 3 ft. high (o.9 m.), is rated at 150 kw. in two independent and automatically controlled zones. It is designed to operate at temperatures from 100°C to 600°C, and is used mainly for heat treating a recently developed type of stainless steel, in sheets 10 swg. (Standard Wire Gauge) thick and weighing 2 cwt. (101.6 kg.). It is also used for the tempering of other steels used in aircraft production.

The corrosion resisting sheets, which are finally used as engine coverings and ribbings, are first treated at minus 70°C, and then heated to a temperature in the region of 450°C in this furnace. This transforms the charge from the austenitic state to the martensitic, and gives the sheets a tensile strength above 80 tons per square inch.

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TWO SEATER GLIDER WITH DUPLICATE CONTROLS FOR TRAINING

The prototype of a new British glider, the "T.49 Capstan", has been presented to the British Gliding Association. It will be used for training instructors.

Designed by Slingsby Sailplanes, the "T. 49" is a side-by-side two-seat glider with an enclosed cockpit. It is intended as a comprehensive trainer capable of handling all stages of gliding training and has a high performance.

Glass fibre has been widely used for components such as the entire nose-cap and fin fairing. All controls are adjustable and duplicated : the side-by-side seats, seat backs and control columns can also be adjusted.

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ANTI-HAIL ROCKETS

One after another three rockets soared into the sky. Trails of fire behind them they rapidly approached a dark cloud overhanging the Kakhetinskya Valley in Georgia.

In a few seconds they had reached the cloud and disappeared into its milky-plumbeous mass. And then the echo of three reverberated.

Like a huge blanket, the cloud began to unfold. Breaks appeared, and instead of the hail which threatened to beat down the vineyards a refreshing shower fell to Earth.

The Tsiv-Gomborsky pass in eastern Georgia is a gateway into the fertile Kakhetinskaya Valley, famous for its magnificient vineyards. Each spring, however, great damage is done by the frequent hails. This is why the first experiments of the Georgian scientists to fight this natural calamity were started precisely, in these parts.

In the mountains, at short intervals, a number of small anti-hail rockets launching pads were established. These rockets possess very good ballistic properties.

Built by Georgian scientists, they carry chemicals to the clouds, which disintegrate not from the explosion but as a result of the complicated chemical process caused by the dissemination of the chemicals.

More than sixty successful experiments were carried out last year. Over 30,000 hectares of vineyards in the north-western section of the valley, protected by the rockets suffered no damage from hail.

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THE GAMMA CAMERA

A new technique for medical diagnosis may develop from the use of a piece of apparatus now on show in London. It's at an exhibition of scientific instruments organised by the Institute of Physics and the Physical Society. The gamma rays from the body pass through a pin-hole in a metal sheet and then, instead of falling on a piece of film to make a photograph, they fall on a special crystal which scientifilates or flashed every time a gamma ray passes through it. This minute flash of light is pickek up by photo-electric cells, and eventually reproduced on the screen of something like a television tube, what is produced on the screen or something lika a television tube, what you see on this screen is, in fact, a picture of the body, showing, not the bones or the tissue, but the radiation.

At present, this kind of picture can only be obtained by scanning the patient's body point by point with a radiation detecter and slowly building up a map of the radiation. The gamma camera does the job in one go.

Obviously this is the beginning of a promising new method of diagnosis. And already London surgeons are exploring its possibilities as a new tool for diagnosing brain tumours.

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RESEARCH ON HOT STARS

A new kind of telescope will soon go into action in Australia. It has been designed by Professor Hanbury Brown of Jodrell Bank, but it isn't a radio teloscope. This is how Professor Hanbury Brown himself described it.

The new instrument which I am going to talk about is called a "Stellar Intensity Interferometer'. It has been designed to study the 200 brightest stars in the sky and to answer the questions, how hot are these stars, and how large are they? Finding the answers to these questions is just one part of our efforts to understand how stars are made, why they shine and how they change with time.

Now, for many stars we can answer these questions quite well already. We can estimate their temperature from their *colour* by using an ordinary telescope, and then, by measuring how much light we received from them we can calculate their size. We do this by working out how big they need to be to give out that much light at that temperature. This method works quite well for cool stars, but it is unsatisfactory for very hot stars. It's difficult to tell the temperature of a very hot star from its colour, and without the temperature we can't get the size.

A more direct method is to measure what's called the angular size of the star and this is what the new instrument is designed to do. Let me explain. If two rays of light leave opposite edges ot the star and meet in your eye, then these rays must converge at an angle which depends upon how large and how far away the star is, we call this angle the angular size of the star.

Now, how do we set about this? If we wish to measure the 200 brightest stars, then we must be prepared to measure a very small angle indeed, for these stars have about the angular size of a penny viewed at a distance of 4000 miles (6000 kms.).

The new instrument which we are sending to Australia represents a fresh attack on this difficult problem. We use two mirrors whose spacing can be varied. We convert the light at each mirror into an electrical current and bring the two currout together to study their relationship, or as we say, their corelation. This method does not rerquire extreme mechanical precision, nor is it upset by twinkling in the earth's atmosphere.

The two mirrors are twenty four feet (7 metres) in diameter, larger in fact than any existing optical telescope. Each of them is made up of 250 small hexagonal glass mirrors which fit togeter like the cells of a honeycomb. These two large mirrors are mounted on trucks on a railway line, which is laid in a circle 600 feet (182 metres) in diameter.

In operation the two mirrors follow the star under the control of a central computer. They move round the track and tilt to follow the star. The spacing between the mirrors is varied by changing the distance apart of the trucks on the railway line.

The light from the star is focussed by each mirror on to a photo-electric detector which converts the light into an electric current which is then carried by a cable into a central laboratory. Here the relationship,

or correlation, between the two currents—which is just a number—is measured by an electronic computor.

The light is not a steady vibration of one frequency, but consists of innumerable vibrations of different frequency which combine to give us the light we see. The way in which these vibrations combine is always changing, and if we were to measure the intensity of the light, in intervals of, say, one millionth of a second, then it would not be steady, but would fluctuate. The photo-electric detectors follow these fluctuations, and it is the correlation between the fluctuations received by the two mirrors which we measure.

We point the mirrors at the star and arrange that they shall track the star for several hours. Then we alter their distance apart, and measure the correlation between the fluctuations in the two currents. We go on doing this at different distances until the mirrors are at their maximum distance apart, 600 feet (182 metres). We next combine the measurements mathematically to give us a crude picture of the star and measure its angular size.

For a bright star, say Canopus, the whole process should take three or four hours. But for fainter stars it will take longer, perhaps three or four nights.

This instrument is finished, and bits of it have already arrived in Australia. It has been sponsored as a joint effort by Manchester and Sydney Universities, it has been built partly in Great Britain, partly in Italy, partly in Australia and it will be installed in the next few months at Narrabri, in New South Wales, British Ent.

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THE MEASUREMENT OF FREQUENCY

Measurements of frequency with an accuracy approaching 1 part in 10^{10} are now required not only for precision laboratory measurements but also for routine operations. This latest addition to the series of Notes on Applied Science, published Feb, 27 describes shortly and simply the techniques which make such measurements possible and also gives an account of the more usual types of frequency-meter which employ a resonant circuit.

The standard is the caesium atomic beam equipment which is used to calibrate the quartz clock working standards. These in turn monitor the carrier frequencies of a number of transmitting stations, with the call sign MSF which are operated at Rugby by The British Post Office on behalf of the N.P.L. The carrier frequency of the powerful VLF station BR is also controlled in the same way and since May 1961 these frequencies have been maintained with 2 parts in 10^{10} of their nominal values. They can thus be used with this accuracy and without subsequent correction throughout a wide area at an laboratory having suitable receiving equipment and local standards. Several typical examples are given of the use of a local standard for the measurement of frequencies in the microwave region.

Most precise frequency measurements can be made with the help of such equipment and the standard frequency transmissions, but in a wide field of applications, for which an accuracy of about 1 part in 104 is adequate, resonators provide a simpler alternative, and the calibration of such instruments is undertaken at the National Physical Laboratory. The design and construction of some

typical instruments are described in the Note in some detail as it has been found during twenty years experience of calibrating both commercial and special instruments that quite minor deficientcies in the mechanical design or adjustment may be sufficient to cause an instrument to fail the tests.

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JOINT U.K.A.E.A.-SOUTH AFRICAN RESEARCH PROJECT

The United Kingdom Atomic Energy Authority and the South African Council of Scientific and Industrial Research (SACSIR) have jointly developed a laboratory-scale process for the separation of caesium-137 from the highly radioactive wastes arising in the chemical treatment of spent nuclear fuel. Caesium-137 is a long-lived radioactive material (half-life about 30 years) which may find extensive application in future years as a source of gamma radiation for industrial purposes. The process is sufficiently simple to permit straightforward development into an industrial scale process at a later stage. The research programme was carried out in the Chemistry Division at A.E.R.E. by an attached member of SACSIR staff, working with Chemistry Division staff, under a collaborative agreement between SACSIR and the Authority.

Technical Details

The new process involves the preferential absorption of caesium by particles of ammonium phosphomolybdate directly from the waste solutions, followed by extraction of the caesium from the ammonium phosphomolybdate. Its success has depended on the development of techniques for the preparation of an ammoniom phosphomolybdate bed which permits a high rate of chemical reaction together with a high rate of flow of liquid through the bed. This method of caesium separation is simpler than methods which depend upon precipitation or recrystallisation and is capable of dealing with the extraction of caesium from waste solutions of widely varying compositions.

The separation is carried out by passing the waste solutions through a column packed with ammonium phosphomolybdate when caesium, together with some ziroconium, is preferentially retained in the packing material. The retained zirconium is washed from the phosphomolybdate packing with a solution of hydrofluoric and sulphuric acids to leave the caesium incorporated into the packing. The material in the column is then dissolved in alkali, and after filtration and destruction of ammonia the solution is acidified with oxalic acid to PH5.5. this solution is then perocolated through a second column containing zirconium phosphate to remove caesium. After removing sodium by flowing 0.1N hydrochloric acid through the column, caesium may be removed as caesium chloride by flowing 6N hydrochloric acid through the column.

The form of amonium phosphomolybdate employed combines the advantages of a rapid exchange rate with a high linear flow rate, thus permitting a high throughput. The advantages /this method of separation over other methods, such as recrystallisation or precipitation, are;

(i) Simplicity of operation;

(ii) adaptability to any waste composition or concentration provided that it is not strongly alkaline and does not contain appreciable quantities of fluoride;

(iii) no non-volatile materials are added to the waste, thus greatly simplifying subsequent treatment of the waste solutions;

(vi) prior neutralization of weste is not necessary.

The capacities and selectivities of ammonium phosphomolybdate and sirconium phosphate are such that the scale of operations is small compared with other methods. For example an annual through-put of 10 megacuries (300 working days) would require a column of ammonium phosphomolybdate having a colume of about 20 littres for daily processing and a similar columm of zirconium phosphate for the subsequent purification process.

Further information may be obtained from the Patents Licensing Officer, U.K. Atomic Energy Authority, 11 Charles II Street, London, S.W.1, or the In ventions Development Division of South African Council for Scientific and Industrial Research, Pretoria.

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PREPARATION OF SODIUM CARBOXY METHYL TELLULOSE

Water soluble sodium carboxy alkyl cullulose, particularly water soluble sodium carboxy methyl cellulose finds use in textile, paper, food, pharmaceutical, petroleum (drilling) and paint industries. The present method of manufacture of sodium carboxy alkyl cellulose by a slurry process employs isopropyl alcohol or tertiary butyl alcohol as the slurry medium. These alcohols are not easily available in India and are expensive. Use of methanol and ethanol as the slurry media is known to result in products of Degree of Substitution (D.S.) 0.16 and 0.35 respectively and are only partially soluble in water. With tertiary butyl alcohol or isopropyl alcohol as the slurry medium a D.S. of 0.88 could be obtained. Investigations conducted at the Shri Ram Institute for Industrial Research Delhi, have shown the possibility of using ethyl alcohol as surry medium for the manufacture of water soluble sodium carboxy alkyl cellulose with a D.S. value of at least 0.5. The process is a modification of an earlier process (*Patent Specificaion No.* 62751) for the manufacture of carboxy alkyl cellulose ether, also evolved at the Institute. In the new process the following conditions are necessary to obtain a satisfactory product : the molar ratio of alkali to cellulose should be at least 5 : 1 ; the concentration of alkali with respect to the total amount of water contained in the reaction mixture should be of the order of 18-35 per cent (wt/wt) and the molar ratio of etherfying reagent to cellulose should be from 1.69 to 2.5 : 1.

The essential steps in the process are bleached powdered hosiery cutting of the mesh size −20+40 (B.S.S.) are suspended in 93 per cent ethyl alcohol (material to liquor ratio, 1 : 16) and agitated for about 15 min. Required volume of caustic soda solution in water was added at room temperatur (25°C). The agitation was continued for an additional ½ hr. and then the required quantity of solid monochloracetic acid dissolved in alcohol was added at room temperature (25°C). Throughout the period the reaction mass was kept well agitated. The temperature of the reaction mixture was then raised to 50-55°C in 60 min. after the completion of the acid addition.

The reaction product was similar in appearance to cellulosic material added at the start. The product was centrifuged, neutralized by acetic washed in ethyl alcohol and finally dried at 80°C for 3 hr.—*Patent Specification* (*Accepted*) *No.* 71818. *Council of Scieniific & Industrial Research, New Delhi.*

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BACTERIOLOGICAL STERLIZATION OF HIDES, SKINS AND LEATHER

For studying the action of individual species of bacteria on any substrate it is imperative to sterilize the material from the existing flora of micro-organisms and then to inoculate it with the specific species which is desired to be studied. Hide and skin cannot be sterilized by heat as is common with other materials in bacteriological study because this would alter its specific structural characteristics and the observations made on such substrates may not represent the true picture with natural hides and skins. On the other hand, other methods of sterilization that have been attempted with hides and skins are of doubtful value as it was never confirmed that such processes made hide and skin bacteriologically sterile. Such uncertainty of the situation has led the use of the gelatin and hide powder as alternative substrates for hide and skin in bacteriological studies. This is because these materials are fairly easy to sterilize, but in doing so the question of structural alterations that take place when hide powder or gelatin are made from hide are not taken into account. It is, therefore, natural that such tests, though having some value, frequently gave erroneous conclusions when the results were extended to normal hides and skins.

In the investigations undertaken at the Central Leather Research Institute, Madras, strips of skin have been made bacteriologically sterile by treatment with ethylene oxide and it has been confirmed that the process neither leaves any residual effect on the treated skin to affect subsequnt bacteriological studies with it nor does it alter the structural characteristics of the treated skins to any appreciable extent from the untreated one. Briefly the sterilizing process is, as follow: small pieces of well-washed air-dried skin are placed in containers with air-tight lids and well cooled ethylene oxide, in proportion of 0.75-1.0 ml. per litre of the volume of the container was added and the lid quickly replaced and tightly held by mechanical means. After 10-20 hr. at room temperarure the lid was carefully removed, the pieces taken out asceptically and tested for sterility in sterile media under both aerobic and anaerobic conditions. About 80 per cent of the pieces further to be sterile and with these pieces further bacteriological studies with pure species of bacteria were carried out.

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LACTIC ACID FROM WASTE MOLASSES

Lactic acid finds use primarily in tanning industry and as an acidulant in food and beve rages partly replacing acetic, citric and tartaric acids. Esters of lactic acid are used as plasticizers and solvents. Synthetic resins and synthetic rubber can also be prepared from lactic acid.

Lactic acid can be produced from carbohydrates either by fermentation processes or by degradation in alkaline conditions. At present it is produced by the fermentation process but the cost is high and considerable space, time and rigid control over the process and culture are required, though a high yield (80-93 per cent of the theoreticl) could be obtained. The chemical methods of production has been found to give yields of lactic acid comparable with that obtained by the fermentation process, besides resulting in lowering of production cost. As a result of a study undertaken at the National Sugar Institute, Kanpur, a maximum yield of 69.5 per cent of lactic acid was obtained from Indian waste molasses by chemical

means. The general procedure for the preparation of lactic acid is as follows : molasses (250 g.) is dissolved in about 500 ml. of water and milk of lime prepared from 100 g. of quick lime is added to the solution of molasses. The volume is made up to 1200 ml. and transferred to a high pressure autoclave provided with a magnetic stirrer. The autoclave is heated to the required temperature and maintained at that temperature for a certain period before stopping heating. After allowing the autoclave to cool down to the room temperature, its contents consisting of calcium lactate along with other acids non-sugars and unreacted lime are heated in a beaker to bring all the calcium salts in solution. Calculated amount of dilute sulphuric acid is added slowly with constant stirring to precipitate all the calcium as calcium sulphate and to liberate lactic acid. Precipitated calcium sulphate is filtered and precipitate is washed with water. The filtrate containing lactic acid along with other organic acids, some colouring matter and non-sugars as impurities, is concentrated under reduced pressure to a smaller volume (about 1 litre) and is then steam distilled to remove the volatile acids like formic and acetic acids. The contents of the flask are concentrated again under reduced pressure and the concentrated liquid is utilized for extraction of lactic acid.

