YOJANA

TWELFTH YEAR 23 NOVEMBER 24, 1968

No - 23

BIG DEEDS
HUMBLE MEN

In this feature Yojana seeks to present the outstanding achievements of some of the many millions of obscure men and women who are working to build tomorrow's India.

BOLANGIR'S BREAKTHROUGH

The farmers of Bolangir district in Orissa have a sense of fulfilment today. Through their efforts and determination, the district has been turned from one of scarcity to that of plenty in agriculture.

Till 1966-67, Taichung was comparatively unknown to these farmers. A spectacular breakthrough in agriculture came in 1967-68 Kharif, when, for the first time, 5,494 acres were brought under the high-yielding variety—Taichung Native-I.

The capping success of this first experiment in the high-yielding programme came when Laxman Kumar Dharua of Kutenpali of Loisingha Block produced a record yield of 195 maunds of grain per acre.

In recognition of his achievement, the State Government presented him with a pumping set and Loisingha Panchayat Samiti gave him a power sprayer. The State Chief Minister's New Year Greeting Card featured him along with another farmer.

A sense of competition has developed amongst the farmers of the district. The encouraging results of high-yielding programme in the Kharif of 1967-68 had its impact on the Rabi prospects. Bereft of irrigation facilities in the district, the people took up the challenge and impounded water wherever available. Small cross-bunds were put up across streams and rivers. New lands were reclaimed. Water was pumped from these small reservoirs. Youth clubs took the initiative of reclaiming lands.

During the Rabi season of 1967-68, an ambitious target of 20,690 acres for growing Taichung was fixed. Of this, 20,000 acres were in two blocks and 690 acres were spread over various Blocks in the district. The farmers' will and courage, and assistance and guidance from governmental agencies have made it a success.

The target was exceeded and Taichung was grown over 22,800 acres of land.

Today, in many areas of Bolangir, one can see lush green Taichung fields and the farmers' smiling faces. And a new confidence has developed. Already, the change has had its impact on paddy procurement. As much as 25,000 tonnes have been procured by June 1968, as against 7,000 tonnes procured in 1964-65, which was the highest since 1959.

RICE FOLLOWS WHEAT IN SAME FIELD

Kashmir Valley, which has been a single cereal crop area through the ages, is undergoing a silent transformation in agricultural production with the successful introduction of Sonora-64 wheat. This high-yielding variety of wheat, which was sown in some parts of Anantnag district in October/November last year after the year's bumper paddy crop had been gathered has just been harvested with encouraging results. According to first reports, the yield from about 5,000 acres in Anantnag District is about 120,000 maunds. The average yield per acre is reported to be from 14 maunds to 27 maunds as against the average of 7 maunds per acre from the local variety of wheat, which, however, could not be grown in paddy land. Agricultural experts expect the yield from Sonora-64 to go up to 40 maunds per acre in due course.

Nila Kanth Razdan of Lariyar in Tral block is one of the many farmers who have cultivated Sonora 64 as a second cereal crop in the Rabi season in place of the usual crop of oil seeds. He reaped about 25 maunds of wheat from his irrigated plot of 7 kanals in place of about 2 maunds of oil seeds worth about Rs 100. He earned an income of Rs 900 by culvating wheat.

Razdan reaped his wheat crop on June 16 this year and sowed paddy ten days later in the same plot. This experiment has made other farmers inquisitive because two cereal crops in the same plot in the course of a year are unheard of in this part of the country.

HIGH-YIELDING GRAINS AT A HEIGHT

From Pamakhar village in the Tawang Sub-Division of NEFA comes the story of an enterprising cultivator. Sang Khandu, the village headman, gave the lead to his fellow tribesmen in the cultivation of a high-yielding variety of wheat.

The local administration tried to introduce this year VLI-401, the high-yielding variety of wheat, but found the peasantry unwilling to adopt it. All the efforts of the Gram Sevak were in vain. Growing any kind of foodgrains above an altitude of 7,000 ft. is a very difficult task. The height of Pamakhar is 7,500 ft. The tribesmen normally obtain a yield of 8 to 10 maunds of the local variety of wheat which is meagre when compared with the amount of labour they put in.

In spite of discouragement from his friends, Khandu volunteered to try the new variety of wheat in a plot measuring one third of an acre and following the instructions of the Gram Sevak to the minutest detail produced 5 maunds of glistening grains, which works out to one and a half times the average yield.

Following Khandu's success, other farmers are now eager to grow the new variety of wheat.

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Yojana seeks to carry the message of the Plan, but it is not restricted to expressing the official point of view.

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LEST WE FORGET

If you are a scientist think of becoming an Einstein, not merely a Reader in your university. If you are a medical man, think of some discovery which will bring healing to the human race. If you are an engineer, aim at some new invention. The mere act of aiming at something big makes you big

—Jawaharlal Nehru

IN THIS ISSUE

RAILWAYS RECOVERY

For the Indian Railways, the largest single undertaking in India, the year 1966-67 was a dismal one. For the first time in 25 years, the year closed with a budget deficit which amounted to Rs 182.7 million. This, despite the fact that gross traffic receipts during the year came to Rs 7,687.8 million, representing an increase of Rs 352.1 million (4.8 per cent) over the previous year. But this was more than offset by a sudden spurt in working expenses, which shot up by Rs 562.1 million to Rs 6,392.5 million (an increase of 9.6 per cent). After paying Rs 1,323.9 millions to the Central Revenues, including payments to States in lieu of tax on passenger fares and meeting other expenses, the Railways found themselves in the red.

While steps were taken to introduce economy without impairing operational efficiency, it became abundantly clear that promotion of traffic through a customer-oriented campaign was the only dependable way of increasing earnings. It was obvious that freight traffic, which accounts for about 63 per cent of the gross traffic receipts, should be given special attention.

In June 1967 Marketing and Sales Organisations were set up on all zonal railways for, among other things, obtaining new traffic and winning back traffic lost to other modes of transport in the last few years.

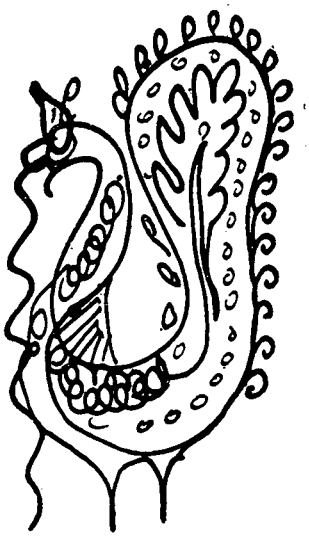
Officers specially selected to head these organisations were given intensive training in Railway establishments and with important private sector concerns to gain first-hand knowledge and experience of business methods and commercial practices. Working mostly on the basis of personal contacts, these officers acquaint themselves with the requirements and transport problems of existing and prospective customers, locate and remove irritants and bottlenecks and ensure that goods are transported and delivered within the agreed time. Through intensive and extensive market research they find out what additional traffic, specially high-rated traffic, which normally tends to move by road or other means of transport, could be attracted by the Railways. Clearance of traffic, specially from areas where there are occasional shortages of wagons and in commodities that are either high-rated or vulnerable to competition by alternative means of transport, is kept under a very close watch.