Maximum yields of lactic acid were obtained at the Kanpur Institute by heating the charge at a temperature of 200°C for a period of 3 hr. keeping the concentration of the charge at about 26-30 per cent solid matter. It was also found necessary to utilize the molasses having minimum percentage of invert sugars.

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INSTROMENT FOR PAPER FLOW DETECTION

For effective quality control in paper manufacture, Radio Corporation of America have designed an electronic paper inspection system which not only detects imperfections such as dark spots, holes, smudges, creases and gloss of coated papers but also enables proper classification of the inspected area in terms of their quality. Mere visual observation has limitations in identifying the defects. For example, dark spots may be easier to see but it is less objectionable from a quality standpoint than wrinkles or creases which are difficult to detect visually.

The RCA inspection system inspects paper by monitoring the light reflected from its surface by electronic scanning. The inspection area of the system can be arranged for various machine widths. It can be used in both 'roll' and 'sheet' operations to classify paper as first, seconds or rejects and in particular sorts sheets of paper in accordance with their flaw characteristics.

The system consists of an inspection head proper containing specially designed illumination and viewing system which, in combination with a series of photoelectric elements, converts the visual quality of the paper surface into electrical informatiion. The signal from each separate photo-element consists of the normal mottle characteristic of the small area of the paper which it sees through its optical system, together with signals which are characteristic of particular kinds of flaws.

A separate compact rack contains the signal collection and a transistorized plug-in classifying circuitry which processes the large volume of information collected from the surface of the sheet as it travels at high

speed past the inspection head. Dark and light signals which exceed the normal mottle pattern of the paper are controlled and are handled by separate channels. The defects causing strong dark signals are not as objectionable as the more subtle wrinkles and creases that generally produce weaker light signals. When a flaw signal exceeds the setting of a threshold control, present in accordance with inspection standards for a 'seconds' quality, a standard with pulse will appear at the 'seconds' output terminal of the apparatus. If the defect is severe enough to exceed the level for a 'reject', standard pulses will appear at both the 'seconds' and the 'rejects' output terminals.

Dark spots of roughly equivalent in area to a $\frac{1}{16}$ in. diam. circle with a diffuse visual reflectance of 50 per cent (or less) of that of the surroundigs are easily detected by the system at speeds of about 1000 ft/min. Holes of corresponding sizes are likewise easily detected. Discontinuities in the surface of the paper such as wrinkles or calender cuts produce a signal of opposite polarity to that of holes or dark spots and the circuitry enadles detecting them. Defects in the gloss of coated papers which might cause poor printing quality are also recognized.

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INSTITUTE FOR MACHINE TOOL DESIGN

On the recommendation of a technical Committee, set up by the Ministry of Commerce & Industry, the Government of India have decided to locate the Central Machine Tool Design Institute at Bangalore to be set up with Czechoslovak collaboration.

The main objectives of the Institute will be to design and develop machine tools, to standardize machine tool elements, and to undertake the manufacture and testing of prototypes. It will train designers and design personnel for the machine tool industry undertake research in methods of calculation in designs, in the behaviour of machine tools and hydraulic, electric and electronic control systems in relation to machine tools. Research in metal cutting, such as, machineability tool research, production processes, etc., will also be undertaken at the Institute. Information and documentation about the progress made on the technical aspects of the machine tool and cutting tool industry will also form part of the Institute's work. The project will cost over one crore of rupees.

A Governing Council presided over by Prof. M. S. Thacker, Director-General of the Council of Scientific & Industrial Research, and consisting of representives of Union Ministries of Commerce & Industry and Scientific Research and technical experts from public sector projects as well as from the private sector has been set up to manage the affairs of the Institute.

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INDIA'S FIRST VITAMIN 'C' PLANT

Production of synthetic vitamin C (ascorbic acid) on a commercial scale has now started in India by the inauguration of Sarabhai Merck's vitamin C plant at Baroda in February 1962. Hitherto, vitamin C has been imported, mainly from Europe. Since annual consumption of vitamin C is reckoned in tons, the Pharmaceutical Inquiry Committee in 1954 recommended the need for immediate attention

to indigenous production. Starting of this synthetic vitamin C plant, therefore, is a first major step towards self-sufficiency in this essential vitamin.

The plant is designed by *E. Merck's* staff to synthesize vitamin C (capacity, 60 tons/year) by the modified Reichstein process under licence from *E. Merck*. In the first phase, the plant will synthesize vitamin C from sorbitol and eventually from indigenous D-glucose. The plant is largely constructed of glass, ceramic, stainless steel, silver and titanium metals and incorporates modern ideas on fermentation technology, solvent extractlon-*cum*-recovery and catalytic hydrogenation.

The Process

The commercial synthesis, at present, starts from D-sorbitol, which is oxidized by a specific microorganism to L-sorbose (which has the same configuration at the 5th carbon atom as ascorbic acid). The primary alcohol group in C_1 position of L-sorbose is oxidized to carboxyl group. During oxidation the primary alcohol group at the C_6 position is protected by converting the sugar to a diacetone derivative (diacetone sorbose). Following the oxidation, the diacetone derivative is hydrolysed to 2-keto-L-gulonic acid and finally subjected to enolization and formation of the lactone ring to produce synthetic vitamin C (ascorbic acid).

The synthetic vitamin C produced is expected to conform to the international standard of purity and meet the specifications of B. P. (1958) and U. S. P. XVI.

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AID TO INVENTORS

The Inventions Promotion Board of the Ministry of Commerce & Industry gave financial aid to the tune of Rs 1.15 lakhs last year to Indian inventors in different States in order to enable them to give practical shape to their ideas or effect improvements in their inventions. This was in addition to the scheme for the award of cash prizes for inventions whose practical value has been proved or workability demonstrated.

The more important of the inventions that were assisted were. 'Ornithopter' or flying cycle (Rs 5000), gadget for running internal combustion engines on kerosene and other cheaper fuels (Rs. 8000), wet and dry grinder (Rs. 5000), an improved cardiac monitoring apparatus called Sphygmoterbograph (Rs. 5000),a new process for obtaining phototransparencies (Rs. 6000), a new type of induction motor (Rs. 5000), puncture proof tyre (Rs. 5000) and a device for raising water (Rs. 5000).

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SCIENTISTS STUDY SEAS' SALINITY

How much salt is found in sea-water was the question studied by scientists from seven countries meeting at Unesco House in Paris in May 1962. The question is more than academic, the scientists pointed out, because it can affect the construction of harbours, the design and construction of ships, the prevention of coastal erosion, the behaviour and migration of fish, as well as many other oceanographic problems.

The scientists, representing a number of international oceanographic organizations, are associated with Unesco in a project to determine new methods and standards for measuring the salt content of sea-water.

Five hundred tests on sea-water samples from all over the world have been made at the National Institute of Oceanography, Wormley, England, under the direction of Dr. R. A. Cox, one of the scientists partici-

pating in the Unesco meeting. Dr. Cox explained that, sixty years ago, the first international efforts were made to establish a standard "measuring-stick" for salt in sea-water. This measurement, made by a chemical method which isolated the chloric content enabled scientists to determine the salt content. The standard for this measurement is known as "Copenhagen Sea-Water".

A new method of determining the salt content in ocean waters has been developed during the past five years. By testing the electrical conductivity of a given sample of sea-water, scientists are able to determine its density and to calculate more accurately its salt content.

This new method was used in the 500 tests made at the Wormley laboratories. The tests will continue and the Unesco meeting has recommended that oceanographic laboratories around the world continue to co-operate by providing samples for testing by this new technique. The scientists have also recommended that the method now be used to establish the Copenhagen "International Standard", in addition to the former chemical method.

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"ELECTROENCEPHALOGRAPH"

A new apparatus for recording "brain waves" in humans and animals has been developed at the Weizmann Institute. The apparatus, called a "Sub-Miniature Electro-encephalograph" (EEG), is part of an existing conventional system for brain wave recording which has been greatly improved by scientists of the Weizmann Institute.

The EEG developed at Rehovot is actually a miniature transmitter, which is placed directly on the head of the subject under investigation. It enables scientists and medical men to record brain waves without the elaborate wiring systems now used in conventional instruments. The absence of connecting wires facilitates greater flexibility in measuring brain waves and makes it possible to investigate the subject under natural conditions.

Articles

MAN AND NATURE

By Academician F. Feodorov

It is from natural resources that society draws all it requires to satisfy its needs of energy, foodstuffs and various products.

Some of them, like the ore veins, originated in the process of the development of the Earth, from the matters it contained. Solar energy played a big part in the creation of the others. It was indeed this energy that prompted the growth of the mighty trees which later turned into coal. It is an energy that agitates the all-planet circulation of water.

The minerals are irrestorable. Their reserves in the Earth are very great but not endless, and may be exhausted after a lapse of some time. The other resources: water in the rivers, fertilizing matters in the soil, wood, members of the living nature—restore themselves as a result of the established physico—chemical and biological processes.

As the productive forces develop, more and more natural resources get involved in the production, and man's interference in the original course of nature's processes becomes more and more active. Thus new resources get drawn into the orbit of the man's activities along with a wider utilization of the known natural wealth.

What are the consequences of the ever growing effect of man on nature? Would its wealth be sufficient for the growing population of the earth?

"Population Bomb" Theory Disapproved

As is known, some economists and sociologists, beginning with Malthus, believed that limitless growth of population, with the limited quantity of natural resources, would inevitably lead to a shortage of the raw materials, first of all of the foodstuffs. Some modern followers of Malthus called the growing population a "population bomb" and declared that this "bomb" is a greater menace to mankind than the hydrogen bomb.

So, what is the future of natural wealth? For the population and its needs grow fast indeed, while the quantity of the natural resources is limited. What will happen?

In fact, although the quantity of this or that natural resources is limited, the possibilities of satisfying the needs of the human society (for this is of the decisive importance) do not diminish but increase with its progress.

Let us take, for example, the production of energy. The resources of the mineral fuels and hydro-energy in the earth are not endless, and sooner or later may be exhausted. However, science discovers completely new power resources at a much faster rate than the mineral fuels stock is consumed. Now, for instance, atomic power stations have become a reality, as the result of which the stock of the raw materials suitable for generation of power has increased manifold in the last few decades not only as a whole but

also as calculated per person in the entire world.

It is known that a thousand times more energy is contained in the raw materials suitable for nuclear fusion.

And so far the tremendous resources of the direct solar energy have not been tapped. It is only the imperfection of modern photo- and thermal elements that holds it up. This obstacle will be removed in the near future. Immense resources of energy are to be found in the sea tides and streams and in the hot interior of the Earth.

Now how matters stand with the foodstuffs ?

It was shown long ago that Malthusian calculations of the socalled "declining fertility" of soil are good for nothing. Harvests increase as the methods of treatment are improved and new types of fertilizers are developed.

Yet agriculture is far from being the only source of food. Immense and untapped reserves of food products are in the oceans. Moreover, modern chemistry has approached the synthesis of fully adequate foodstuffs from totally different kinds of raw materials.

Far, very far away is the time when even the most "scarce" riches like, for examble, rock oil would be coming to an end, while the flights to space beyond the earth have become possible. In a few decades or may be earlier, the natural riches of the nearest planets will be within man's reach.

Thus all the experience of the engineering testifies that though the Earth's natural resources are exhaustible, this cannot and shall not restrain the development of the human society.

Yet, No Pillage of Natural Resources

Does it mean, however, that the natural resources can be used pell-mell, or that the natural resources could be intensified with at random ? Of course not. In the time by-gone the primitive hunter was taking nature as it was. He took from it what he could, but the people were few and their random interference in the natural processes was negligible.

Since the appearance of agriculture men began to separate small lots from the surrounding nature : a plough-land, a garden, a meadow, a herd of animals, into which they put much labour and care. The rest was wild, belonged to nobody and was used on the ancient hunter's principles : to procure raw materials and food; it was turned into private property, like the arable land, and into a source of enrichment.

Therefrom originated the monstruos forms of agriculture, pillage-like ways in the utilization of the natural resources.

Preservation is not Non-interference

It stands to reason that a resolute struggle should be waged against the pillaging approach to the use of the natural resources not only within individual countries but on a world scale. However, in the just struggle against any culture, as a demand of non-interference in the course of the natural processes.

Is it right ? Should nature be turned into a kind of all-embracing reservation ?

Of course not. We need woods. We need them as a source of raw materials, as a regulator of river feeding; they are needed also as a part of the landscape. Shall it mean that any wood should be preserved in its natural state-with marshes and gnats, with the asp

and other sorts of low value would prevailing? It is obvious that in using and restoring the wood care should be taken to transform it, to put it in a condition corresponding in the best manner to the interests of the society.

Can we be reconciled to the existence of the deserts in Central Asia, or shall we take steps to preserve the permafrost which spreads on a considerable portion of the USSR ? Of course not.

Obviously, not the protection of nature against the influence of the man, but transformation of nature in his interests should become a major task.

The scientific endeavour which is conscientiously directed, will never turn a garden into a desert; on the contrary, it will transfrom a desert into a blossoming garden. It is important to note here that the growing technical might is the practical basis on which the natural wealth can be transformed, developed and made more efficient. The construction of the cascades of the large hydroelectric stations with their reservoirs has changed the nature of the Volga and the Dnieper. Large areas of formerly arid lands were irrigated, marshy areas dried up. The scope of these operations grows with every decade, as well as their effect on the totality of the natural processes. It is very important to know how to calculate this effect.

For a Planned Transformation

At the same time it should be noted that the problem of transformation of the natural conditions has not yet found its proper place in science. The geographical, geochemical, biological processes that determine the condition of the natural medium form a complex movably balanced system.

The sun heats differently the polar and equatorial areas of the globe, the continents and seas; this causes the circulation of the atmosphere and movement of the ocean waters which in the final count determines the main features of the climate. The forests and soil conditions in the river basin determine the stability of its flow. Blossoming and fruit-bearing of many plants is closely connected with the well-being of certain insects which carry pollen from flower to flower.

Science has collected much material describing the natural processes in the atmosphere, ocean and on the surface of the globe, so we have a general idea of the scheme of their inter-relations. Yet our knowledge of the quantitative correlations in these relations is still fragmentary.

With the storage reservoirs set up in the Volga basin the water evaporation increases, so the Caspian Sea gets less water. How will this additional evaporation affect the general circulation of water ? Will it increase the precipitation, and where ? When a desert is irrigated and its area is turned into an arable land, the heat and moisture exchanges between the soil and lower strata of air would change. How would this affect the thermal balance, the precipitation.

RADIATION PROBES AID SOIL AND WATER CONSERVATION RESEARCH

Further benefits for agriculture are seen in new applications of controlled nuclear radiation.

Two new research techniques using radiation—one to measure the density of sediment at the bottoms of lakes and reservoirs, the other to measure soil moisture—are being used by scientists of the United States Department of Agriculture (USDA) to increase the accuracy and broaden the scope of soil and water conservation studies.

The new techniques involve the use of two commercially available instruments known as radiation probes. They have two major advantages over conventional testing methods. First, the probes measure relatively large amounts of sediment or soil in their natural locations. Older testing required the more time-consuming and laborious method of removing small cores of earth for later laboratory tests. Second, measuring with radiation is up to 99 per cent accurate, while the older laboratory techniques provided unpredictable results of generally low accuracy.

In their research activities the USDA scientists used a gamma ray probe to measure sediment density at the bottom of a reservoir or lake. The measurements not only gave a knowledge of how much available water was stored, but provided data for calculating total sediment weight. The knowledge derived shows how much erosion has occurred in the watershed upstream from the reservoir. The system allows periodic sediment measurements to determine the location and rate of sediment accumulation so that future water storage space of the reservoir can be predicted.

For such measurements the probe used consists of a metal cylinder containing a small amount of radium 226, with lead shielding and a gamma ray detector. The probe is inserted in a long metal tube and the tube pushed into the sediment for the tests. If sediment deposits around the probe are sense, they will absorb much of the radiation and little is deflected to the detector. Thus, low readings indicate high sediment density and vise versa.

To measure the moisture content of soils, the scientists use a neutron probe. As a source of radiation, this device uses radium-beryllium. It is placed inside a special tube that is inserted into the ground. The tube is left in place so that the researchers can take a series of readings at the same spot, testing the same soil each time. Tubes can be placed in as many locations as desired in the moisture content study.

In the conventional method of samplin 60 the soil, requiring the taking of soil samples for laboratory research, the researcher cannot sample the same soil twice and only a limited number of samples can be collected in any area. Another disadvantage of the old technique is that findings may be deceptive because they do not represent the particular soil map as a whole.

Both the gamma ray and neutron probes are being used in soil and water studies extensively by USDA and state experiment stations over the nation and found to provide satisfactory results. Major drawback is that the probes are complicated devices and

(*Continued on next page*)

NEW TECHNIQUES IN TURBINE TESTING

By D. M. Desoutter

Editor of "Research and Development for Industry", London

While a turbine rotor is in operation its blades will be in continuous vibration through the stresses and strains set up in the materials of the blades. It is important to know these effects accurately, not only to discover reasons for blade failures but also to obtain information which will lead to improved designs for blades.