The drive has already started to pay dividends. In the Central Railway, considerable quantities of petroleum products which were moving by road between Bombay and Poona are now carried by rail. The Eastern and South Eastern Railways have won traffic in motor cars and are running four to five special trains a month to move these cars to Delhi and points beyond. Special arrangements have been made for moving tea from Assam and Dooars to Calcutta and for the delivery of the consignments at the customers' godowns.

Typifying the orientation of the Railways' service to customer needs and customers' satisfaction are the container services started on an experimental basis between Bombay and Ahmedabad in January 1966. The container service marks a revolutionary development in the history of Indian Railways and has been hailed as a miniature revolution in the field of transporation. It is opening new traffic horizons and gearing up the Railways to offer a complete, comprehensive and door-to-door rail-cum-road service free from delays, damages and compensation claims. The service is completely new, both in concept and in equipment used. Three types of containers are now in use. One of these has a 4.5 tonne capacity. There is another which is collapsible and has a pay load of 62 kg, while a third variety has a one tonne capacity.

The Railway Designs and Standards Organisation has designed a new 5-tonne container capable of moving on both broad gauge and metre gauge services.

Fourth Plan framework not materially affected by Reduced Foreign Aid . . . says Gadgil



What has come out of the Planning Delegation's visit to the Soviet Union ?

It was the main endeavour of the delegation to convince the Russians that because of the progress made in the industrialisation of India, it was no longer necessary for us to import to the same extent plant and machinery from the Soviet Union and that our requirements of imports in the Fourth Plan were wider, including components and raw materials and things such as ships, fertilisers and so forth. Also, it would be necessary in the changed circumstances (if we have to keep up a larger volume of trade with that country) that the Russians should think in terms of making available to us some other types of goods which we require in the Plan. We were satisfied largely because we thought there was a fair appreciation of this changed circumstance among the Russian leaders and officials with whom we talked.

With lesser aid coming in, will Fourth Plan Approach be changed ?

The framework, I do not think, will be materially affected because it was prepared to suit the changing circumstances of which less reliance on aid was already

Prof. D.R. Gadgil, Deputy Chairman, Planning Commission, was answering questions put to him by *Mr Dilip Mukerjee* of *the Statesman* and *Prof. Gyan Chand*, economist, at the India International Centre in New Delhi last month. This is an abridged version of the questions and Prof. Gadgil's replies.

an important component. Maybe, because we are not yet sure, we are working out the details. The lesser aid component may affect the size of the Plan; but here I should like to draw the attention to one factor, that is in this sphere of foreign aid the climate changes so often and so quickly that we need not necessarily make a very firm five-year projection now. I would give an illustration. At the beginning of this year when we, within the Planning Commission, were thinking of the Approach, knowledgeable persons, knowledgeable in foreign aid, thought that our aim of reducing foreign aid to about half by the end of five years was too drastic They thought, much more aid could be available and it was not good of us to deny ourselves this possibility. Today the same experts say that much less aid would be there and, therefore, this is obviously an area in which firm projections for a five-year period seem to be dangerous. We would therefore proceed naturally, so far as the annual Plans are concerned, more or less on the basis of what is immediately available. But on the five-year basis I think it would be safe to go on the broad expectations that we had made earlier.

Has planning largely failed ?

Self-criticism is always necessary and, in a country like ours going through a new experiment in conditions which are very difficult, continuous self-criticism, I think, should be exercised, specially by those in authority. There is no doubt about that. There is no doubt again that planning continuously should take full account of the analysis of past experience and that if there have been failures, a proper accounting for the reasons of the failures. And it is most essential to allow for them in the future Plans to the extent that you can.

Can work on the Plans be the same in the changed political structure ?

I am not in a position to appreciate the emphasis on the altered political structure, in the sense that I have not seen any considerable difference between the Chief Ministers belonging to various parties as regards their readiness to tax. It is not because, it appears to me, in the post-'67 structure the State Governments do not all belong to one party that the resource mobilisation has become specially difficult.

Resource mobilisation is difficult on two counts. Firstly, when the country has been passing through an agricultural crisis and an industrial recession, resource mobilisation is difficult *per se*. Secondly, when it happens, as it is happening now, that there is a certain shift in income and the classes from whom resources are likely to be raised are classes who are, politically speaking, more important, more influential, such as the substantial farmer class, the resource raising does become difficult. But that has not anything to do with the situations of the various political parties in the country.

I am merely suggesting that the political problem is the problem of raising resources, that the political leadership may find it difficult; but the way the situation and the general attitudes have changed during the last six or nine months makes me think that once the problem is put squarely, there will be a greater readiness to raise resources than appears at present.

Are not vested interests in a stronger position now ?

I find it quite difficult to agree that during the last nine months in particular the vested interests have become stronger necessarily. If there has been that general tendency or trend, I think it has been over a much longer period, over a five-year or a ten-year period. When we talk of the vested interests becoming stronger, in the political sense, and influencing planning, I believe we are apt to neglect one aspect of the situation, maybe because this country never had a monolithic party. We have no necessary guarantee of a particular interest or interests holding the field absolutely.

If the vested interests are in political power, then those in political power are finding it more and more difficult to restrain a great many exhibitions of resistance to existing policies and a general trend towards, what you may call, the lowering of order in the country. Now, that does not seem to me to be a sign of the vested interests being so entrenched that they can carry with them everything.

I believe, therefore, that it is particularly in times like these that it is possible to put a programme before the country, which is better balanced, which does not give in all the way to vested interests, which tries to the extent possible in that situation to look to the interests of others, as we have said in the Plan Approach, to the smaller farmer, to the weaker sections, to the employment of the landless labourer, to the dispersal of industry. If such a programme is meaningfully put forward, there would be a greater pressure in the circumstances on those in power to accept such a programme than would be otherwise. So that my own analysis would be that though the vested interests are important, their power is really not absolute and there is nothing to prevent, quite apart from intellectuals outside, even the specialists to put forth ideas that would, so to say, match the situation more evenly.

How can imbalance between States be set right ?

Regarding the imbalance between the States, there have already been two meetings of a Committee of Chief Ministers of the National Development Council. One result already established is that in distributing Central assistance to the States, special consideration should be given to the fact of the income of a State—the per capita income of the State being less than the national average.

All the Chief Ministers have agreed that a given proportion of the total Central assistance in the next Five Year Plan, defined as 10 per cent, should be specially distributed to such States. Maybe, that by itself will not cure the imbalance. That is quite obvious; but the recognition by all the Chief Ministers unanimously is an important step forward.

In the second of these meetings, considerable attention was given to the problem of other factors making for imbalance, such as the location of the Central projects, the help given by financial institutions to private or public or co-operative industry and so forth in various areas. The very detailed data that the Planning Commission compiled in this regard showed an extremely disparate distribution between States.

Now, on an analysis, it would seem that this was only in part due to outside action. In part, the infrastructure development within the States in terms of communication development, power development, even more importantly, the institutional development, such as of the co-operative structure, was rather an extremely important factor in getting private or co-operative industry established.

And if a private or co-operative industry were not so established, it is quite obvious that financial help from outside the national institutions will not be forthcoming. It is, therefore, definitely recognised by all the Chief Ministers that this was part of their own responsibility.

At the same time, it was recognised by the financial institutions—the Governor of the Reserve Bank taking a lead in this matter—that, looking at the retarded development in some areas and in some States, it was necessary for them to make some adjustments in their policies, in procedures, in terms of repayment of charges, of a sort of yardstick they apply of viability and so forth. The Bank would not give up in entirety the general banking view. But all these concessions in terms of procedures and charges, could be made and should be made. In fact, the Planning Commission is appointing a Working Group to go into the details of these matters with the help of financial institutions. I do not expect a great change to come about immediately, but I do feel that following these two meetings of the Chief Ministers there is sufficient change in the climate of opinion to hope for some concrete steps being taken so that slowly, at least, the widening of imbalance will be stopped.

What are the steps taken to prevent price rise ?

In September last year I said the immediate objective was maintaining price stability. Then I said that if the harvest was at all good, prices would maintain by themselves a downward pressure from about October to March and the real problem was to see that they were kept from rising rapidly from May to September. In fact, prices went down from something like 222 in terms of the wholesale index in September to roughly 202 in February and they have not risen above 209. So, the policy has more or less succeeded. We have to take account of the fact that failures of rains in August pushed up prices immediately so that the great sensitivity of the Indian economy and the Indian price structure to the monsoon was again exemplified and today we are back at the September 1967 level. We are not above it. I reckon that during the next month (November) a downward trend will again begin. If a programme of building a buffer stock of three to five million tonnes succeeds, then it would certainly curb the tendency to a rise in prices on the slightest flimsiness of the weather or a bad monsoon as was exemplified this year. The Planning Commission programme, which is being fully endorsed by the Government, is, to begin with, to build up a two or three million tonne-buffer stock within two or three years, and operate it over a period so that the Government is in a position (a) to even out physical supplies between years and (b) to see that the crucial foodgrain cereals prices are not fluctuating widely.

The other aspect of inflation is deficit financing. Now here the calculations are rather difficult to make. During the last year deficit financing possible has been of the order of Rs 100 crore and yet the inflationary pressure has not been greatly visible. Now this does not mean that I am subscribing to the proposition that you can live with deficit financing of that order. But it is obvious that some amount of deficit financing is permissible. How much of it is permissible is a matter for calculation. But I do believe this also that the more the Government has instruments, such as buffer stock of cereal foodgrains, buffer stock of other agricultural commodities, by which to control the economy, the greater the risks it can take in times of emergency with deficit financing. But I entirely agree that the stability condition is important and that without paying a great deal of attention to stability, you cannot think in terms of continuous economic development.

What are the steps contemplated to reduce class disparities ?

In the circumstances in which we find ourselves, the ordinary way—through physical devices or through insurance measures—of greatly increasing the standard of living of the lower classes is denied to us. We just do not have the resources. Therefore, given a structure that the planning has today, what the Government has to do is to concentrate attention on broadening the base of economic activity, the resource base and the base of the weaker sections in the community. The only programmes that the Approach to the Plan incorporates are therefore plans of economic development of these classes. What we are concerned with is, for example, how to help the small holders to broaden his base. What are the supplementary things that we can give to the landless labour ? How can you link the period of employment of the labour during the year ? What can you do to the artisans, to the forest labourers, to those various classes who are the weaker sections ?

Now these problems are extremely difficult, because each one of them has to be tackled specifically. There is no general prescription here at all. And our emphasis in the Plan is on making as many experiments as possible in relation to these in various directions in all the States so that some general programme would emerge. I fully visualise that to most people this will appear to be too gradual a programme, lacking revolution. I do not immediately see what actually could be done.

What concrete measures are there to uplift the small farmer ?

Given the fact that we are an ancient land so that all the land resources have been fully occupied at a relatively low level of technology, and given the fact of our continuously increasing numbers, the dilemma is that we have not the resources for adopting a high-level of modern technology in many respects immediately. With the immediate unemployment effects of the adoption of high-level modern technology, we have to watch our steps more carefully.

The middling and the substantial cultivator have contacts with officialdom; they are members of Boards of Co-operatives and so forth. So they are in a position to profit from any new mode of assistance that comes forward or any new governmental programme that has developed. The smaller farmer does not have those contacts, does not often know the programmes and has not the manoeuvrability of resources which are oftentimes required for taking advantage of them and this is the same with any programmes that you can think of. There have been, for example, for some years past, governmental programmes for guaranteeing small risks in small industries. The complaint from banks—quite a number of co-operative banks—is that no individual viable applications come to them in that regard. So the position is difficult. Any programme by itself will not be helpful to them. Unless you go out of your way, unless there are governmental agencies and unless there is an adjustment of the programmes in such a way that these classes get the help and, in fact, profit, nothing is going to happen. I believe there is a greater ready recognition today of this basic reason for our failures. I have recognised this fact for some time and, I believe, it is true of the Planning Commission. It is possible to communicate this slowly to the Ministries and it is possible to lay emphasis on taking special steps for orienting your programmes.

And then the other example, of the Reserve Bank giving concessions for location of industry in backward areas. This is an area in which, I believe, even the vested interests are clever enough to see that unless they do something, opposition to them will grow. This is an area of doing something concretely, so to say, for the underdog, or the weaker sections. It does not cost a great deal. The inputs are personal inputs, administrative inputs, of taking an intelligent view of the programmes rather than so much money in the first instance. I would not entirely say I am thoroughly optimistic, and immediately things will happen.

To what extent will defence expenditure affect development ?

In a broad way the real difficulty is that in this country all considerations of defence are wrapped up in great secrecy. And this is a sort of thing in which the general public is not interested or should not be taken into confidence. So that, whereas in other countries White Papers are placed before Parliament which say what the strategy is, what the costs are and when the strategy is changed, why it has been changed, unfortunately, we here and, I am afraid, we include the Planning Commission, know too little about it. So that we do not really know why defence expenditure is likely to rise. The real important point is that we have a beginning of a general debate as to what is our strategy...I take it that it is generally agreed that in the context of the country's development of technology—a big country like India can never be secure. It just has not the resources to completely man itself against all eventualities.

Obviously, therefore, we must choose a certain level as being the compromise between what we can afford and what we think we must have. Now what that level should be, how it should be reached, and whether it will begin to go rather into our developmental expenditure is extremely important...Any large further expenditure on defence will definitely be at the expense of development, and I think that needs no explanation at all. It is very clear. But if we have to take a decision that defence expenditure must increase, development must give way, it is, I think, due to the people at large that they should understand the full implications and why the decisions were taken. Well, to the extent that the Planning Commission is concerned with it, for example it is extremely closely concerned with the administration of the management of the public sector enterprise, it is a matter in which the Planning Commission does not say it has nothing to do. The Planning Commission has views on those matters which it proposes to put in cogent form and to press on the authorities.

AUTHORISED FOREIGN LOANS FOR INDIA'S DEVELOPMENT TOTAL ABOUT RS 8,000 CRORE

The total amount of fresh loan agreements signed during July-September this year amounted to Rs 82.18 crore. Loan agreements amounting to Rs 304.37 crore were signed during the earlier quarter April-June.

With these commitments, the total amount authorised by foreign countries and institutions for India's economic development comes to about Rs 7,977.195 crore. This excludes U.S. commodity assistance (under P. L. 480), all grants and the drawings from the International Monetary Fund.

Out of the new authorisations of Rs 82.18 crore, only Rs 1.5 crore is in the form of project aid. The remainder is non-project aid (including debt relief).

"There is an element of service involved in science and that is why I would want to come back to India. It is very right to say that if I had stayed back, my personal contribution may not have been as much but even if I would have trained up three or four students, I would have done my part."