The most common method of measuring blade vibrations is to attach strain gauges to the blades, the signals from the gauges being passed to the recording equipment by means of slip-rings fitted to the rotor shaft. Slip-rings, hower, introduce mechanical and electrical design problems, and to avoid these problems workers at the Central Electricity Research Laboratories have developed an ingenious system for transmitting the gauge signals. The balance weight of the end disc of the rotor is designed to carry a telemetry capsule. A winding on a C-core in the capsule picks up a 50 c/s supply voltage from a primary winding distributed around the endplate of the generator. This supply is rectified and stabilised in the capsule to provide power for the telemetry circuits.

(*Continued from previous page*)

require skilled technicians to handle them. New methods of improving the instruments' versatility and ease of use are being developed almost constantly.

Scientists emphasize that use of the probes brings no radioactive contamination of soil or water and trained personnel can work with them in complete safety.

The capsule contains a radio transmitter whose output signal is frequency-modulated by the data signals from a strain gauge. The output is fed into a small loop aerial and is received by a transmission line formed by two circles of wire on the generator endplate. The signal can therefore be picked up, whatever the position of the rotor.

The outputs from a number of strain gauges can be obtained simultaneously by employing different carrier frequency for each data signal and subsequently unscrambling the signals picked up by the transmission line.

Different Technique

Workers at Bristol Siddeley Engines Ltd. have adopted a different method of obtaining information about blade vibrations or, more specifically, about the frequency and amplitude of the blade-tip vibrations.

The technique is based on the principle of the dynamo : a magnet moving past a straight wire will induce a voltage pulse in the wire. If the wire is bent into the shape of a hairpin the magnet will induce a voltage in one direction as it passes the first leg, then a voltage in the other direction as it passes the second leg. If, now, a series of parallel wires is connected by bends to form a continuous grid, then, as a magnet passes the grid, an alternating voltage will be induced in the grid, and if the size of the grid is correctly chosen the voltage will be more or less sinusoidal.

This principle is applied to blade testing by fitting a grid (punched out of thin section

copper) around the lining of the engine casing so that it lies just above the tips of the blades in the stage which is being investigated. Magnets made from short lengths of 0.04 inch (1.02 millimetres) diameter wire are inserted in holes drilled in the blade tips. Assuming no blade vibration, a rotor moving round with constant speep will give rise to a grid signal of constant frequency, the frequency depending on blade velocity. Any magnet-tipped blade which now vibrates in a manner which has a component perpendicular to the grid lines will consequently introduce frequency modulation into the grid signal. Analysis of this signal will give information about the blade vibration.

The system has many refinements and extensions, and can be used for purposes other than those originally envisaged.

X-Ray Crystallography

X-ray crystallography is being used for studying the complex structures of materials such as proteins, and the evaluation of crystallographic data is becoming correspondingly complex. Any device which, while still maintaining accuracy, can speed up the plotting of reciprocal lattice points and produce the results in a convenient form for subsequent computation is, therefore, sure of a welcome.

Such a piece of equipment has been conceived and developed by Dr. W. Arndt and Dr. D. C. Phillips at the Davy-Faraday Laboratory of the Royal Institution, London. A single crystal of the material is set up on the instrument and reflections are recorded in a logical order as they occur on reciprocal lattice lines. When a complete lattice level is recorded,a single adjustment sets the instrument up for the next level. The background and signal for each reflection is automatically measured, and the formation is fed in digital form to a printout device and also to a tape punch for feeding into a computer.

The instrument, known as a linear diffractometer, is manufactured by Hilger and Watts Ltd., under licence from the N.R.D.C.

DTA Identification Data

Differential thermal analysis is a technique which follows the course of endo-and exothermic reactions which occur when a material is slowly heated. The information is obtained in the form of temperature differences between the material and a thermally inert material placed beside it. The profile of the temperature curve can be used to identify the reactive material with considerable certainty, and the method is finding wide-scale application in the identification of minerals (particularly clays), double salts and even organic compounds such as soaps.

Cleaver-Hume Press Ltd. has now published the "Scifax" D.T.A. data index, which brings together data published through-out the world, together with the extensive data obtained by Dr. R. C. Mackenzie of the Macaulay Institute for Soil Research, Aberdeen, Scotland. The index contains 1,630 punched cards with guide and code cards, which are already slotted in 29 ranges of principle peak temperatures, thus rendering the first step in the identification a matter of a few moments. Sorting needles and an explanatory booklet are included.

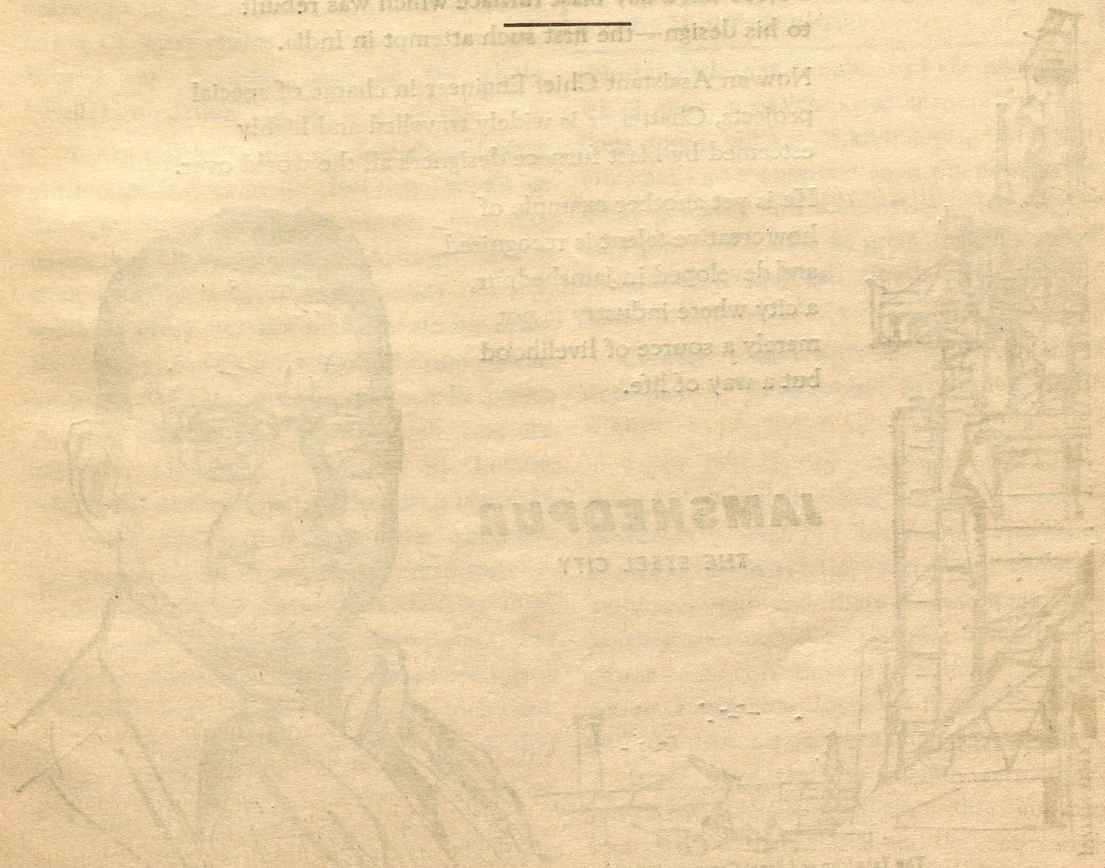
Metallographic Guides

Scientists and engineers who need to gain, in a short time, some understanding of the crystalline structures of metals and the techni-

ques of metallography should be interested in the work of Metallurgical Services Ltd.

They are offering a series of courses, each consisting of a set of specimens and an explanatory booklet. The number of specimens in each set varies from six to about 20. More than 20 different sets of specimens (with annotations) of bronzes, brasses, steels and light alloys are available, and the list is still being added to.

For beginners in the subject there is an "Introductory Practical Metallography", by Dr. A. R. Bailey, which contains 37 specimens, and a booklet which explains grain structure, preparation of micro specimens, and techniques of microscopic examination. Each specimen is annotated and illustrated, and instructions for polishing and etching are given. A similar course by Dr. D. Lloyd dealing with ternary alloys of the aluminium-copper-silicon system is also available.



He never looked back...

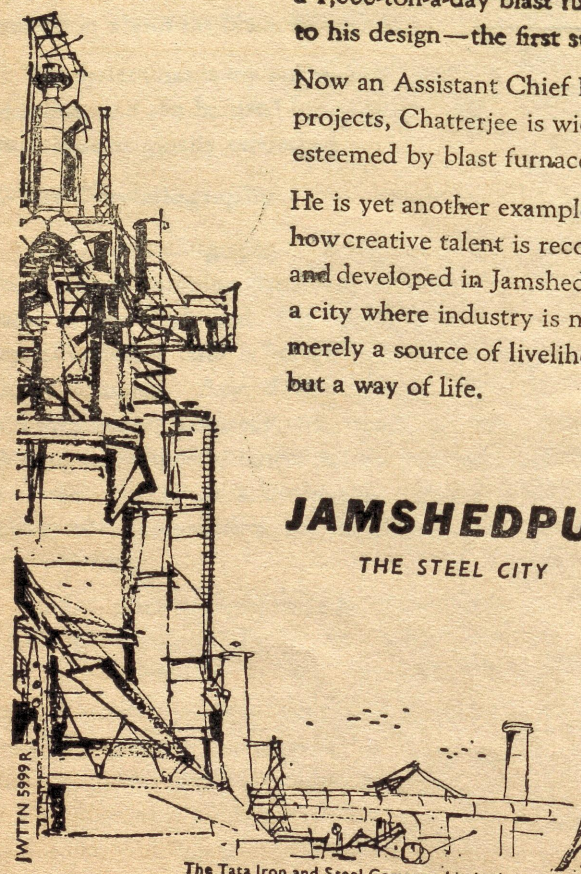
In 1920, P. K. Chatterjee, a young man just out of school, joined Tata Steel as an apprentice draughtsman.

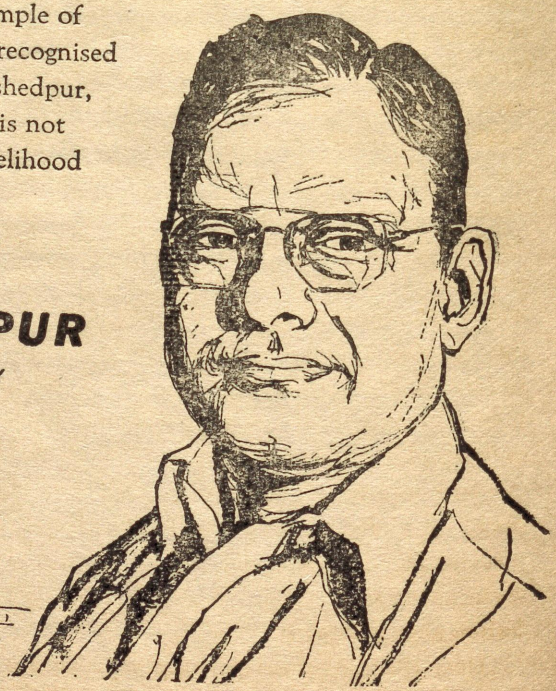
Full of ambition and zeal to learn, he entered the Company's Technical School which afforded the opportunity to study during leisure. Young Chatterjee was among the first to complete a three-year course in engineering.

Over the years, Chatterjee has worked his way up in the Engineering Department, and blast furnaces have been his enduring interest. He has helped to rebuild the blast furnaces in the Jamshedpur Works, including a 1,000-ton-a-day blast furnace which was rebuilt to his design—the first such attempt in India.

Now an Assistant Chief Engineer in charge of special projects, Chatterjee is widely travelled and highly esteemed by blast furnace designers all the world over.

He is yet another example of how creative talent is recognised and developed in Jamshedpur, a city where industry is not merely a source of livelihood but a way of life.





JAMSHEDPUR

THE STEEL CITY

JWTTN 5999R

The Tata Iron and Steel Company Limited

LIFE IN OUR PLANET—WHERE ELSE ?

By Dmitry Dmitriev

"The evolution of life on the Earth can not be understood if we do not take into account the processes going on in our galaxy." This was how Academician Vasily Fesenkov, a well-known Soviet astronomer, began to set forth his hypothesis on the origin of planets.

What is the origin of the Earth, "the stellar home" of mankind ?

According to one hypothesis our galaxy started its existence 15-20 thousand million years ago in the form of a gigantic accumulation of inter-stellar hydrogen. This gas became the material basis of the whole "stellar population" of the solar galaxy.

Today this galactic family has about 15,000 million luminaries in it. But they are all at different stages of development. For instance, the sun is one of the fourth generation stars, a so-called hydrogen luminary. Strictly speaking every star is a gigantic atomic reactor in the depths of which thermonuclear synthesis of various light atoms take place. As time goes by the "fuel" of such reactors changes. Hydrogen is replaced by helium which has accumulated in the deep layers of the "hydrogen" star. This is how, gradually the atomic nuclei of nearly one third the chemical elements known to us, including iron, are formed. But as for "uranium" stars you can look where you like for the formation of nuclei of these heavy elements which complete the Mendeleyev table; you will not find them anywhere.

Substances of Earth

How then did these substances which are met with in the composition of the Earth appear ?

Contemporary science has an answer to this question. There are some stars in whose depths thermonuclear synthesis proceeds like an avalanche. In them heat and light energy accumulate more quickly than they can radiated into the expanses of the Universe. Such stars are doomed. They explode like a colossal hydrogen bomb, and the matter of which they were composed scatters for billions upon billions of kilometres. Astronomers have now observed such phenomena in other galaxies, and these catastrophes, which take place on a scale so great that the mind boggles at it, they call "outbursts of supernovae".

Quite recently leading biologists, chemists, physicists and astronomers from the Soviet Academy of Sciences met in Moscow to discuss the problems connected with the origin of life in the universe. The discussion is summed up in this report by Dmitry Dmitriev.

Chinese manuscripts of 1054 A.D. mention such a catastrophe in our galactic family.

When there is an "outburst of a supernovae" it is accompanied by the intensive formation of nuclei of heavy and superheavy chemical elements—tin, antimony, thorium, uranium, etc.—and these begin their long journey through the boundless ocean of the cosmos. In consequence of a study of radioactive substances found in the earth's crust and the isotopic composition of meteorites, it is believed that the cosmic catastrophe which led to the formation of the "building materials" of our Earth and the other planets took place about 5-6,000 million years ago.

In our epoch, however, outbursts of supernovae occur very rarely and cannot keep the majority of the planetary systems supplied with heavy elements. Academician Fesenkov therefore proposes that the sources of heavy elements be sought in the very heat of the galaxies. There, thanks to the extraordinarily dense accumulation of stars, such outbursts may set off "chain reactions" among neighbouring stars. This process leads to the extremely intensive formation of various chemical elements, which are scattered at high speed towards the periphery of the galaxy concerned.

Other "Stellar Homes"

Academician Fesenkov considers that one in every million planets in our galaxy resembles the Earth in all its main features. This means that even in the very near neighbourhood of the solar system, within a distance of approximately 100 light years from the Earth, there may be one or two planets like our own "stellar homes".

However, it is not all planets, by any means, that become a cradle of life.

If a celestial body is to have the conditions for the origin of life there must be "comfort" for living organisms. In other words it must have an atmosphere, water and favourable climatic conditions.

The formation of the Earth's atmosphere, incidentally, is linked with the heating of our planet by heavy radioactive elements. Consequently, processes taking place in the heart of a galaxy may determine the origin of life on planets tens of thousands of light years away.

Adaptibility of Organism

Academician Alexander Oparin spoke on the origin of life on the Earth. From him we learnt that the ability of organisms to adapt themselves to their environment is extremely great. Contemporary science has established this fact with considerable certainty. Take, for instance, the world of micro-organism. A myriad living beings-bacteria, microscopic fungi and water-plants crowd the waters of the world's oceans, the Earth's crust and our atmosphere. And the spores of these minute representatives of the living world are capable of surviving the cold of the cosmos, heat that is fatal for other organisms, and doses of radiation many times stronger than the lethal dose for man. There are bacteria capable of living in an oxygenless atmosphere, in the waters of hot radioactive springs, or even in uranium ores.

An interesting experiment was once carried out at the Institute of Biochemistry of the Soviet Academy of Sciences—Academician Oparin is the director of this Institute. A root of sugar-beet was placed in a thermostat in which a steady temperature of-10°C was maintained. Within two weeks it had a rapidly progressing column of parasitic microbes on it. When the temperature of that part of the root affected by microbes was measured it turned out that it was plus 20°C; The microbes had themselves created "comfortable conditions of life". In 10 to 14 days quite ordinary bacteria which with the sugar beetroot had been placed in unusual environmental conditions, had acclimatized themselves perfectly to the new circumstances.