Picture by T. S. Nagarajan

Dr S. CHANDRASEKHAR TALKS TO YOJANA

Dr. Chandrasekhar, the eminent Professor of Theoretical Astrophysics at Chicago University, was recently in New Delhi to deliver the second Nehru Memorial Lecture on Astronomy in Science and in Human Culture. Dr. Chandrasekhar, who had his education in Madras and Cambridge, has been in Chicago University from 1936 till today teaching and doing research on astrophysics. He became an American national in 1953. Dr. Chandrasekhar's brilliant researches on the structure and dynamics of stars and galaxies have won for him many coveted distinctions and honours including the National Medal in Science, the highest award for scientists in the United States, and Padma Vibhushan from India.

IN INDIA THE STRUCTURE FOR WORK IS THERE BUT SCIENTISTS ARE UNHAPPY

"TAKE the Tata Institute of Fundamental Research or the Atomic Energy Establishment. What they have done is a phenomenal achievement by any standards. One can refer to it only in superlative terms. Our Atomic Energy Establishment is as competent as the Canadian. Bhabha's accomplishment in Indian science is really great." Dr. S. Chandrasekhar, the renowned astrophysicist and Distinguished Service Professor of Theoretical Physics at Chicago University, seemed to want to be charitable and point his finger at the brighest patches when we asked him what he thought about the research carried out at the large number of national laboratories established in the post-independence period. His sensitive face lit up when he made these remarks.

Indian Scientists Are Frustrated

About other national laboratories, he said, "I don't feel as critical as some people here have felt." He was told many times in the last few days that brick and mortar did not make science. But where would anyone work if there were no brick and mortar structure, he was prone to ask. He emphasised, "The point is that these laboratories are there. That is, the structure is available. The very fact that the set-up is there, and the opportunity is there, makes the problem simpler. So when the right people come, they don't have to work to create the structure. Men and equipment have only to fill these laboratories and work." Dr Chandrasekhar was quite confident that the development of these laboratories would be justified in the long run.

But the picture of Indian scientists that presented itself to him in America was not altogether bright. "I want to be frank and honest," he said with disarming candour. "It seems to me that the scientists are not happy. They are frustrated. I do not really know what the origin of it is. The country is passing through difficult times." We probed his mind for any reasons that he had for this state of affairs. "There are a variety of reasons. By and large there is insecurity. Many of our young men go abroad and they don't return." But he hastened to add, "It is not for me to criticise. I am one of those who have gone away. But it is an unfortunate situation that most young people want to leave." However, it was not a phenomenon that affected only India, he emphasised. "Take Great Britain, for instance. Something like 37 per cent of engineers who graduated from Britain last year migrated to the U.S.A."

Dr Chandrasekhar is too much of a polished gentleman and a refined scientist to take a 'J'accuse' attitude on any question and rush headlong into conclusions. That was why he said, "My own feeling is that *perhaps* there is much needless frustration. It is an unfortunate situation." He had no ready-made remedies. "Somehow or other it has to be rectified. The young people have to be assured that even within the country they will get their worthwhile. Granted that only a certain amount of money is available, it could be made available more easily and with less restrictions." He would of course single out hierarchy as one of the major obstacles in the progress of Indian science. "You seem to be caught in a ladder in which you can't skip a single step. You want to buy an equipment for which you have to get a requisition signed. That goes to the man above you, then above and above and ultimately it is lost. Nobody knows what has happened to it." Something had to be done with these administrative snags, he felt.

Youth Lacks Sense of Pride

But more than all prescriptions of material and administrative changes, Dr Chandrasekhar seemed to lay emphasis on developing a sense of patriotism and pride in our young men, which, he said, they seemed to lack. He felt sorry that it was so. That seems to be the impression uppermost in his mind. When he was asked how India appeared to him now, having been away from India for such a long time, he replied "It is very difficult to say. India is quite different from what it was 40 years ago. However, there is one big difference—I do not know if it is true. There was one thing which was dominant in all our minds: We were proud of Mahatma Gandhi, of Nehru, of Tagore, of Ramanujan. We were proud of the fact that anything that we could do would equate to anything else in the world. I did not participate in politics but I felt that as a person I could do the best if I could have the opportunity." In other words, the whole atmosphere in those days seemed to him to be capable of inspiring the youth and instilling a sense of pride in them. "It does not seem to me that the youth of today has that sense of pride," Dr Chandrasekhar lamented. But like a true scientist he would hate to be categorical and would leave room for correction. "Maybe I am wrong in thinking so. I have been away so long; I have come back to India after eight years," he added.

India Has Made Significant Progress

And his sense of pride about his mother country made him only too eager to acknowledge her achievements. Since Independence "India has made significant progress," he remarked. To illustrate this he repeated what he had told the Indian Press earlier : "I was in India in 1951 and gave a number of lectures. I was again here ten years later, in 1961, and gave 70 lectures. All those lectures were given in halls which had not existed in 1951. That is to say, in ten years there had been so much construction, so much progress."

Asked if the scientist had a role to play in developing the nation's economy, Dr Chandrasekhar, who has spent almost a lifetime studying the stars and their spectra, said, "He has a definite role to play. After all a scientist is also a citizen and in a democratic country all citizens should contribute their best to national development. A scientist has the competence to contribute. Scientists have to play a key role in many fields, for instance agriculture, technology." And he did not think there was anything wrong in buying the latest know-how from advanced countries to bridge the technological gap in developing countries. "If you can start with the advance which the other countries have made, time and expense can be saved," he said. He did not see any point in starting from scratch and doing everything all over again in fields in which others have progressed considerably.

Sugar Shouldn't be Cut Out to Make Up Protein Deficiency

Perhaps it is Dr Chandrasekhar's devotion to pure science which brought out the telling reply from him to our question whether in a developing country applied research should not take precedence over fundamental research : "If you are deficient in protein, you have to make up the deficiency. For that you don't have to cut out sugar or carbohydrate, do you ? If your diet is deficient, the proper thing is to balance it." In other words, he seemed to say that pure research was entitled to an equal place with applied research.

Dr Chandrasekhar agreed that whether it is in pure science or applied science, achievements in modern research to a large extent depended on sophisticated equipment and well-equipped laboratories. "There is no gainsaying the fact that you need facilities, books, laboratories, equipment," he emphasised. When we brought to his notice that Dr C.V. Raman said recently that he did his Nobel-prize winning work with equipment costing only Rs 300, Dr Chandrasekhar remarked : "True, even today there are examples of discoveries made with very little equipment." But he added, "One should remember that science is not made of great discoveries. It is made of a great amount of information. It does not depend on any single man making a discovery. It depends on a large number of people doing competent work." He would no tconsider individual brilliance as important as building up a large body of scientists. That is why he would not brook any reference to the eminence that he himself had achieved in science. "I discount firmly all those remarks about my eminence and heights," he said, when we referred to his achievements. "One should remember that in science one tries to contribute to knowledge and it is wrong to identify that contribution in terms of what a single person does. The main thing is that you try not only to contribute to science but help others to contribute."

He largely agreed that it was not correct to judge a nation's scientific excellence by the number of Nobel Prize winners it had in science, except when their number was sufficiently large. "For example," he said "India has only one. Japan has two. Japan's science should be twice as good as India's. As a matter of fact, it is ten times better than India's science because in Japan there are ten times more scientists than in India." To drive home the point, he said "Mahatma

Gandhi was the greatest man of the century. That does not mean India is the greatest country in the world. To take another example, Cherrapunji has the heaviest average rainfall in the world, but it does not mean in India as a whole there is heavy rainfall."

Dr Chandrasekhar, who has strode like a colossus in astronomy and astrophysics for well over three decades laying bare the hidden secrets of distant stars, impresses anyone by his patent humility and simplicity. He carries his eminence lightly on his shoulders. He has no airs and does not throw his weight about. Although he has spent almost a lifetime gazing at the stars, he is not starry-eyed. He pauses for a while and ponders before he answers any question. Typical of a teacher he maintains an equipoise and equanimity and is never ebullient. And training young people in science he considers as the greatest contribution one can make to science. "A scientist's life is more important by the example he provides, the service that he renders to his fellowmen and to his students," he told us. "Science is not a means by which anyone can become a Newton or Einstein. What a scientist does may not be as significant or as important as what Newton or Einstein did, but the values of science can be attained by the extent to which he does the kind of things which the great men have done and help other people to do likewise," Dr Chandrasekhar added.

When we asked him why he chose astronomy from the vast range of scientifie subjects, he said, it was purely accidental. "I was interested in certain branches of physics and it turned out that I had an aptitude for it. You are drawn to a thing which you can do. What a scientist does is the result of a great variety of reasons." We asked him a hypothetical question: if he had stayed in India instead of settling down in the United States, would he have achieved what he could now? He thought for a while trying perhaps to look back in a second over the thirty two years he had spent in the United States and then said: "Well, perhaps I would have done less myself. But maybe, I would have created ten people better than myself in science, and those ten would have trained ten more people and in this way perhaps I would have done much more for science than what I have done. It is possible that a person in India may not be well-known outside India, but if he creates ten people who are well-known, it is significant. There are thousands of physicists living today in different countries contributing to science and thus helping their countries to develop."

What about Coming Back to India?

This, we thought, was an opportune moment to ask the renowned astrophysicist if he had ever toyed with the idea of coming back to this country and give a chance to the new generation to benefit from his experience. When we posed the question, he crossed his fingers, looked up at the skies, as it were, and fidgeted for a second. "I should naturally like to come. But, as you know, life is a one-way street. There are two aspects to this question—personal and external. I am now 58. I don't believe that in any sense what I can contribute is really very much. That is one thing On the other hand, if circumstances would permit me, it certainly would be nice. I have always associated with young men of the age group of 24 to 30 and in the last thirty years the age group with me has not changed." We asked him if he had any regrets that he had left India. He replied, "There is an element of service involved in science and that is why I would want to come back to India. It is very right to say that if I had stayed back in India, my personal contributions may not have been as much but even if I would have trained up three or four students, I would have done my part. Some forty students have taken Ph. D.s working with me. Of course forty Ph. D.s in the U.S.A. are a drop in a bucket. But in India, that number means a lot."

Science Is Social Activity

We told Dr. Chandrasekhar that *Yojana* is read by a number of young men and women and asked him if he would like to tell them, specially University students, something through our columns. The teacher in him became eloquent: "The only thing I can say is that the life of a scientist is primarily concerned with social activity. Science is social activity and is not really very different from other worthwhile activities. You have to do it in such a way that you derive pleasure from it and that depends on the aims which you have. What are your aims? Understanding. When you study science, you have a critical attitude. You always ask questions and then at a certain stage you do not get the answers. So you try to answer them. After some time you will be able to ask deeper questions and the answers you give will be significant. Science is a means of better expression, a means by which you can serve your community and young people. So long as you take that attitude, then you have done science."

We asked him if the common people should be made aware of science in an effective manner by putting telescopes in temples, as a famous Indian science writer in the U.S.A. suggested to us. Dr. Chandrasekhar did not think it was necessary to make the public aware of the benefits of science. He thought that everyone who lived in the modern world was aware of the technological advancement. "There is no use in putting telescopes in temples," he said. But wasn't it necessary for the people to have a scientific outlook, we persisted. "Well, in India there is an enormous amount of superstition," Dr. Chandrasekhar remarked and he found that it was there even in high places. "But installing a telescope in the temple is not going to drive off superstition. We have to make the people believe that superstition and mythology would not do them any good. They have to be eliminated."

R. K. P.

THIS INDIA

YOJANA invites contributions to this feature from its readers. Each anecdote must be true to life, of less than two hundred words, capturing something significant of India's rich and varied life. Each published anecdote will be paid for.

I took charge as B.D.O. and Chief Executive Officer of the Taluk a few days ago. One day in my office the Chairman of a particular Panchayat wanted to meet me. When I called for him, two persons came in, one with a fine dhoti and silk shirt and the other with a big red turban and soiled clothes. When I offered them seats, the man in the silk shirt hesitated whereas the other man immediately sat on the floor. The silk clad man gestured to him to sit in the chair but himself did not sit. Taking him to be the Chairman, I tried to know what he wanted. He pleaded that the cheques of the Village Panchayat were not honoured for more than four months and that he wanted authorisation for the cheque to be honoured by the Sub-Treasury Officer.

When I looked into the concerned file, I found that the man with the silk shirt was the Secretary of the Village Panchayat, who was also the Patwari (Shanbhoga) of that village and the man who sat on the floor was the Chairman. Further, the Chairman of V.P. was the Talyari previously and he had just learned only to sign his name. Out of the 13 members of the Committee, all the 12 were illiterate except the Chairman who was taught to sign. The Secretary was all in all and he manipulated the proceedings, decisions and accounts of the Village Panchayat according to his sweet will.

Deodurg B. S. NAGAPPA

One evening I was standing near Connaught Place in a queue waiting for the bus. A small boy selling the evening newspaper approached me. He was wearing a torn shirt and nickers and his eyes and cheeks were sunken. It was obvious that he had not had enough food for many days. I took pity on him. After buying a newspaper I paid 30 paise. The boy stared at me, kept the five paise which was the price of the newspaper in his hand and returned the 25 paise coin saying "I am not a beggar. I only get money for my labour. Please keep it with you." I was stunned.

New Delhi O. P. GUPTA

At a party which I attended to bid farewell to an employee of my friend's office, on the eve of his retirement, two senior officers spoke in appreciation of the retiring employee's services. One of them appealed to the employees gathered, quoting the Gita, that they should work without expecting any reward. The other boss said that the value of a man should be measured by his mind and manners, rather than the amount of money he gets.

Later on, on enquiry, I was told by my friend that of the two bosses while one was drawing a salary of Rs. 7,000 a month, the other was getting Rs 5,000, excluding other allowances. As against this, the retiring man, at the end of about 25 years of service, was getting a meagre monthly salary of Rs 420.

Delhi PAWAN CHAUDHARY

At midnight someone knocked at our door. My husband got up and opened the door to find the landlady crying for help and a child lying unconscious on her hands. Her husband followed rubbing his eyes. He tried to pacify her but she wouldn't listen. She insisted on his fetching a doctor immediately.

After her husband left, she turned to my husband and almost cried, "Be a good neighbour. Please call the Maulana from the mosque." My husband wanted to wait for the doctor but her insistance left him also with no option.

Responding to her emotional outbursts our next door neighbour also joined us, who was also sent out to call the Pandit of Mahavirjee Temple.