Life on our planet really is ubiquitous and diverse. The crowning triumph of nature's work is a reasoning being, a thinking brain, and one can boldly say that mankind is not the only creation of this kind.

The present-day conception of how life originated in the Universe assumes that our reasoning brothers in space may by no means be identical with ourselves.

"Life Elsewhere"

It has been established that in the composition of the live organisms on our planet there are altogether 20 types, of aminoacids out of the hundred that are known on the Earth. So it is not difficult to imagine possible varieties of living organisms, even on the basis of other combinations of amino-acids, other than those which form part of the protein of man or animal, of plants or micro-organisms. In short, the origin of life on earth is only a part of the logical development and increasing complexity of form of movement of matter in the Universe. But because of this a study of the development of life on our planet, particularly in its initial period, can help us to find an answer to question which in our days have not only scientific but also practical significance: where, and on what planets may we meet live organisms or other organized systems, in what conditions can highly organized beings develop.

"An analysis of the data available and the summing up of the experimental material of present-day science," Academician Oparin declared, "show that life appeared on the Earth 2-3 thousand million years ago, in the process of the evolution of hydrocarbon compounds in the waters of the world's oceans. Climatic conditions of these times differed sharply from those we know today. The Earth's atmosphere contained practically no free oxygen, and the very simple organisms on our planet then did not need it for their development." As a decisive argument in favour of this hypothesis, the Soviet specialist advances the fact that now, too, metabolic processes in the organism on the Earth—from man to very simple organisms—are based on phenomena for which oxygen is not a condition of existence. Those metabolic processes in which the "gas of life" takes an active part developed in organisms later on, as the result of their adaptation to changing conditions of life.

Such conclusions are being confirmed by experimental means; Scientists already have an adequate knowledge of the physical conditions of the world's oceans, where the first live organisms on our planet originated. Academician Oparin explained that a number of experiments conducted by Soviet and foreign scientists had shown it to be possible for the first act of metabolism to have taken place in a medium that did not contain free oxygen.

However, we are very far from knowing all there is to know about the secrets of life. So far man has only succeeded in lifting a corner of the curtain over this great enigma of nature.

PRESS NEWS

PHOTOGRAPHY AS FACTOR IN NATIONAL ECONOMY

The convention of British photographers to be held in the Central Hall, Westminster, London, from October 16 to 19, organised by the Institute of British Photographers, will investigate ways in which photography can be used as an aid to industry, research, commerce, and communications. It will seek to encourage the use of photography as a vital factor in the national economy.

In addition, the convention will examine new techniques, the latest materials and equipment, and will discuss current technical and scientific matters of common professional interest.

Wide Range of Subjects

There will be 14 lectures covering such diverse subjects as colour portraiture, photography in crime detection, document reproduction, the photographer and the law, journalism, medicine; atomic energy, advertising and public relations.

The lecturers will include Mr. Norman Parkinson, a leading British creative photographer; Mr. Leslie J. Hewitt, head of the Photography Group at the British Atomic Energy Research Establishment at Harwell; Mr. Paul Linwood Gittings, the well-known American colour portraitist; and Mr. R. Ollerenshaw, who is Director of Medical Illustration of the Royal Infirmary and Christie Hospital, Manchester.

There will also be two symposia, one of which will discuss present and future trends in Press photography and photojournalism. Among those taking part in this will be Mr. Jocelyn Stevens of the *Queen* magazine, Mr. N. S. Jeffries of *The Times*, Mr. Hugh Cudlipp, of the *Daily Mirror* and *Sunday Pictorial*, with Mr. Barnet Saidman and Mr. John Chillingworth.

Special Demonstrations

Among the nine special demonstrations to be given will be a photographic technique utilising camera movements, fashion photography by electronic flash, flash illumination for the industrial photographer, specialised techniques in forensic photography, a new periphery camera and its applications, a new Kodak 16 mm Reflex C.K. Special II camera, and a new 16 mm portable and studio magnetic recording unit, and associated equipment.

The demonstrators will include Mr. Carl Koch, Mr. Harold White, Detective Superintendent W. R. Cramb, of New Scotland Yard, Mr. Francis Fox, who is Chief photographer at the Thornton Research Centre, and Mr. Leo Vala.

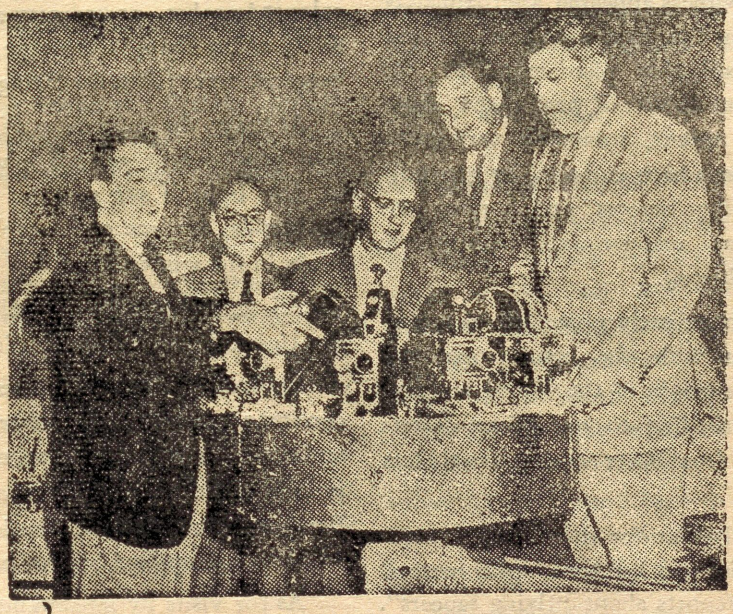
Apart from the lectures and demonstrations, the special activities of the convention delegates will include visits to the new Woburn Studios in London, to the photographic department at the National Physical Laboratories, Teddington, Middlesex, the Polytechnic School of Photography (Cine Section), London, and to P.A.-Reuter Photos Ltd., in Fleet treet, London. A "Film Even-

ing" will include a demonstration of 16 mm production standards and techniques at the Colour Film Services theatre in London. There will also be social functions during the evenings in and around London.

Interchange of Ideas

The Institute of British Photographers probably is the only photographic association in the world serving the interests of all branches of the profession, covering portraitists, Press and commercial photographers, advertising, medical and forensic photographers, as well as those engaged in industry and research whose work ranges from the gamma ray testing of castings to cinematography in nuclear physics. The basic idea of the covention is to enable all these specialists to interchange ideas and techniques.

Coupled with the convention will be an exhibition of materials, equipment and services for the professional photographer. The space for this exhibition is being deliberately limited so that the 40 firms which will be showing there will exhibit only items of immediate interest to those attending the convention.



A novel American cinema technique of projecting a film on a circular screen is being demonstrated to the Delhi public in CIRCARAMA shows at the Ferozshah Kotla ground. The CIRCARAMA film has to be shot by a special camera unit. Walt Disney (left) the famous American motion picture Producer, who originated the CIRCARAMA, is seen pointing out the operational aspects of the rig of the eleven 16-mm cameras on a common mount.

Scientific Know How

FLYING SAUCERS A MYTH

By Professor V. Dobronravov,

Doctor of Physics and Mathematics

Sensational reports about luminous objects flying in the sky began to appear in the press, especially in the West. Since a decade, fantastic stories about this strange phenomena were spread by fanciful reporters. The flying saucers as it has been generally described began to receive serious attention when statements of eye-witness appeared approximately in 1952, claimed to have seen strange and seemingly inexplicable phenomena in the sky: luminescent objects of oval shape moving at varying speeds, sometimes very great. These phenomena have come to be generally known as "flying saucers" and in more official quarters as undetermined atmospheric phenomena (objects).

This had immediately given rise to fantastic speculations with the result that two versions of the origin of the "flying saucers" appeared. According to one, these objects are spaceships from other worlds: from Mars or Venus.

Subsequently, various authoritative commissions of scientists had thoroughly investigated all the reports about "flying saucers". A long and detailed fact-finding investigation of almost all the phenomena produced a very simple explanation. Only a few facts remained the nature of which had not been determined, granted that the description by eye-witnesses were true.

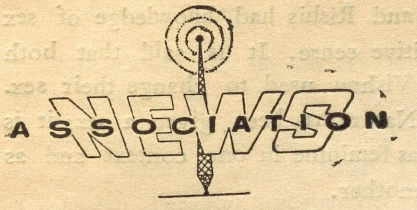
Even in these few cases it has been determined beyond any reasonable doubt that the objects had nothing to do with spaceships from Mars or Venus, or with any other flying craft. As a rule, weather balloons, light coloured probes, or ordinary airplanes. specifically of the flying wing type, or the light of beacons, were taken for flying saucers.

At times, the impression of 'flying saucers' was produced by optical phenomena, such as the light of sun rays on small breaks in the clouds, or some easily explainable phenomena in the winter sky.

All this has been officially explained in the United States and in the Soviet press.

Apparently certain optical phenomena can take place in the terrestrial atmosphere and the nature of these phenomena may occur in connection with the magnectic field of the Earth, solar corpuscular radiation on the Earth which is exemplified by the polar lights.

As for visits by inhabitants of other planets to our Earth in interplanetary ships, there is absolutely nothing to lead to such an assumption, no scientific characteristics even in the form of hearsay.



1. Hyderabad Branch

The present membership stregth of branch is 75. Two meetings of the branch Executive Committee were held upto July, 1962. The following action were taken in the branch Executive Committee meetings:—

(*a*) *Formation of Scientific Staff Association*: A Sub-Committee was formed to draft suitable constitution and make recommendations regarding the eligibility for membership, mode of collection of subscriptions, etc. The Committee will be submitting its report shortly.

(*b*) *Laboratory amenities* : Certain difficulties to the laboratory staff arising from lack of amenities were considered and represented to the Director.

(*c*) *Staff amenities* : A sub-Committee has been formed to invite suggestions from members and make appropriate recommendations to the Director for provision of amenities in the staff colony now under construction, especially transport, school, market, watch & ward etc. The Sub-Committee will discuss this matter with the Engineer-in-Charge and also take into consideration the needs of the Nutrition Research Laboratory staff colony.

(*d*) The question of instituting Contributory Provident Fund to the ICOC & NRDC staff has been taken up by the branch with the administrative authorities.

(*e*) A Lecture on "Fifth Chapter" was held by the branch. Dr. Mulk Raj Anand spoke on "Fifth Chapter" which was well-attended.

(*f*) The Branch in collaboration with the Hyderabad Science Associatiion arranged a reception and "At Home" to the Director-General and Directors of National Laboratories on 11th July, 1962, at the premises of the Nutrition Research Laboratory, Hyderabad. About 200 members participated. Prof.M.S. Thacker, President, ASWI who later addressed the members stressed the need for an association for scientists and called for greater support and cooperation from scientists. Dr. A. Lahiri & Dr. S. H. Zaheer also spoke.

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2. Bangalore Branch

The Bangalore Branch of the ASWI is trying its utmost to serve the technical and other needs of the staff and students of the Institute. The Scientific and Technical books required by any member of the Institute can easily be procured through the ASWI Science Book Club which is offering voluntary service. Over 7000 books costing about 100,000 have been procured so far. The Association also arranges popular lectures and scientific film shows.

The Association places on record its grateful thanks to the authorities of the Institute for providing facilities to have our office of the Book Club on the Western Wing of the Main Building and encouraging the Association to carry on its other activities also.

CFRI Branch

1. The Annual General Body Meeting was to be held on April 5, but was postponed due to the iliness of Dr. A. Lahiri, president of this Branch. The meeting could not be held subsequently, although several dates were proposed by the Secretary, due to the preoccupation of the President whose presence at such a meeting was necessary.

2. The Branch is taking steps to form 'Scientific Workers Association, CFRI', a Service Association as per the definition by the Council of Scientific and Industrial Research. The BEC, therefore proposed that the Annual General Body meeting should be postponed—now that it has not been held—till such a time as the new 'SWA CFRI' is formed.

3. Two BEC meetings were held—one on April 21 (minutes enclosed) and the other on July 13.

(i) At the meeting on April 21, the BEC directed Messrs. A. Ghosal and S.N. Roye to prepare a draft of the Constitution of the proposed SWA, CFRI.

(ii) In the meeting held on July 13 the BEC discussed the draft constitution.

4. A lecture was delivered by Major (Dr.) H. C. Mullick of Dhanbad, Vice-Prosident Indian Medical Association on May 10. The subject of the talk was "Hidden Science". Summary given below :—

Summary

"All 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 as that even rivers 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 coglomeration of several sections is also male. So a male can alse have an off-spring without the help of a female partner. When an off-spring comes out of a female, we think of her consort as Providence, a Supereuman Being or God.

Man is supposed to be one sex and woman the other. But actually, this is not so. The human race is hermophrodite 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 function to suit their purposes.

With 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"

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4. Lucknow Branch

The feature play on the life of Sir P. C. Ray written by Dr. P. Dasgupta, the present Secretary of the Lucknow branch of the Association, was broadcasted from Lucknow-Allahabad station of AIR on 3rd August, 1962 at 10 P. M. The play was translated into Hindi by Sri K. Nagar and directed by Sri S. S. S. Thakar,. The Play was a success and greatly appreciated by the public.

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Resolution passed on 4-8-62 on the sad demise of Dr. G. I. Patel, Pool officer, National Botanic Gardens, Lucknow.

This meeting of the A. S. W. I. Lucknow Branch records its deep sense of shock and sorrow at the sudden death of Dr. G. I. Patel on March 10, 1962 as a result of an accident while on his way to work at Banthra Research Station of National Botanic Gardens, Lucknow. We convey our deep sympathies to Mrs. Patel on her bereavement

W·F·S·W· News

Minutes of the 2nd Meeting of the Indian Regional Centre Committee held on 30th July, 1962, at 6.00 P. M. in the CSIR Conference Hall, New Delhi.

Present

Dr. S. Husain Zaheer (Vice-Chairman), (Hyd.) Sharbshri A.K. Singh, Secretary (Kanpur), G. Thyagarajan, Jt. Secy. (Hyd.), J.N. Misra, Treasurer (Delhi), S. Ramabhadran, Member (Delhi), M.R. Raman, Member (Delhi) G.M. Verma, Member (Kanpur) U. B. Kanchan, Kanpur (by invitation), Y. M. Rao, Delhi (by invitation).

The meeting took place with Vice-Chairman, Dr. S. Husain Zaheer in the chair.

1. Confirmation of the Minutes of the 1st CEC Meeting

The Minutes were confirmed.

2. Report of the Secretary

The report of the Secretary was read out and approved by the Committee.

3. World Federation Symposium

The Committee noted that a sum of £ 200 has been allotted to the Indian Regional Centre towards the travel fund for the Indian Delegation to attend the Symposium on 'Higher Scientific & Technological Education' to be held in Moscow in September, 1962. The Committee approved the following delegation :

1. Dr. S. Husain Zaheer Chairman (Hyd)
2. Prof. P. C. Mahalanobis Member (ISI, Calcutta)
3. Prof. A. C. Joshi, Uni. of Pb. (Chandigarh)
4. Prof. B. R. Seshachar, Uni. of Delhi
5. Dr. Gurbakhsh Singh, Banaras Hindu Uni.
6. Prof. S. N. Bose National Prof. Cal. Uni. (Calcutta)
7. Brig. S. K. Bose, Director, IIT, Powai, Bombay.
8. Dr. Rais Ahmed
9. Mr. A. Rahman.

In this regard, Dr. Zaheer and Prof. Mahalanobis would not be requiring any aid from the National Preparatory Committee. It was decided that Prof. S. N. Boes, Prof. A. C. Joshi, Prof. B. R. Seshachar, Dr. Gurbaksh Singh, Prof. S. K. Bose, will all be given a grant-in-aid of Rs. 550/ towards their travel expenses from India to Taskent and back from Taskent to India.

The remaining expenses towards this should be incurred by the individual concerned.

In respect of Dr. Rais Ahmed, regarding whom the World Federation has also made some suggestion at a later date, it was decided that the National Preparatory Committee/ Indian Regional Centre/ASWI will have no objection to his joining the delegation provided the expenses towards his proceeding to Taskent and back are incurred by him. However, the National Preparatory Committee will

have no objection to his getting any aid directly from the World Federation, if he is able to get the same. It was also decided that Mr. A. Rahman be permitted to join the delegation during his visit to USA/UK. on his own. The NPC should take immediate action to inform Prof. Biquard regarding the decision taken at the IRC meeting and also to advise the members of the delegation to be prepared for proceeding abroad at a short notice.

Treasurer IRC

Consequent to his transfer to Delhi, Shri J.N. Misra regretted his inability to continue as a Treasurer of the Indian Regional Centre. In this context, the Committee noted that the post of treasurer was created at Kanpur with a specific purpose of having two office-bearers in order that transaction in the bank and maintenance of account would be easier. **After some discussion, it was decided that the Secretary, Sri A. K. Singh be authorised** to nominate one of his colleagues at Kanpur as a Treasurer and formalise the ratification from the members of the Committee for this purpose. Sri Misra informed that he has already finalised the accounts and also handed over the necessary charge to the Secretary, Sri A. K. Singh, at Kanpur prior to his departure.