First came the Maulana and then the Pandit. Both of them examined the child. The Maulana passed his judgement : "This is nothing but an evil spirit dominating the child." The Panditji took no time to agree. Just then the doctor entered. He examined the child and the room. On finding a burning hard-coke oven inside the unventilated room, he could immediately say that it was a case of asphyxiation. He administered certain medicines and said the child would be all right in a few minutes. The doctor left after collecting his fees.

The lady was not satisfied. She turned to the Maulana and weepingly said, "Please do something to save the child." The Maulana took some coins in his hand and rotated it round the child's hand.

Touching the feet of Panditji, the lady again begged for the life of her child. Panditji took out some holy ashes and placed on the forehead of the child.

The child regained consciousness and the mother was happy. I was wondering who won the mother's effection, the doctor, the Maulana or the Panditji ?

Shikarpur SAVITRI SAXENA

IS GROWTH RATE PROPOSED FOR FOURTH PLAN FEASIBLE ?

M.A. OOMMEN

A Plan has to be related to an overall growth rate. The Approach to the Fourth Plan has envisaged a 5 to 6 per cent compound rate of growth or 30 per cent aggregate growth during the Plan. It is held that this growth rate is "based on reasoned calculation". Is this order of growth in national income really feasible? Let us examine.

The growth rate is generally thought of as a function of two variables, namely capital-output ratio and the rate of savings invested. Though the figure of the capital-output ratio assumed for the Fourth Plan is not specifically laid down in the Approach, it is possible to calculate it.

The Approach points out that the average rate of savings will have to be stepped up from the current level of about 8 per cent to around 12 per cent. We may assume that the savings in the first year of the Plan would be 8 per cent of the national income. To this may be added the foreign savings made available for investment in India, which works out to about 4 per cent of the national income. The total savings that will be invested in the first year of the Fourth Plan would be 12 per cent of the national income.

Assuming only a 5 per cent growth rate in the first year, the capital-output ratio works out to 2.4 and would be 2 if 6 per cent growth rate is assumed. We may say that the capital-output ratio ranges from 2 to 2.4.

In the light of the performance of the Indian economy in the past, is it realistic to assume a capital-output ratio of 2.4 ? The capital output ratio for the First Plan works out to 2.3, that of the Second Plan to 2.9 and of the Third Plan to 6.2. For calculating these ratios, the investment and national income figures were taken at 1960-61 prices.

The last year of the Third Plan (1965-66) was an abnormal year. The country faced the worst drought of this century in that year. This depressed the national income considerably, thus pegging up the capital-output ratio to a very high level. During the first four years of the Third Plan, the national income increased, on an average, at the rate of 4.2 per cent per annum. Assigning this rate to 1965-66, the capital output ratio for the Third Plan works out approximately to 3.5.

Thus, the capital-output ratios for the first three Plans come to 2.3, 2.9 and 3.5 (adjusted) respectively, showing more or less a uniform increase of 0.6 point in each Plan. We do not take into account the trend in investment and output in the last three years of the annual Plans which are admittedly abnormal years. If we assume that the same trend as in the first three Plans would continue in the Fourth Plan, the capital output ratio for the Plan may be placed at 4.1.

FAR FROM REALISTIC

There is no firm indication in the Approach Note to show that the high priority given to the capital-intensive investments during the Second and Third Plans would be reversed. It is just not possible to radically alter the investment pattern. It is likely to remain substantially unaltered. Even if we assume that the present high rate of agricultural production would be progressively increasing and that the industrial capacity already built up would be more fully utilised, the capital-output ratio could not be considered much lower than 3.5. At any rate, the Planning Commission's assumption of a capital-output ratio of 2.4 for the Fourth Plan seems to be far from realistic.

As regards the rate of savings also, the assumptions of the Approach Note do not seem to be valid. The domestic savings is expected to rise from 8 to 12 per cent. This depends on (a) the magnitude of the additional income and (b) the marginal rate of savings out of the additional income. The expectation that the average rate of savings would rise at the rate of 8 to 12 per cent means that the marginal rate of savings may have to be stepped up even as high as 50 to 80 per cent. This is unlikely in a country where the marginal propensity to consume is near unity. During the three Five Year Plans, the marginal saving-income ratios were 29.5 per cent; 18.9 per cent and 14.6 per cent respectively. In view of the sharp increase in prices during the last 3 years, this may be assumed to be lower still. Hence it appears unrealistic to assume that the anticipated growth in savings would materialise.

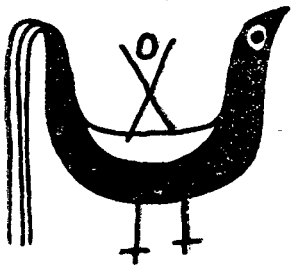
From the present trend of national income growth, we may estimate the national income for 1969-70, the first year of the Fourth Plan, which comes to about Rs. 31,000 crore. As 30 per cent growth in national income is expected during the Fourth Plan, the additional income that would be generated comes to around Rs 10,000 crore. Assuming that the capital-output ratio of 3.5 which we have arrived at for Third Plan is valid for the Fourth Plan, the investment required would be of the order of about Rs 35,000 crore. We may also assume that the marginal rate of domestic savings would increase as it had during the Third Plan. Then the

total savings available would work out to about Rs 15,000 crore. In fine, the domestic resources that would be normally available would not be more than 43 per cent of the amount required to obtain the desired growth rate.

Less Hope of Aid

As far as the size of external assistance is concerned, nothing is definitely known. Assuming that the same order of foreign assistance as in the previous years would follow, the total aid, including P.L. 480 imports, could be placed at about Rs 6,000 crore. But the Approach expects that the foreign assistance would be reduced to 50 per cent of the present level by the last year of the Fourth Plan. This is based on the heroic assumption that exports could be stepped up at the compound rate of 7 per cent per annum during the Fourth Plan. But Indian exports in the past have not gone up by more than 4.5 per cent. So it does not seem realistic to pin much hope on the performance of the export sector. In view of the tight balance of payments position of the U.S.A. and the dependence of the various international lending institutions on U.S. assistance, the U.S, assistance is likely to be of a low order. We may put the size of the foreign assistance approximately around Rs 5000 crore.

The foregoing discussion shows that it may be unrealistic to assume a capital-output ratio of less than 3.5. Even on the basis of optimistic estimates regarding the resources that are likely to be raised, the total resources that could be raised, internally and externally, are not likely to exceed Rs 20,000 crore. This would generate an additional income of only Rs 5,700 crore on the basis of a capital output ratio of 3.5. Thus the growth rate that is reasonably possible seems to be of the order of 3.4 per cent as against 6 per cent envisaged in the Approach to the Fourth Plan. The assumptions of the Approach Note appear to be, therefore, somewhat unrealistic and overambitious.



QUOTATION BOX

It was said of an ambitious Indian educator early in this century that he wanted to make every ass a graduate. For pure reasons of husbandry, we seem to have decided that it would be cheaper to make every graduate an ass, so that the difference will not be noticed.

—Prof V.V. John in "Quest"

There is no Gandhian among the Ministers, either at the Centre or the States...the fact is it is not very easy to be a Minister and at the same time a Gandhian.

—Prof V.K.R.V. Rao

Only those who do not follow Gandhian philosophy can become Ministers.

—Bhibhuti Mishra M.P.

The feeling that Communists are a terrible lot and that the Marxists are even more terrible should go. After all we eat the same food.