Subsequently, Sri A. K. Singh, Secretary, IRC, suggested the name of Sri J. S. Yadava for the post of Treasurer, Indian Regional Centre of the World Federation. The Committee approved his name and directed the Secretary to finalise other formalities with the bank.

It was also decided that during his visit to Russia when he will be able to meet the office-bearers of the WFSW, Dr. Zaheer should discuse the matter regarding the programme and activities of the Indian Regional Centre vis-a-vis financial aid.

Specific attention should be brought to the fact that Indian Regional Centre is unable to carry on with the organising activities in the South East Region because of lack of finances which in turn confines the activities of the IRC for which purpose the Indian Assocn. is also existing. As such, it becomes impressing for the Indian Assocn. if the IRC is to confine the activities to India alone.

Keeping these facts in view, Dr. Zaheer should find out the possibility of having a detailed plan of work for the IRC and obtaining requisite funds, if necessary on a phased base, to ensure that IRC includes at least a few of the neighbours of the country.

Jt. Secretary, Sri G. Thyagarajan will ensure that Dr. Zaheer will be given all the necessary briefs inclusive of statement of accounts, etc, required in this context.

The meeting came to a close with a vote of thanks to the Chair.

(G. THYAGARAJAN)
Jt. Secretary.



15. Lektion

Dear friends !

Our three friends are talking to-day about a problem dear to so many of us—food ! By the way, people do eat rice in Germany, in smaller quantities though. Quite naturally, the climatic conditions prevailing there influence the modes and habits concerning food.

Walter : Das Frühstück, das Mittagessen und das Abendessen sind die drei Mahlzeiten in Deutschland.

Prem : Wann frühstücken die Leute in Deutschland ?

Walter : Gewöhnlich frühstücken die Leute morgens um 7 oder 8 Uhr.

Krishna : Was nimmt man zum Frühstück ?

Walter : Man trinkt zum Frühstück meistens Kaffee mit Milch und Zucker und isst Brot oder Brötchen mit Butter und Marmelade. Sonntags essen die Leute meistens Kuchen.

Prem : Wann isst man in Deutschland zu Mittag ?

Walter : In Deutschland isst man um 12 oder 1 Uhr zu Mittag.

Krishna : Was essen die Leute ?

Walter : Zuerst essen die Leute einen Teller Suppe, dann Fleisch mit Sauce, Gemüse oder Salat und Kartoffeln.

Prem : Gibt es nach dem Essen einen Nachtisch ?

Walter : Ja. Nach dem Essen gibt es dann zum Nachtisch meistens eine Süssspeise oder Obst. Freitags essen die Leute in West—und Süddeutschland Fisch.

Krishna : Was trinkt man zum Essen ?

Walter : Oft trinkt man zum Essen Bier oder Wein.
Zum Essen braucht man das Besteck. Das sind : der Löffel, die Gabel und das Messer. Man benutzt auch eine Serviette.

Prem : Was isst man zum Abend ?

Walter : Zu Abend isst man meistens "kalt", das heisst (d. h.) es gibt nur Brot mit Butter, Wurst, Schinken oder Käse. Zum Abendessen trinkt man dann Tee.

Praepositionen mit dem Akkusativ

Hans geht *durch den* Park. Kumar bestellt *für seinen* Freund ein Glas Bier. Das Auto fährt *gegen das* Haus. Kumar geht *ohne seine* Schwester spazieren. Die Freunde gehen *um das* Haus. Wir fahren *die* Strasse *entlang*. Remember : durch, für, gegen, ohne, um, entlang

immer mit akkusativ.

also : entlang steht immer nach dem Substantiv.

Wortstellung :

		I	II	III
Kumar geht zur Universität,	aber	Hans	lernt	zu Haus.
Wir gehen zu Bett,	denn	wir	sind	sehr müde.
Kumar liest,	und	Hans	schreibt	einen Brief.
Sie lesen Zeitungen,	oder	sie	arbeiten	zusammen.
Er arbeitet nicht,	sondern	er	geht	spazieren.

Merken Sie die Wortstellung : aber, denn, und, oder, sondern, zählen nicht

der Apfel	apple	der Löffel	spoon
did Apfelsine/n	orange	die Mahlzeit/en	meal
benutzen	to use	die Marmelade/n	jam
das Besteck/e	cutlery	das Messer	knife
die Birne/n	pear	die Milch	milk
das Brot/e	bread	das Mittagessen	lunch
das Brötchen	roll	der Nachtisch	dessert
die Butter	butter	das Obst	fruit
		der Salat	salad
das heisst/d.h.	that is/i.e.	die Sauce/n	sauce
der Fisch/die Fische	fish	der Schinken	ham
das Fleisch	meat	die Serviette/n	napkin
das Frühstück	breakfast	die Suppe/n	soup
frühstücken	to have breakfast		

die Gabel/n	fork	die Süsspeise	sweet/dessert
das Gemüse	vegetable		
kalt	cold	der Teller	plate
die Kartoffel/n	potato	der Wein	wine
der Käse	cheese	der Wurst	sausage
Merken Sie	N.B.	der Zucker	sugar

16. Lektion

Dear friends !

We shall listen to-day to a conversation between two gentlemen one Indian and the other German, who meet somewhere by chance.

M.: Guten Tag, Herr Arndt !

A: Guten Tag, Herr Mehta ! Wohin gehen Sie ? Können Sie heute abend zu mir kommen ? Peter besucht mich mit seiner Schwester Else. Wir wollen bei mir zu Abend essen und dann zum Tanzen gehen.

M.: Ich dank Ihnen sehr für Ihre Einladung, Herr Arndt, aber ich kann heute abend leider nicht kommen. Ich muss einen Besuch machen. Herr Müller hat heute Geburtstag; ich gehe zu ihm. Jetzt will ich für ihn ein Geschenk kaufen.

A.: Was wollen Sie ihm schenken ?

M.: Etwas zum Rauchen: Zigarren oder Zigaretten. Aber was kann ich seiner Frau mitbringen ? Können Sie mir einen Rat geben ?

A.: Kaufen Sie Blumen für sie !

M.: Das will ich tun, ich bringe ihr Blumen mit. Den Kindern muss ich aber auch etwas mitbringen. Ich glaube, ich schenke ihnen Schokolade und Bonbons. Das macht den Kindern immer Freude.

A.: Das glaube ich auch. Aber jetzt muss ich gehen, es ist schon ein Viertel vor sechs.

M.: Ich habe auch keine Zeit. Die Läden schliessen um halb sieben, und ich muss um dreiviertel acht bei Familie Müller sein. Herr Müller erwartet mich pünktlich zum Essen ; ich will nicht zu spät zu ihm kommen.

A.: Grüssen Sie ihn bitte von mir ! Ich gratuliere ihm auch herzlich zum Geburtstag.

M.: Ich will es ihm sagen. Kann ich auch seine Frau von Ihnen grüssen ?

A.: Aber natürilch ! Ich wünsche Ihnen heute abend viel Vergnügen.

Auxiliary Verbs of Mood

Auxiliaries of mood express the relationship between the doer of an action (subject) and the action itself and state whether there is a wish or desire (wollen) compulsion or necessity (müssen) or ability (können) to perform the action. When auxiliaries of mood are used, the main verb appears at the end of the clause in the infinitive. The English counterparts of the German auxiliaries of mood, often called anomalous finites, are defective as they have no infinitive.

Modalverben

Robert *will* nach Deutscland *fahren*. Zuerst muss er Deutsch *lernen*. Dann *kann* er die Leute in Deutshhland *verstehen*. Peter and Else *wollen* zum Tanzen *gehen*, aber sie haben kein Geld. Sie *müssen* ihren Vater *fragen*. Er gibt Paul zehn Mark, und sie *können* xum Tanzen *gehen*.

wollen:	müssen:	können:
ich will	ich muss	ich kann
du willst	du musst	du kannst
er will	er muss	er kann
wir wollen	wir müssen	wir können
ihr wollt	ihr müsst	ihr könnt
sie wollen	sie müssen	sie können

Merken Sie: Ich will, ich muss, ich kann: *ohne* e
er will, er muss, er kann: *ohne* t

Ich *fahre* mit Peter nach Deutschland/Ich *will* mit Peter nach Deutschland *fahren*.

einen Besuch machen	to pay a visit to	der Rat/-schläge	advice
		einen Rat geben	to give advice
bis	till		
bleiben	to stay/remain	rauachen	to smoke
die Blume/n	flower	schenken	to give, to present
der Bonbon/s	sweet		
einladen	to invite	die Schokolade	chocolate
die Einladung/en	invitation	spät	late
erwarten	to expect	tanzen	to dance
die Freude/n	pleasure	vielleicht	perhaps, may be
Freude machen	to please		
der Geburtstag/e	birthday	das Viertel	quarter
das Geschäft/e	shop	wollen	to want to, to wish to
das Geschenk	present		
das Gespräch/e	conversation	wünschen	to wish
glaubeh	to believe	können	to be able to
gratulieren	to congratulate	mitbringen	to take along with
grüssen	to give one's kind regards	müssen	to have to
natürlich	of course	die Zigarre/n	cigar

17. Lektion

Dear friends !

To-day is grammar day !

Wortstellung—order of words in sentences.

I	II	III	IV
Ich	will	mit Peter nach Deutschland	fahren
Nach Deutschland	will	ich mit Peter	fahren
mit Peter	will	ich nach Deutschland	fahren

Personalpronomen

	Singular				Plural			
Nom. : ich	du	er	es	sie	wir	ihr	sie	Sie
Akk. : mich	dich	ihn	es	sie	uns	euch	sie	Sie
Dat. : mir	dir	ihm	ihm	ihr	uns	euch	ihnen	Ihnen

Examples : (1) Der Lehrer gibt dem Schüler das Heft.
Der Lehrer gibt ihm das Heft.
(2) Der Lehrer gibt dem Schüler das Heft.
Der Lehrer gibt es dem Schüler.
(3) Der Lehrer gibt dem Schüler das Heft.
Der Lehrer gibt es ihm.

Bei einem Personalpronomen und einem Substantiv (1 u. 2) steht zuerst das Personalpronomen (Dat. oder Akk.) dann das Substantiv. Bei zwei Personalpronomen (3) steht zuerst das Akkusativobject, dann das Dativobject.

Personal Pronouns

Personal pronouns always stand for a specific noun. If a verb has two objects, one being a noun and the other a personal pronoun, the personal pronoun always comes immediately after the verb, and the noun after the personal pronoun. Here it is immaterial whether the objects are direct or indirect, the general rule being that we should place the personal pronous as near to the verb as possible. If both objects are Personal pronouns the accusative preceeds the dative.

Das Zeitadverb—adverb of time

It is not difficuit to combine adverbs. The first letter of the corresponding substantive is small instead of capital and an "s" is added at the end. For example :

Substantiv	Adverb
der Morgen	morgens,
der Mittag	mittags,
der Abend	abends,
der Montag	montags,
der Dienstag	dienstags, etc,

Hints on telling the time

The expressions (ein) Viertel acht, halb acht, drei Viertel acht for 7.15, 7.30 and 7.45, respectively, convey that a quarter of an hour, half an hour and three-quarters of an hour of the eighth hour of the day have elapsed. The expressions (ein) Viertel acht, drei Viertel acht are those preferred in Central and Northern Germany.

Die Uhrzeiten —The time

7.00	Uhr	— sieben Uhr
7.05	„	— fünf (Minuten) nach sieben
7.10	„	— zehn (Minuten) nach sieben
7.15	„	— (ein) Viertel nach sieben, Viertel acht
7.20	„	— zwanzig nach sieben, zehn vor halb acht
7.25	„	— fünf vor halb acht
7.30	„	— halb acht
7.35	„	— fünf nach halb acht
7.40	„	— zehn nach halb acht, zwanzig vor acht
7.45	„	— (ein) Viertel vor acht, drei Viertel acht
7.50	„	— zehn vor acht
7.55	„	— fünf vor acht
8.00	„	— acht Uhr.

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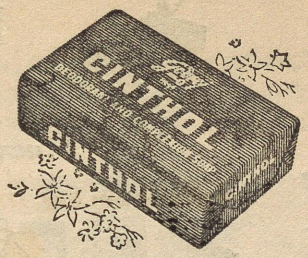

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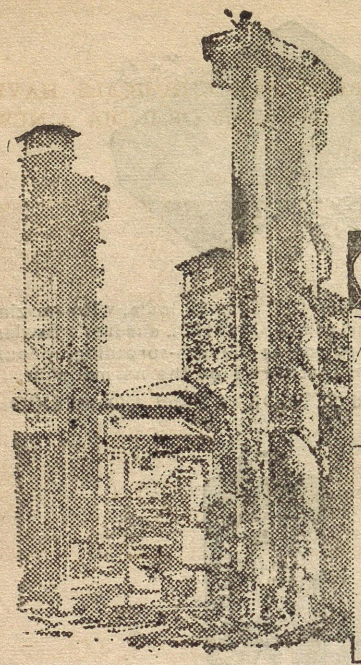

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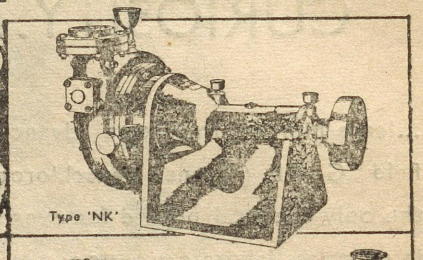

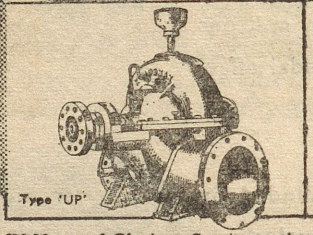

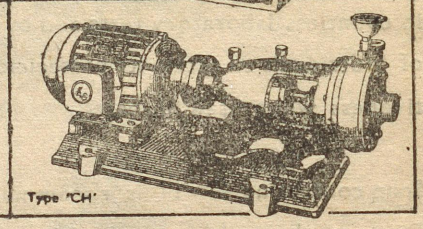

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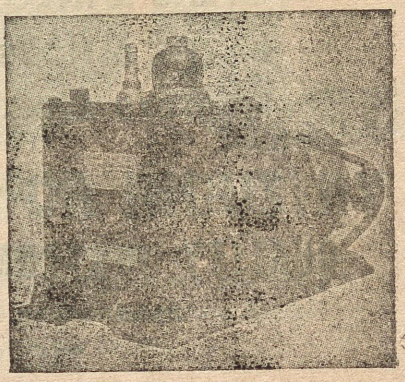

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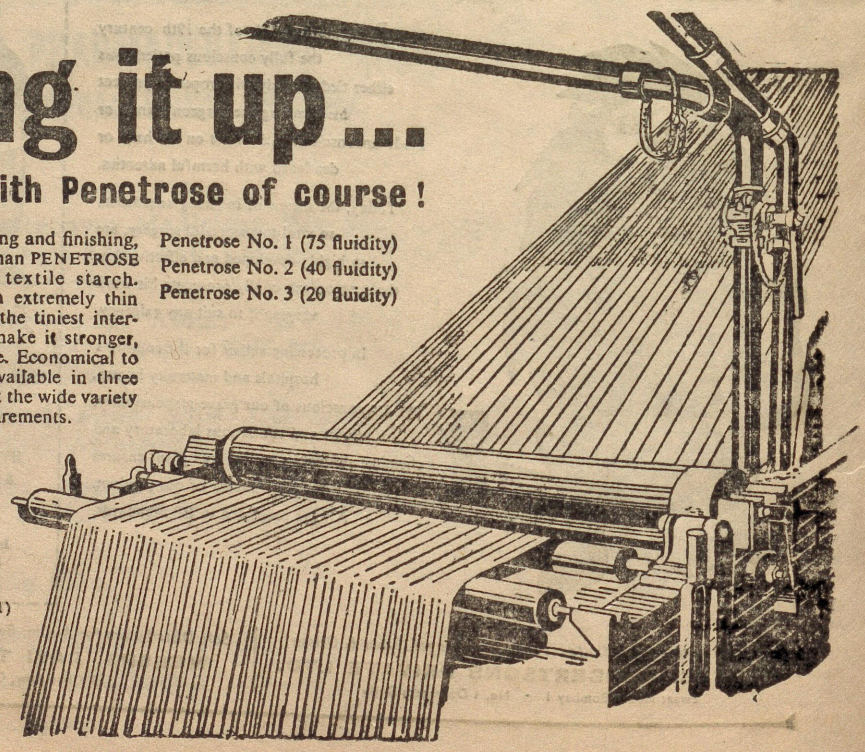

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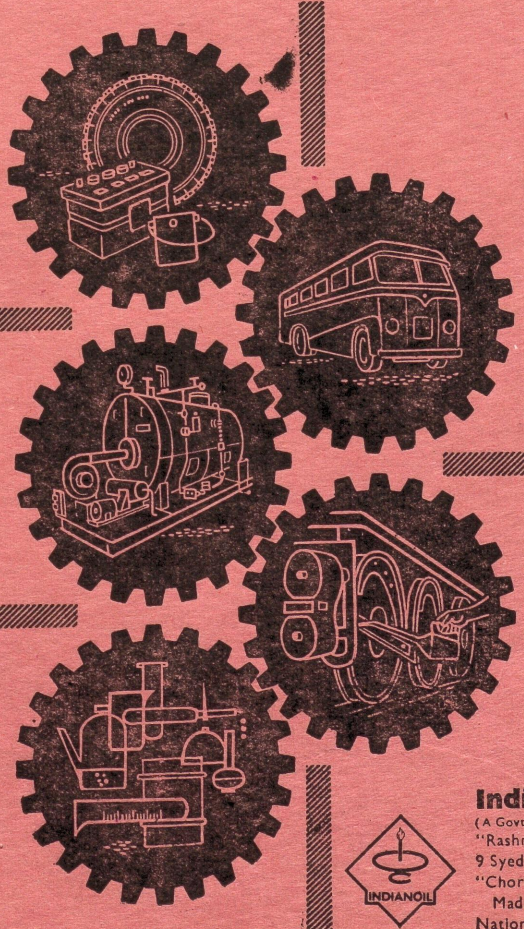

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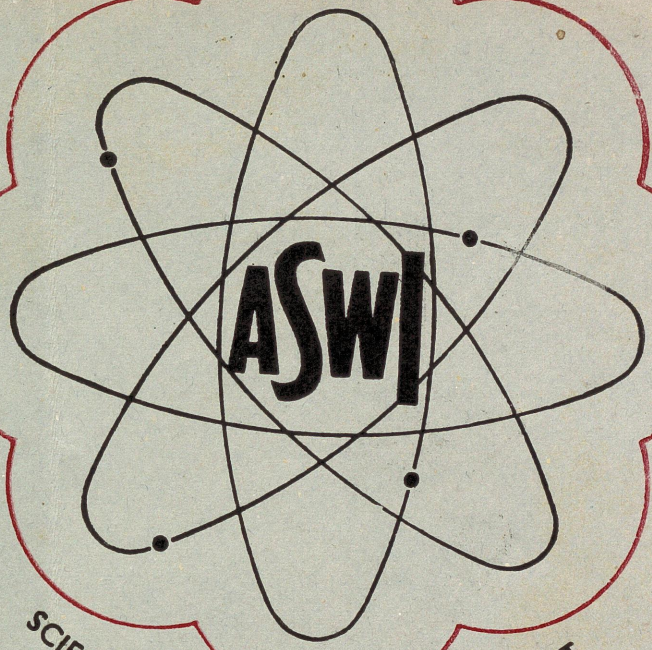

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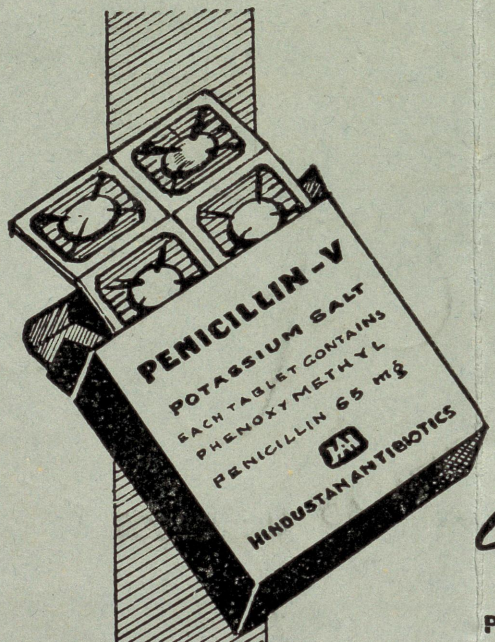

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Science News



Piped water under the sea

British consulting engineers and scientists have been called in by the Hong Kong Government to help with an ambitious civil engineering programme, designed to relieve the Colony's acute water shortage. The Colony's population (now estimated to be nearly 3¼ million) has grown so rapidly in recent years that, during the dry season, a water supply is available for only a few hours a day. Among the plans for the new supply is a scheme to reclaim a bay on the cost of Hong Kong's New Territories and use it to store fresh water.

One part of the scheme provides for piping fresh water eight miles along the seabed, from the neighbouring island of Lantau, where a reservoir capable of supplying up to 35 million gallons a day is under construction. The underwater pipes have already been laid and tested, and water should begin flowing through them before the end of next year.

After consideration of the geological conditions and other factors it was decided to build an earth dam for the Shek Pik Reservoir, on Lantau Island, and to combine earth and rock for two of the dams associated with the Plover Cove scheme (which provides for the enclosure of bay, pumping out of the sea water, and substitution of fresh water).

Hong Kong's climate is extremely wet for five months of the year—most of the average rainfall of 85 inches occurs between May and September—but much of this is inevitably wasted, with the result that the existing reservoirs are dry by the beginning of the summer. The new scheme, therefore is designed not only to provide new storage capacity but also to integrate the supply system.

In the Hong Kong climate, flood conditions are even more important than in a temperate climate; Binnie and Partners, the British consulting engineers (who carried out the feasibility studies on behalf of the Hong Kong Government) had to take into consideration an intensity of rainfall which has been known to amount almost ten inches in 24 hours (the world record is 12 inches). In a single hour as much as four inches may be recorded.

Because of the danger of erosion, an earth dam cannot be allowed to overflow, so a spillway has to be constructed to take floodwater. A spillway and its associated tunnel are built of concrete, and since this is an expensive addition to the cost of an earth dam, the advantage of using local materials for the dam may be lost unless the cost of the spillway is carefully controlled. When asked to undertake design of the Shek Pik Reservoir, therefore, Binnie and Partners consulted the British Hydromechanics Research

Association. A model of the proposed bellmouth spillway, shaft, tunnel was build, and tests were carried out under conditions representing a variety of flows up to 14,400 cubic feet a second—more than twice the "catastrophic" flood anticipated by the designers. Pressure measurerents were taken at a number of points along the slope of the bellmouth.

It was demonstrated that, at low rates of flow the water tended to fall down the centre of the shaft, and that there was, consequently a danger of excessive local wear at the junction of the shaft and tunnel. A deflector ring was therefore introduced at the top of the shaft and, after experiments, was accepted by the designers. The result of this modification was to distribute the water at the bottom of the bellmouth and destroy some of its kinetic energy, so that the water, falling down the shaft, was aerated and more uniformly distributed.

The Research Association's recommendation to use a right-angled, instead of the more expensive rounded, junction of the shaft and tunnel was also accepted and incorporated in the final design.

An additional model study of the even large bellmouth spillway (106 feet in diameter) designed for the flood-balancing reservoir at Lower Shing Mun, for the Plover Cove Scheme, was not necessary, but the Hydromechanics Research Association was consulted on the design.

The total cost of the Shek Pik and Plover Cove schemes will be more than £50 million. In the design of the Plover Cove integrated water scheme, Binnie and Partners are working jointly with Scott and Wilson, Kirkpatrick and Partners, of Hong Kong.

× × ×

Fire extinction by jet engine

The use of a jet engine as a method of fire extinction—both by flooding a building with inert gas and by using large quantities of highly expanded foam—has reached a stage at which manufacturers could develop a model suitable for pilot use by Fire Brigades.

This is stated in the annual report for 1961 of the joint Fire Research Organisation (a joint responsibility of the Department of Scientific and Industrial Research and the Fire Offices' Committee) published on July 3rd, 1962. "Fire Research 1961" DSIR 8/6d.

The Board also emphasises the importance of model studies in providing a rational basis on which to assess the necessary fire performance of buildings and in furthering knowledge of the growth of flames and heat transfer, particularly under wind conditions. This work will give a better understanding of spacing requirements between buildings. Research into the effect of the material used to line walls on the spread of fire is another study which should be pursued since their is a noticeable lack of information on this subject both at home and overseas. The Board says that it has been particularly impressed by the progress made in the modelling of fires in sections of buildings which may represent rooms, factories, halls, or offices.

With the continuing trend towards high buildings the Board considers the experimental programme on means of escape and confinement of fire in multi-storey blocks, most urgent. This, together with the work on

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curtain walling and that on the fire performance of concrete-protected steel members, should provide the answer to most of the outstanding fire problems associated with the newer type of building.

× × ×

The secret of snow water

From the experiments of the biophysical laboratory of the Tomsk Research Institute of Nuclear Physics, Automation and Telemechanics, one learns many unusual things. And the first of these is that the ancient saying that "water will not feed you" is not very exact. True, what we refer to here is not the usual water, but snow water.

Several yaers ago the head of the laboratory, Boris N. Rodimov, conducted some interesting experiments with snow water. In December 1960, two groups of poultry of the same age and weight, each group consisting of 14 laying hens and one rooster, were studied at the Tomsk Experimental Agricultural Centre. Both groups received the same food rations, but the experimental group drank only snow water. In three months' time this group produced 38 eggs per laying hen, whereas the usual group produced 19 per hen. It is interesting to note that the weight of the egg mass of the experimental laying hen was 1,988 grammes whereas that of the usual hen—only 931 grammes.

Increases weight

Experiments with pigs produced most unexpected results. Each of the five sucklings, who were given snow water to drink, increased an average of 600 grammes a day, whereas the others, who were fed the same way but who drank the water that came from the water pipes, gained only 360 grams. A sow who had been given snow water beginning with December bore 10 sucklings (7 female, and 3 male) on February 1st, and each of the newborn pigs weighed 1.5 kg. (those of a sow that had been fed with usual water weighed 1 kg. each). At the age of two months the former weighed 17.5 kg., and the latter—12—13 kg. A substantial difference.

In the winter of 1961-1962 the experiments were continued at the poultry farm of the "Tomsky" State Farm, on a large scale. From January 25 to February 24, 1962, 2,000 hens, that were given only snow water to drink, laid 11,474 eggs. Another group of hens of the same number, that had received usual water, laid but 7,775 eggs.

What is the reason for this ?

And reproductivity too

According to Rodimov, snow water, which contains less "heavy water"—in comparison with the usual one—contributes to the better assimilation of the nourishing substances by the organism. Hence with the same expenditure of fodder, the productivity of animals that receive snow water is greater. Furthermore, according to institutes data, there should be a greater number of females in the posterity of animals that drink snow water. That is very important. A report on the work was made at session of the Presidium of the Moscow Regional Board of the Scientific Technical Agricultural Society last summer. This winter a number of poultry farms of Moscow Region Economic Council plan to make a wide-scale checkup on the efficacy of snow water.

Austerity is the Mother of Liberty.

On the basis of some calculations Rodimov says: A farm having 400 cows will, in five months, if the cows are given snow water to drink, not only compensate for all the expenses connected with preparing water, but will also have a net profit of 50,000 roubles (in new currency).

Helps Plants

Snow water probably affects plants too, doesn't it ? Vegetables, for instance.

Of course, it does. The results obtained at the Siberian Botanical Gardens are interesting. Cucumbers and radishes that had been watered in a hot-house with snow water produced twice as large a crop as the usual plant. We must also associate with the action of snow water the fact that winter grain crops (in January, under the snow) produce a two fold harvest. The vitality of weeds in the fields is well known. We can probably find the secret of this vitality also in the fact that they receive snow water. Cultivated planted in the soil in spring, when all snow water has already been transformed into ordinary with the usual content of heavy water."

The Committee on Inventions and Discoveries under the Council of Ministers of the USSR has issued to Boris Rodimov a certificate on the registration of his work: "Snow water as a stimulator of an increase in the productivity of agricultural animals and plants." In other words this work merits attention.

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Job cost and progress computer

A simple computer which gives a greatly improved progressing system for maintenance and installation workers and an up to the minute cost control has been built by engineers at Harwell. This computer has already saved its cost and a second is now under construction.

A counter for electrical pulses is connected through plugs on the control panel to a pulse generator providing pulses at a repetition rate appropriate to the terms of measurement. One plug is assigned to each worker so that at any time the number of plugs inserted can be adjusted to the number of workers on the job.

Time switches are arranged so that the motor runs during the normal working hours but a selector switch allows overtime work to be included.

To measure progress in terms of man-hours, the pulse rate is one per hour and to measure in terms of cost, the pulse rate is the rate per man hour divided by the unit cost (e.g.£1) in which case the rate per man hour may be the total rate, labour and materials. The cost of exceptional items can be added automatically by a separate pulse generator during the lunch hour. By displaying the estimated cost on an adjacent plaque an immediate comparison can be made.

A licence may soon by granted for the manufacture and sale of this equipment and equiries should be addressed to the Patents Licensing Officer, U. K. Atomic Energy Authority, 11, Charles II Street, London, S. W.I.

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Anticorrosion process precedes construction

Large steel structures—such as bridges—can be adequately protected against corrosion at the time of construction. That is the

Pay the price to retain the national pride.

claim of four British companies, each specialist in its own field of anti-corrosive treatment.

Preventing corrosion—and the heavy and continuous maintenance charges it involves—has long been one of the big problems facing engineers responsible for steel construction.

The four companies have combined to show that the job can be done successfully—and the structure they are tackling is the new Forth Road Bridge in Scotland, the longest single-span bridge to be built in Europe. This protective system applied in this case should mean that it will not need the constant attention of an army of painters.

Twenty thousand tons (20,320 tonnes) of steelwork for the bridge are being delivered in pre-fabricated sections to a treatment plant in Scotland. They arrive already covered with millscale and affected by surface corrosion.

Work starts when a specially designed shot blast plant removes scale and rust from the fabrications and simultaneously prepares the steel surface for subsequent protective coating. The sections then receive a coat of pure metallic zinc. The nozzles of the spraying units deliver a high velocity jet of molten zinc droplets, which on impact with the prepared surface, bond together to form a coating which is resistant to atmospheric corrosion.

The paint used follows exhaustive testing of various paint combinations which have proved their effectiveness under laboratory conditions, and also in practical use on steel structures in many climates.

The sections arrive at the site, protected and ready for use.

The protective system chosen for this major British engineering project can, say the firms involved, be adapted for use on steel structures, large and small, in any part of the world.

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Steel straps used in packing cases suggested to earthquake-proof rural homes in Iran

Girdling a mud-walled home with steel straps—just as in strengthening a packing-case—may be a practical, inexpensive way of enabling houses in rural Iran to stand up to earthquakes.

This suggestion was made to Iranian authorities by Dr. Nicholas Ambraseys, a Greek scientist and lecturer in soil mechanics and earthquake engineering at the Imperial College of Science in London, who has just returned from a UNESCO mission to Iran.

Dr. Ambraseys' mission followed the devastating quake on September 1 that left 12,000 dead and 80,000 homeless after striking 160 villages over an area of 2,200 square miles.

In Paris on his return from Iran, he reported that the method of encircling houses with steel straps is now being tested in Iran. In two hours, four men can do the job by planting poles at each corner of the house and then tightening the straps with turnbuckles. It is hoped that this method can also be used to save houses with walls cracked by previous earthquakes.

Dr. Ambraseys explained that it has been used in the arid Central Asian regions of the Soviet Union to protect homes against wind damage. In an earth-quake-prone area, it serves to prevent the walls of house from spreading apart and allowing its roof to collapse, crushing its interior like a battering-ram.

His survey of Iran, which took him 3,000 miles by jeep, showed that the heaviest damage was caused when walls spread apart in this manner. On the other hand, small huts in the form of mud domes resting on the ground (these huts are used by herdsmen for vigils in their fields) rode out the earth-quake perfectly.

On his survey, Dr. Ambraseys also located the fracture that produced the 'quake'. Measurements have shown that the maximum intensity of the September 1 trembler did not exceed 8 on the Mercalli scale, the bottom intensity for a major earthquake. The Agadir earthquake in Morocco in 1960 was recorded as 9 while the Orleansville earthquake in Algeria in 1954 registered 11.

In his recommendations, Dr. Ambraseys has suggested the adoption of a building code with adequate provisions for earthquake-proof construction.

His mission to Iran is now being followedup by that of two more UNESCO experts, Mr. Jean Despeyroux and Mr. Christian Lescuyer de Chaptal, both French engineers with the "Securitas" office in France. Their task will be to study methods of anti-seismic construction of schools and rural buildings with local materials.

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Ventilated jacket for radiant heat

A ventilated garment, served by an air-cooling unit, has been produced by a British steel firm. For use in steelworks' crane cabs and other hot surroundings, the jacket, weighing less than 1 lb., is made from "Terylene" sailcloth with a series of ventilation ducts served by a single air intake—a flexible plastics tube.

The "coat" has a number of small holes in its outer and inner surfaces which allow a wide distribution of air and gives overall diffusion for the worker's outer garment—such as a boiler suit. The effect is a barrier of cool air insulating the wearer from the surrounding heat.

This principle of "dynamic insulation" has been the subject of investigation by a climate and working efficiency unit of Britain's Medical Research Council, working in conjunction with the British Iron and Steel Research Association, and has been shown to be an efficient method of protecting the human body against radiant heat.