—Panampilli Govinda Menon

Many of us would be delighted to pay as we go, if we could only catch up from paying as we're gone.

—Cartaret County News-Time, USA

I had association with George Harrison...Does it make a great player of the sitar because I am his teacher ?

—Ravi Shankar

Every year thousands of tons of fertilizers, weedkillers and so on are spread on the land, and ultimately, at least some part of this is leached into the water courses. The effect in the future, if not immediatly, must be to upset the ecological balance of the systems upon which the chemicals infringe.

—Ariadne in "New Scientist"

The inhabitants of Humphrey, New York, voted mainly for Richard Nixon, but in Nixon, Texas, the local favourite was Hubert Humphrey.

—A Reuter report

They've tried to dispossess us of our manhood and womanhood. Of course childhood and adolescence... Why, they even tried to dispossess us of our dislike of being dispossessed !

—Ralph Ellison, the Negro American novelist, in "Invisible Man"

No deaf or dumb will be left in China, thanks to Chairman Mao Tse-Tung. A Peking Radio broadcast said that a doctor has evolved a method to cure them. The method involved pricking of certain part of the patient's body with a needle. He pricked himself deeper and deeper until he reached the level to be fatal.

Fortunately for medical science and for the patients, Peking Radio added, just as he was about to give up the experiment Mao's thought "When we die for the people, it is worthy death," occurred to him. He continued his experiment, and now he can cure the sufferers.

From "Link"

The low cost people's car of the late fifties has now been transformed into the small car. It is quite alive and kicking even after a decade or so of gestation within the files of the Industry Ministry and Yojana Bhavan.

—From an article in "Mainstream"

In the eighteenth century people wore false teeth for vanity and took them out when they wanted to eat. Nowadays people resent having to be without them even for an anaesthetic. Not long ago well-off people insisted that false teeth should be complete replicas of their own crooked natural ones, Nowadays people go to some trouble, and often considerable expense, to have their own teeth made as regular and unnatural-looking as the old fashioned cheap false ones.

—From a book review in "Economist"

Unlike an average Indian baby, the Indian baby car stubbornly refuses to be born...

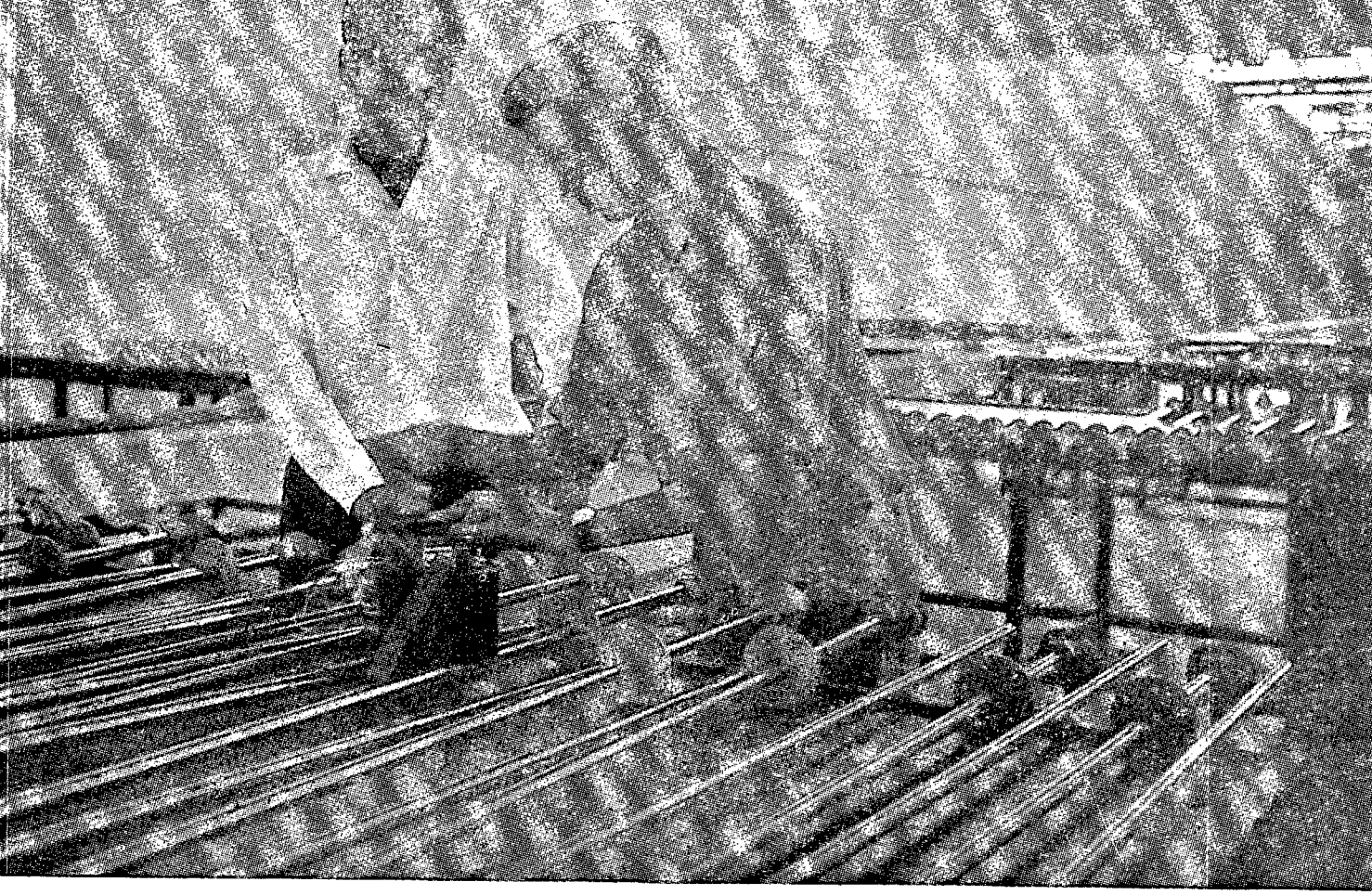
—From "Organiser"

—The once faceless, bureaucrats are now issuing their photographs to the newspapers and waxing eloquent on the innovations they are about to introduce in their Ministries.

—Mr Romesh Thapar in 'Economic and Political Weekly"

In field houses, armouries, factories, football stadiums and high school gymnasiums (in the U.S.A.), more than 29,000 people gathered to scrub their teeth for about 2½ minutes, as part of a mass 'brush-in' to demonstrate the decay-preventing qualities of a new dental paste.

—From "Time"



Instruments are vigorously tested before they are despatched

KOTA gets Rs 10 crore orders for its PRECISION INSTRUMENTS

MORE PHOTOGRAPHS OVERLEAF

INSTRUMENTS have come to be widely used for industrial process control, and their increased use has resulted in better quality control, higher production and reduced manpower. Our country is currently using about Rs 100 crore worth of these instruments, a major portion of which is accounted for by steel and chemical plants and thermal power stations. With our growing industrialisation, the need for these instruments was bound to grow, and, until recently, no manufacturing facilities of a substantial capacity existed in the country.