"Terylene" sailcloth is virtually impervious to air at the pressures involved and being a woven materials can readily be sewn.

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Fibre glass filter for clinically clean air

Special filters made of glass fibre which can extract particles of 0.3 micron diameters at an efficiency level of 99.9 per cent and at high temperatures, have been developed by a firm in Gloucestershire.

Designed for use where the highest possible filtration efficiency is required, where long life is essential and where humidities of up to 100 per cent. exist, the filters can be operated at constant temperatures of 5000°C.

Jawans are fighting for the nation—let us give them strength.

They have the advantage over esparto grass-based filters of being rot and insect proof, are unaffected by acids, and bacteria will not grow through them. Their efficiency never varies—unlike natural fibres.

The filters are already being used in nuclear power stations, where large volumes of absolutely clean air are required. One filter is capable of handling 1,000 cu. ft. (16387.1 cu. m.) of air a minute. The filters are also being used for hospital operating theatres, laboratories, precision engineering and pharmaceutical manufacturing.

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Light weight suiting fabric

A lightweight suiting cloth produced after several months' research by two British firms is a blend of 55 per cent Terylene and 45 per cent. wool worsted, combined in a material which, the manufacturers claim, has a lustre akin to mohair and the hard-wearing characteristics of Terylene. It is particularly suitable for men's tropical or semi-tropical suits and for skirts.

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New phone system

A new kind of public telephone, which times conversations and returns change for any time paid for but not used, is now being tried out in Haifa, Israel.

Developed by two Israeli telephone technicians, the machine enables users to pay only for the exact time of conversations, instead of for entire 3-minute periods as at present.

Before dialling the number required, the caller puts into a transparent slot container the quantity of tokens he considers will cover the length of his call. As he speaks, he can clearly see his tokens dropping down. When he finishes speaking and unused tokens remain in the machine, he presses a button and they are returned to him.

If the new device proves successful during its present 6-month trial, it is to be put into general use.

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Hope for the blind

Blind people still able to distinguish between light and dark will soon be able to read books and newspapers with the help of an instrument, recently perfected in Israel, which enlarges letters 26 times. But its special effect is produced by the fact that the ray of light strikes through the letter straight into the eye and is not broken by the paper, as happens in ordinary reading.

The device was tried out on a man who had been considered completely blind for many years. A newspaper was placed on top of the box, and the enlarged letters which appeared on the neon-lighted screen were easily discerned and read aloud by him, blurred only by the tears of joy which welled into eyes that had lived in darkness so long.

The idea was first conceived when the inventor, Mr. Julian Aker, was walking with a blind friend. Suddenly the friend gripped his arm and shouted "I can see, I can see!", pointing at the same time at a bright neon-lit advertising sign. Mr. Aker realised that the special properties of neon light could be employed in enabling blind people to read, and went on to develop the instrument, which he proposes to market soon.

Articles

COMBATING CANCER—THE GREAT KILLER

By Professor Nikolai Blokhin,
President, World Cancer Congress, Moscow.

Only recently the most representative forum of the peoples for general disarmament and peace in history ended at the Palace of Congresses in the Moscow Kremlin.

On July 22 in this very same hall the biggest international medical Congress in history got down to a discussion of ways of combating cancer and other malignant tumours. In my view this fact itself is very meaningful. If envoys of virtually all the nations of the earth discussed at the World Congress of Disarmament and Peace the most vital problem of the day--how to save mankind from the menace of a thermonuclear war--our Congress, at which medical men of 70 countries were represented, was convened to find ways and means of ridding humanity of one of the most dangerous diseases--cancer. Human health and peace are inseparable.

Major Problem

The problem of malignant tumours is one of the major problems, and one of the most difficult, facing 20th century medicine. In order to solve it, it is necessary to pool the efforts of scientists working in a wide range of spheres in all countries. That is why this Congress was not only attended by oncologists but by surgeons and gynaecologists, virologists and radiologists, biologists and physicists, chemists and representatives of other specialities.

Scientists have been wrestling with the problems of cancer for many centuries. Yet no one in the world can say that he has made decisive headway in this field.

That, of course, does not mean that the efforts of scientists have yielded no fruit.

When speaking of cancar research in Russia it is necessary to mention M. Rudnev and M. Novinsky, the originators of oncology. Attempts were made way back in pre-revolutionary times to set up special oncological institutions, as, for example, the Institute for the Treatment of Tumours founded in Moscow in 1903 by V. Zykov.

It was only after 1920, however, that possibilities opened up for large-scale state-sponsored measures to combat cancer and to organize cancer research. There are now 19 oncological research institutes in Russia two of which operate within the network of the Academy of Medical Sciences of the USSR (Institute of Experimental and Clinical Oncology in Moscow and the Institute of Oncology in Leningrad). Oncological clinics have been set up in all the big cities. These are institutions consisting of a polyclinic and an in-patients department equipped with everything necessary for modern surgical and ray treatment of tumoura as well as treatment with various medicines.

Mass Prophylactic Examinations

The mass prophylactic examinations carried out throughout the country have made it possible to spot and cure tens of thousands of cancer patients in the early stages of the disease, in addition to hundreds of thousands with pre-tumour ailments.

Scientists are attacking cancer on a broad front. Widely known is the research done by L. Shabad and his pupils in studying cancerigenic agents.

The study of cancerigenic substances in man's environment is generally linked with tumour prophylaxis. The research done by oncologists in this direction is closely linked with the work done by the special commissions which controls possible cancerigenic influences in the enviornment.

Of great significance is detection of benzopyrene 3--4 in the atmosphere of a number of industrial cities and in instituting measures to prevent contamination of the air. A case in point is Angarsk, a new town being built in Eastern Siberai, where the air is almost completely free of benzopyrene.

Another laboratory has been doing research in the virus theory and tumour immunology for many years. L. Zilber is the author of the virus hypothesis in tumour formation. His laboratory has discovered specific tumour antigens and is now doing very interesting research in tumour immunology.

Scientists have also spent many years studying the role of viruses in the origination of tumours. These laboratories have accumulated interesting data on the isolation of virus—like bodies from certain types of tumours in man, and also on their cultivation in tissue cultures and chick embryos.

Induced Tumours

Many laboratories are working on new types of tumour growths in animals. Scientists

United Nation Award For British Doctor

A London doctor was among seven international research workers who received from the President of the United Nations General Assembly in New York (October 10) an award of $ 10,000 for "outstanding scientific reserarch in the causes and control of cancerous diseases". Other winners of the awards were from the United States, France, and the Soviet Union.

The British winner was Dr. W.R.S. Doll, assistant professor at the statistical Research Unit of the British Medical Research Council. He was unable to attend the presentation ceremony, and the award was received on his behalf by Sir Patrick Dean, Britain's permanent representative at the UN.

The citation stated: "Dr. Doll is renowned for several studies on the epidemiology of lung cancer, illustrating the very major part played by the smoking of cigarettes in the occurrence of this disease. He has also been able to demonstrate a dose-effect relationship between ionizing radiation and leukaemia.

"Through the methods described and employed by him, Dr. Doll has largely contributed to the extension of epidemiological studies of cancer throughout the world."

This was the first time the awards have been made since they were instituted in 1959. The President of the General Assembly, Sir Muhammad Zafrulla Khan, of Pakistan, said that in honouring the seven outstanding scientists the United Nations was also paying tribute to all research workers engaged on the problems of cancer.

have succeeded, for the first time in the world, in inducing bone sarcoma in monkeys with the help of cancerigenic agents. They have induced bone sarcoma in rats with the aid of radioactive strontium. In recent years tumours of the prostate gland and testicles have been induced in rats. Success has been obtained in forming an experimental model of lung cancer, and so on down the list.

The research done in the sphere of tumour pathogenesis reveals the significance of the nervous system in the development and metastasis of tumours. The many years research done by another laboratory headed by in the field of morphology of malignant tumours and pre-tumour ailments is of tremendous significance in classifying and understanding the origin of a number of tumours.

In recent years research on the chemotherapy of tumours has been widespread. The work done by a team of chemists, so far has made it possible to introduce new anti-tumour medicines—novoembichin, dopanum, sarcolysinum.

Teams of chemists are working actively to find new medicines to combat tumours. They are co-operating with biologists and doctors who are studying the practical effects of these medicines.

Hormone Therapy

Methods of hormone therapy in treating certain tumours are being elaborated in greater detail and methods of ray treatment are being perfected. The surgical method of treating tumours, which has been greatly developed is being augmented by modern ray and chemical therapy methods. All this taken together makes for better results in treatment.

This far from complete list makes it clear that scientists are steadily approaching a solution of the highly complicated problems connected with the origin and treatment of malignant tumours.

Our common aim is to fight cancer, which is one of humanity's most merciless killers. We hope that the hour is near when the collective efforts of scientists in different fields will provide doctors with effective means for preventing this disease and for more effective treatment.

Those attending our Congress clearly realized that humanity can be rid of disease and of such a killer as cancer only if there is peace and co-operation between scientists. We shall do our utmost to fulfil our duty to humanity.

We believe that man will triumph over disease and take the highroad to light, knowledge and happiness.

Military fights, when the civilian strives.

49 years... not even a scratch

The rate of industrial accidents in India has increased from about 24 per thousand workers in 1938 to about 44 in 1959. Every year, over 93,000 workers are involved in accidents and 250 lives are lost. Also wasted annually are a million man-hours—enough to produce 170 broad guage locomotives or 700 coaches for the Indian Railways.

Safety has always been Tata Steel's watchword as efficiency is hardly possible without it. 'No-accident month' as an annual feature, safety exhibitions, training in safety, safety awards, safer working conditions, a continuing campaign under the direction of joint councils to turn safety into a habit... these are some of the means adopted in Jamshedpur to prevent accidents in the Plant.

Safety, however, depends largely on the worker himself because about 75 per cent of industrial accidents are found to be caused by human negligence. This is where men like Jamuna Dube, the oldest employee in Tata Steel, come in. He has worked for 49 years without ever sustaining an injury, not even a scratch.

The importance of safety was one of the first things that Jamshedpur taught Dube when he arrived in the Steel City half-a-century ago ... a city where industry is not merely a source of livelihood but a way of life.



JAMSHEDPUR
THE STEEL CITY

The Tata Iron and Steel Company **Limited**.

JWTTN 6093A

GIVE FREELY TO NATIONAL DEFENCE FUND

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 Commission'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 so-called 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 the 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 boron 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 technique is being used by physicians and others who are using

ROYAL SOCIETY GOLD MEDAL FOR PROF. S. CHANDRASEKHAR

Queen Elizabeth has approved the recommendation by the Council of the Royal Society that the Society's Royal Medal be awarded to Professor Subrahmanyan Chandrasekhar, formerly of Madras and now professor in the University of Chicago, U.S.A.

Professor Chandrasekhar, educated in Madras and Cambridge, is the first Indian ever to be awarded the Royal Medal. The award, says the announcement by the Royal Society, is "for his distinguished researches in mathematical physics, particularly those related to the stability of the convective motions in fluids with and without magnetic fields".

The Royal Medals have been awarded since 1826. Two, struck in gold, are awarded annually by the Sovereign, on the recommendation of the Council, for the two most important contributions to the advancement of natural knowledge published originally in the Commonwealth within a period of not more than 10 years and not less than one year of the date of the award.

The second award for this year has been made to Sir John Eccles, Professor of Physiology in the Australian National University at Canberra, for his investigations of the function of the spinal cord.

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 depth 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 months. To date, the results have been beneficial in nearly 50 percent of the cases treated.

Teaching Machine

An experimental teaching machine is being tried out at the National Physical Laboratory to train new and unskilled staff to do complicated though routine tasks. Much of the measurement and test work at the Laboratory involves long sequences of operations which have to be carried out with care and accuracy. Training staff for this work at present makes demands on the time of senior research staff because it requires much knowledge and experience, and the teaching machine may help to relieve them of this. The machine was on show on the DSIR stand at the Instruments, Electronics and Automation Exhibition opening at Clympia on May 28.

The teaching machine, esssntially a film projector, contains a serics of basic instructions. After completing each instruction, the pupil is presented with the next instruction in the sequence merely by pushing the answer-switch. Some of the instructions are put in the form of questions; the answer key (yes/no) enables the user skip over any of the detailed instructions with which he is familiar, or allows the machine to follow one of several sequences of instructions, according to the answer given.

The teaching machine, in a senses, controls, a human being as a programme does a computer. Just as it possible to program a computer to do very complicated work, so it should be possible to program relatively unskilled people to do work which would normally be quite beyond them.

The machine uses a 35-mm. film incroporating a code which controls the sequence of events. Two satacks of photo-electric cells (one for each of the alternative answers) receive signals from alternate transparent and opaque bands, bordering each strip of the film, as required. Any given sub-routine can be used at any point in the training sequence.

ASSAULT AGAINST CANCER

What has been called history's most dramatic and best coordinated assault against a single disease is now under way in the United States. The goal is a durg which will cure cancer as effectively as, for example, penicillin cures pneumonia.

In the search for a cancer-killing pill or injection, more than 100,000 drugs have already been studied. Of these, a few dozen have shown enough promise to merit trials on human (rather than animal) patients. In general, however, their performance has been disappointing.

One of the dilemmas confronting the searchers for a positive cure for cancer is that many of the new drugs now being studied are highly toxic. Animal tests have shown that the new drugs, if given in too small quantities, have no effect against cancers. But if given in too large doses, they attack normal body cells.

Surgeons at Tulane University's School of Medicine in New Orleans now appear to have found an effective method of utilizing the good qualities of the drugs while at the same time minimizing their side-effects, it is reported by the publication *Today's Health* published by the American Medical Association. The method—called the perfusion technique—was developed initially by Dr. Oscar Creech, Chairman of the Department of Surgery at Tulane, and Dr. Edward T. Krementz, associate professor of surgery.

A chief difficulty in connection with the new drugs, they agreed, was that the doctor could not deliver them to the target—the cancer—in sufficient quantity. If a method could be found to give the cancer a "sledge-hammer blow" of a drug, and at the same time keep the drug away from susceptible normal tissue, it should be possible to obtain effective results.

In its initial stages, cancers tend to remain confined to one region of the body. The two doctors reasoned that if they could isolate the particular body region that contained the cancer, and treat only that region with very large amounts of anti-cancer drugs, placed exactly where needed, they might succeed in curring some of their patients. They wished, if possible, to use doses of drugs 10 or even 20 times as large as those that could be tolerated by the body as a whole.

In using the method, the doctors believed, it should be possible to isolate almost any body region. To isolate a brain tumor, for example, the doctor would tie off the carotid artery and jugular vein in the neck, and then connect a heart-lung machine to the brain to maintain the blood circulation to that area. A similar method would be used in connection with cancerous areas in the legs, arms, brests and the abdominal region. A lung cancer, however, would require major surgery.

To discover whether or not their idea was practical, the two doctors and their associates performed dozens of operations on laboratory animals, whose organs and body regions were isolated and then perfused with large doses of anti-cancer chemicals. Virtually all of the animals survived without difficulty and were up and about in a day or so, none the worse for their experience.

Factories and Farms are as important as Arms for Nation's Defence.

The next step was to use the method on human patients. Within six months the Tulane doctors "perfused" a total of 73 patients, treating a variety of types of cancer with six different anti-cancer drugs. In all cases, the doctors treated only patients for whom no other type of therapy was possible In many, cancer had spread too widely for surgical excision; while others had types of cancer that did not improve under radiation. Marked improvement occurred in a majority of the cases treated by perfusion.

Even so, Dr. Creech, with the medical researcher's customary caution, refuses to say that any of the patients have been "cured" of their disease. It is much too early for that. Considerable time must pass without a recurrence of cancer before it can be said with positive assurance that the disease has been totally cured. Dr. Creech says, however that in numerous cases the disease has been "arrested." And in cases where the cancer was too advanced to make a cure possible, there has been marked relief from pain—one of the most striking aftermaths of perfusion.

While perfusion has been surprisingly effective, it has been only slightly beneficial in treating cancer of the brain. The procedure has proved of some benefit, however, in treating other cancers in the head area—cancer of the tongue and mouth, for example.

As yet, it is too early to know what the final effects of perfusion treatments will be. In many cases there has been "Quiescence," and in others "temporary regressions." On a relatively small number of patients, the technique has had no observable effect.

Why is treatment of this type effective in one case and ineffective in another—although exactly the same type of cancer may be involved in both ? This is one of the most puzzling questions.

Summing up the present situation with regard to the perfusion technique, Dr. Creech still refuses to say that a single case of cancer has been "cured". Such a claim, he points out, cannot be made until more time has elapsed.

Today, most cancer researchers are convinced that the eventual conquest of the disease will not be achieved by any one single method. Cancer, they believe, will eventually yield to a series of small tactical triumphs. At this point, perfusion appears to be one of these.

Buy only when you must. Keep prices Down.

ASSOCIATION NEWS

Resolution passed by the Association of Scientific Workers of India, Lucknow Branch on the death of Prof. Niels Henrik David Bohr, winner of Noble Prize for Physics of 1922.

This meeting of the Lucknow Branch of the Association of Scientific Workers of India wish to record its deep sense of sorrow at the demise of one of the distinguished world renowned Physicist Prof. Niels Henrik David Bohr of Denmark. Prof. Bohr—the father of modern physics.

Niels Bohr was born at Copenhagen on October 7, 1885. Upon completing his University studies in his native town, where he graduated in 1911, he lectured in physics at his alma matar from 1913 to 1914. In the latter year he went to the Victoria University of Manchester to work with Prof. Rutherford, but returned two years later to Copenhagen, where he has since occupied the chair of theoretic Physics. In addition he undertook, as from 1920, to conduct the Institute for Theoretic Physics attached to the University.

Already as an undergraduate Bohr aroused with admiration in connection with scientific prize question set by the Danish Academy of Sciences; this questions Bohr succeeded in solving by means of theoretic and experimental investigations in the laboratory of his father, Professor Christian Bohr, and the prize was awarded to him in 1908. The disputation he delivered after graduating dealt with the explanation of the physical properties of metals with the aid of the electron theory, and his subsequent work was likewise devoted to problems of the theory of atoms. It was in 1913, at the age of 28, that he established his fame by conceiving the theory of atomic quanta. Starting from the belief that, within the atoms, the electrons can only follow such courses as suffice for definite quanta relations, he arrived at a correct explanation of the hydrogen spectrum. In further confirmation of his theory, he established that certain spectral lines, which until then had wrongly been attributed to hydrogen, were peculiar to helium, as in fact, experiments show that these lines can be produced in helium tubes wholly devoid of any admixture of hydrogen. Indeed, Bohr's theory of atoms even demonstrated the possibility of ascertaining the most important constants of the science of electricity by mere spectroscopic observation.

In 1920 Bohr set up a theory for periodical system of elements, the practical outcome of which was the discovery of the formerly unknown element 'Hafnium', (so called after the town of Copennagen). In later twenties, Bohr attained special merit in

casting light on the theoretic and natural philosophic significance of the new science of wave mechanism. In 1936 he proposed his theory of nuclear reaction.

Dr. Bohr went to the United States in 1939 and worked on a theory of nuclear fission. He was forced to flee from Denmark in 1943 escaping to Sweden in fishing boat. From there he was flown to Britain in the bomb day of a mosquito bomber. During the flight he was unable to make his oxygen mask work—and was unconscious when the plane landed.

He lived quietly after the war but in 1950 wrote an open letter to the United Nations appealing for an exchange of information about atomic energy as a means of relaxing international tension.

In 1957 he became the first person to receive the atoms-for-peace award created by the Ford Motor Company in response to President Eisenhower's appeal for international effort in developing nuclear energy for peaceful purposes.

Prof. Bohr was awarded the Noble Prize in 1922 for his work on the structure of atoms and of the radiations emanating therefrom.

He was Director of Copenhagen Institute for Theoretical Physics, Foreign Member of London Royal Society and President of Royal Danish Academy of Sciences. He was also a member of the International Association of Scientific Workers.

Mathematics and Automatisation

For the application of automatic control to an industrial process each unit of the process should ideally, be described in mathematical terms. So far not enough is known about mineral processing operations to provide a methematical description from first principles. However, by measuring the performance of the plant over a wide range of operating conditions and analysing the results it should be possible to construct the necessary mathematical formulae empirically. This data will be obtained from experiments carried out on a full-scalle plant over a period of several months at the Parc Mine, which is a lead/zinc mine with a modern processing plant and which is being equipped with a wide range of instruments and equipment for automatically recording results in a form suitable for analysis on a computer. The equipment, which will continuously measure plant performance and will include a polarograph and an X-ray fluorescence spectrometer, is being provided through the National Research Development Corporation by the organisations, which are also undertaking some of the development work necessary for its application to this field.

Lend to Defend—Invest in Defence Deposit Certificates.

W·F·S·W· News

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The names and addresses of members of the tw bodies elected by the Seventh General Assembly of the W. F. S. W. in September 1962 are given below.

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22 Lektion

Dear friends !

We shall listen to-day to Walter telling his two friends a story about a pick-pocket—Der Taschendieb.

Ein Kaufmann machte einmal eine Reise. Er stieg in einer Kleinstadt aus, denn er wollte dort seinen Freund treffen. In einem Hotel mietete er ein Zimmer und ging dann in die Wohnung des Freundes.

Die Freunde sassen lange zusammen und erzählten. Spät in der Nacht ging der Kaufmann in sein Hotel zurück. Die Strassen der Stadt waren sehr dunkel, und er konnte nur schwer seinen Weg finden. Niemand war auf der Strasse. Plötzlich hörte er Schritte. Ein Mann kam eilig um die Ecke einer Seitenstrasse und stiess mit dam Kaufmann zusammen. Der Mann sagte eine Entschuldigung und eilte weiter.

Der Kaufmenn blieb stehen. "Wieviel Uhr ist es schon ?" dachte er und wollte auf seine Uhr sehen. Er griff in die Tasche seiner Jacke, aber er fand die Uhr nicht. Auch die Taschen seiner Weste waren leer. Schnell lief er dem Mann nach, fasste ihn am Mantel und rief: "Geben Sie mir sofort die Uhr !" Der Mann erschrak sehr, denn die Stimme des Kaufmanns klang sehr zornig. Er gab ihm die Uhr, und der Kaufmann ging zufrieden weiter.

Im Hotel ging er sofort in sein Zimmer und machte Licht. Da sah er auf dem Nachttisch neben seinem Bett eine Uhr. Er griff in seine Tasche und fand—die Uhr des Mannes ! "Mein Gott !" sagte der Kaufmann, "ich bin ja ein Taschendieb und nicht dieser Mann !"

In dieser Nacht schlief der Kaufmann sehr schlecht. Am Morgen gab er der Polizei die Uhr. Die Polizei konnte den Besitzer der Uhr schnell finden und gab ihm die Uhr zurück.

aussteigen	to get out	denken	to think
da	at this moment	dunkel	dark
der Dieb	thief	die Entschuldigung	excuse
eiling	in a hurry	erzählen	to tell
erschrecken	to be startled	finden	to find
fassen	to take hold	das Hotel	hotel

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greifen	to put ones hand in	ja	indeed
die Jacke	coat/jacket	die Kleinstadt	small town
klingen	to sound	leer	empty
das Licht	light	Licht machen	to turn on the light
der Mann	man	nachlaufen	to run after
niemand	nobody	plötzlich	suddenly
die Polizei	police	rufen	to cry
schlecht	bad	der Schritt	step
schwer (adv)	difficult	die Seitenstrasse	side street
stehen bleiben	to stop	die Taschendieb	pickpocket
treffen	to meet	die Weste	waistcoat
zornig	angry	zufrieden	contended, satisfied
zurückgeben	to give back	zusammenstossen	to collide with
zurückgehen	to return	ändern	to change
der Genitiv	genitive	das Imperfekt	preterite
schwach	weak	wessen	whose ?
der Besitzer	owner		

Genitiv

Der Schüler hat ein Buch. Das ist das Buch des Schülers.
Mein Freund hat ein Haus. Das ist das Haus meines Freundes.
Das Zimmer hat zwei Fenster. Das sind die Fenster des Zimmers.

	masculine	*neuter*	*feminine*
Singular	des Schülers des Freundes meines Schülers	des Zimmers des Kindes meines Zimmers	der Schwester meiner Schwester
Plural	der (Schüler (Zimmer (Schwestern	meiner (Schüler (Zimmer (Schwestern	

Singular	des—(e) s	des—(e) s	der
Plural		der	

Genitiv Singular maskulin hat oft die Endung-s oder-es, neutral hat immer die Endung -s oder -es, feminin hat keine Endung.

Plural maskulin, neutral und feminin haben keine Endung.

Fragepronomen — wessen ? fragt nach dem Genitiv !

Wessen Buch ist das ? Das ist das Buch des Schülers, des Kindes, der Tante, der Kinder.

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23. Lektion

Dear friends !

Today we learn how to express the past tense in German.

The Imperfect

The imperfect, like the English simple past, is a form of the verb which expresses an action or happening in the past. The imperfect forms of what are known as the "weak" verbs have the same suffixes as the present but are preceded by a -t-, although the 3rd person singular terminates in an -e (without any final -t). The 1st and 3rd persons singular thus have the same form. If the stem of a verb ends in -t or -d, -et-is inserted between the stem and the suffix.

The strong verbs are those with a special from in the imperfect they should be learnt separately.

A few verbs, known as mixed, have a special imperfect form, the suffixes, however, being the same as those of the weak verbs. In the 1st and 3rd persons singular the strong verbs have no flexional suffixes.

Imperfect

	(a) sagen			(b) antworten	
ich	sag-t-e	-t-e	ich	antwort-et-e	-et-e
du	sag-t-est	-t-est	du	antwort-et-est	-et-est
er	sag-t-e	-t-e	er	antwort-et-e	-et-e
wir	sag-t-en	-t-en	wir	antwort-et-en	-et-en
ihr	sag-t-et	-t-et	ihr	antwort-et-et	-et-et
sie	sag-t-en	-t-en	sie	antwort-et-en	-et-en

(a) ablehnen, aufräumen, bestellen, besuchen, bezahlen, brauchen, danken, dauern, diktieren, drehen, eilen, einkaufen, entschuldigen, erklären erzählen, fassen, fragen, führen, gehören, glauben, gratulieren, grüssen, heizen, holen, hören, kaufen, klingeln, leben, legen, lernen, lieben machen, rauchen, schenken, stellen, studieren, suchen, telefonieren, üben, verbessern, wählen, wiederholen, wohnen, wollen, wünschen, zählen, zeigen.

(b) arbeiten, betrachten, enden, erwarten, kosten, mieten, rechnen, schaden, vermieten, warten.

Diese Verben sind schwach und haben vor der Konjugationsendung immer ein -t- oder -et-

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Merken Sie !	bringen :	**Imperfect :**	er brachte
	denken :		er dachte
	kennen :		er kannte
	haben :		er hatte
	können :		er konnte
	müssen :		er musste

(c) geben	(d) rufen	(e) gehen	
ich gab	ich rief	ich going	
du gab-st	du rief-st	du ging-st	-st
er gab	er rief	er ging	
wir gab-en	wir rief-en	wir ging -en	-en
ihr gab-t	ihr rief-t	ihr ging-t	-t
sie gab-en	sie rief-en	sie ging-en	-en

Infinitiv	**Praesens**	**Imperfekt**
anbieten		er bot—an
beginnen		er begann
bleiben		er blieb
einladen	er lädt..ein	er lud..ein
einziehen		er zog..ein
essen	er isst	er ass
fahren	er fährt	er fuhr
finden		er fand
gefallen	er gefallt	er gefiel
geben	er gibt	er gab
gehen		er ging
greifen		er griff
halten	er hält	er hielt
heissen		er hiess
helfen	er hilft	er half
klingen		er klang
kommen		er kam
laufen	er läuft	er lief
lesen	er liest	er las
liegen		er lag
nehmen	er nimmt	er nahm
rufen		er rief
schlafen	er schläft	er schlief
schliessen		er schloss
schreiben		er schrieb
sehen	er sieht	er sah

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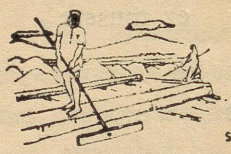
What salt means to you!



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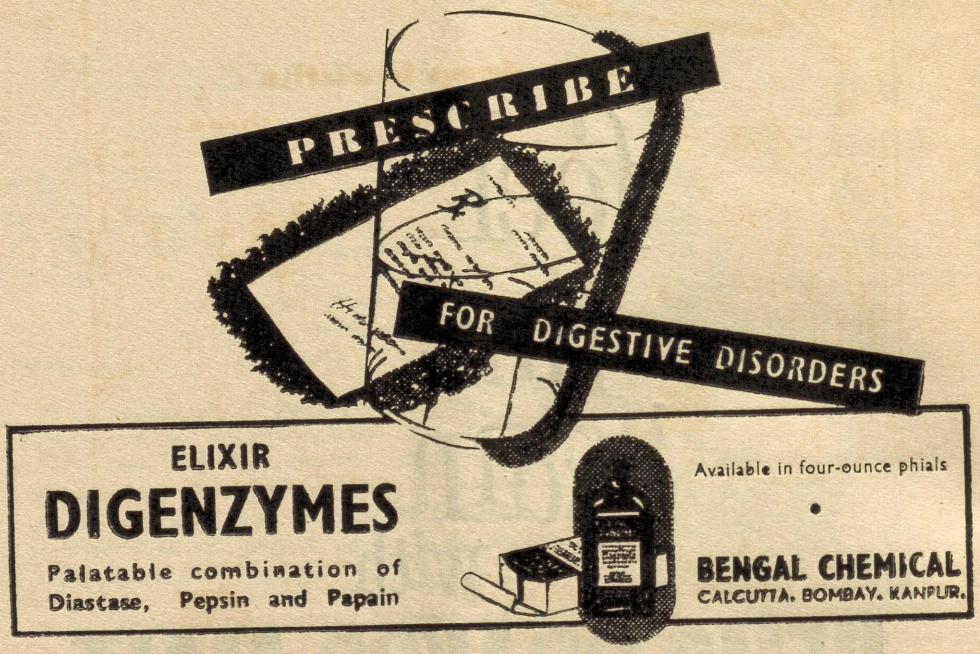

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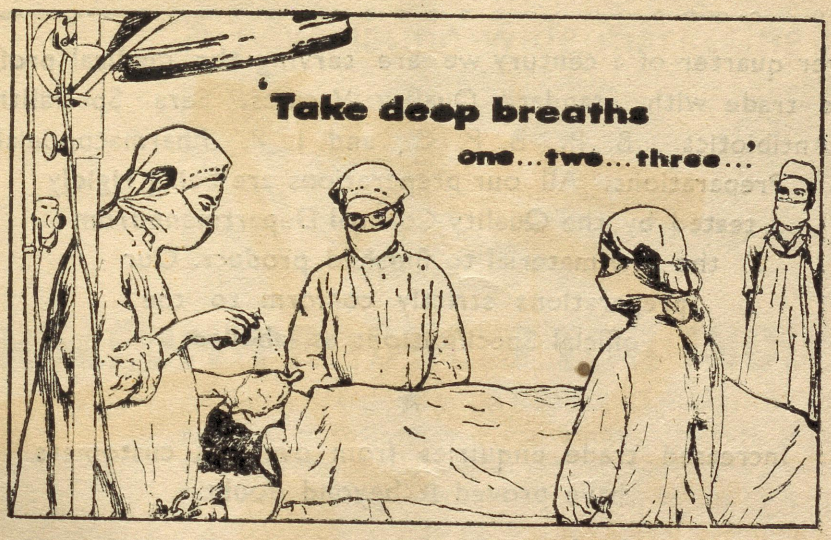

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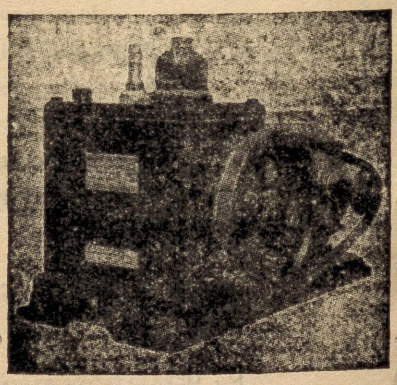

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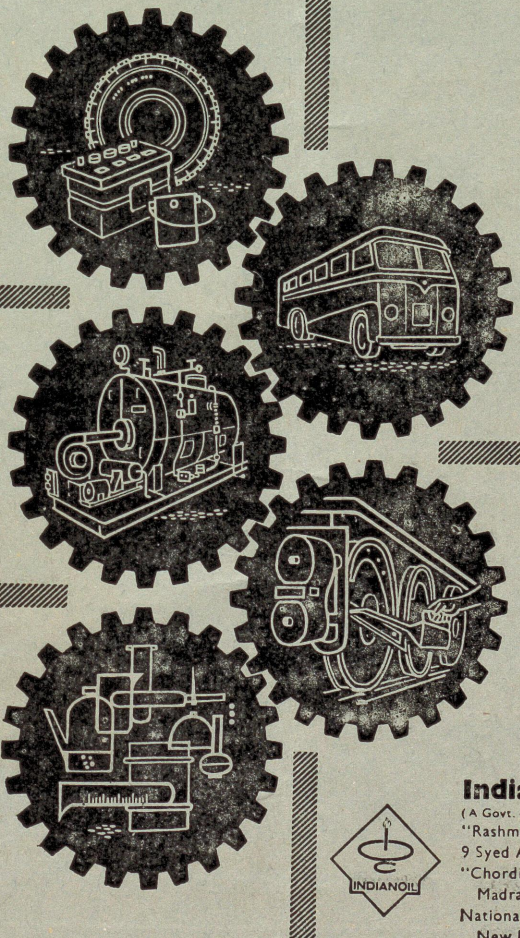

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