Realising the important role played by the process instruments in the setting up of basic industries, it was decided to undertake their manufacture in the country, and the 'Instrumentation Ltd.' was set up for the purpose in the public sector. This enterprise set up the Rs 5-crore (pre-devaluation) Precision Instruments Plant at Kota with an annual production capacity of Rs 10 crore worth of instruments to be reached after the 7th year of commencement of production. The plant commenced production in September 1968, and, by the end of March 1969, it expects to effect sale of about Rs 80 lakh worth of instruments. Orders and letters of intent valued at over Rs 10 crore have already been received from thermal power stations and the Bokaro Steel Plant. The product range, which has been diversified in the light of customer requirements as also to ensure better utilisation of the existing installed capacity with minimum marginal investments, includes a variety of sensing elements, magneto-electric instruments and electronic indicating, controlling and recording instruments. The diversified products are in course of time expected to save crores of rupees in foreign exchange. The manufacturing faci-

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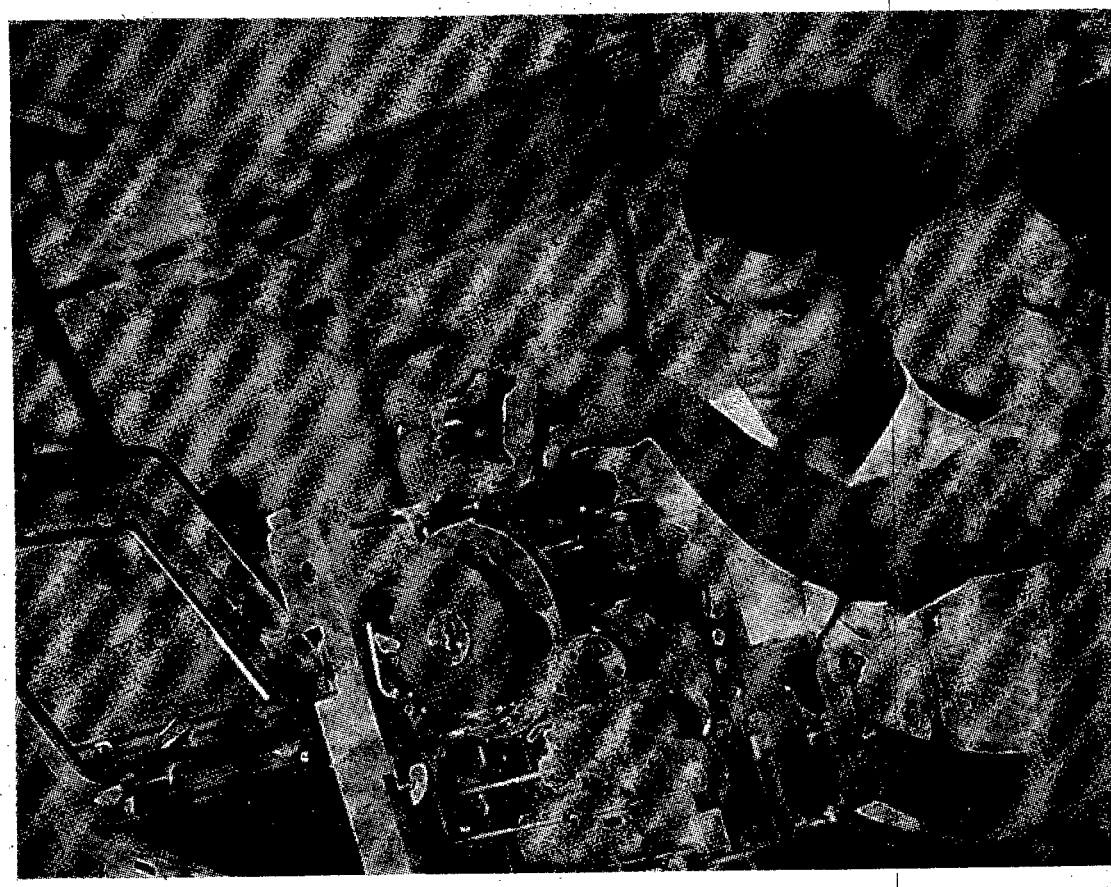
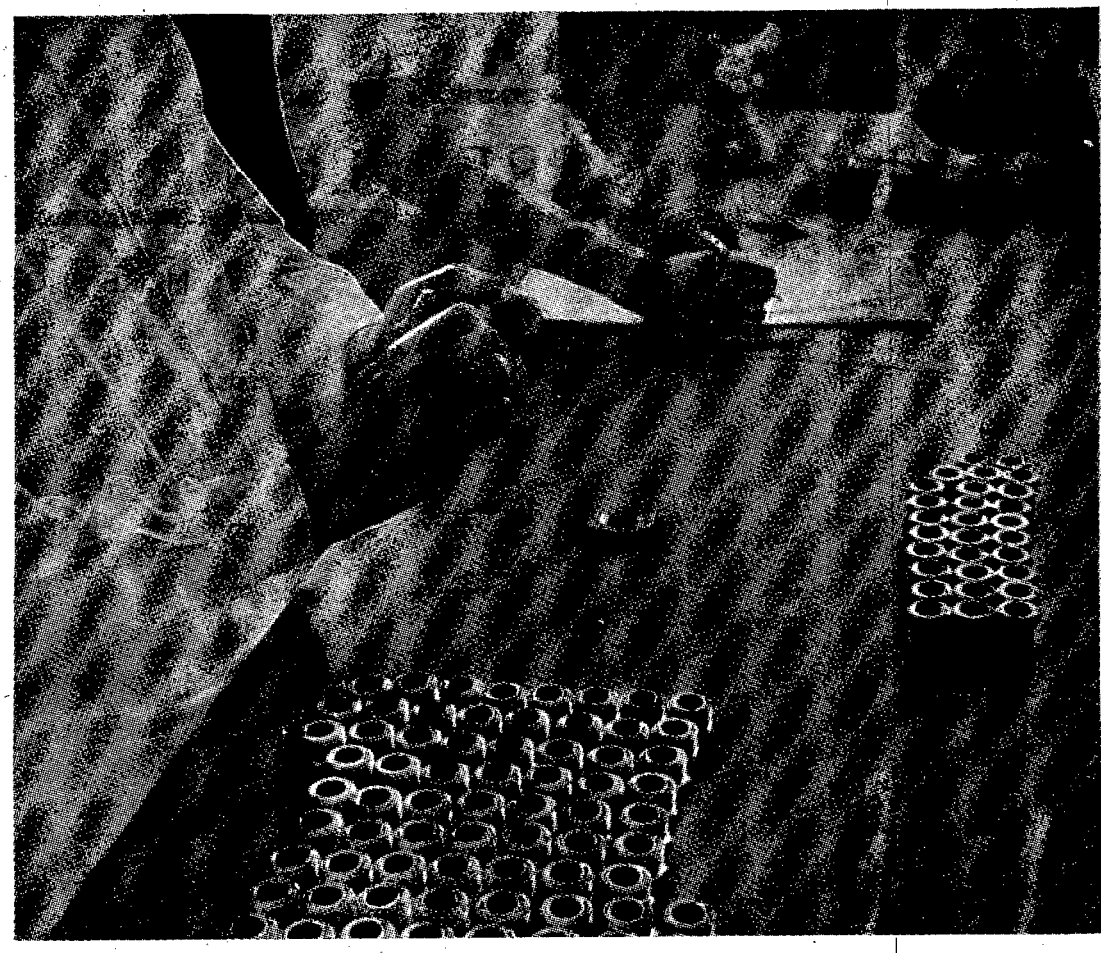
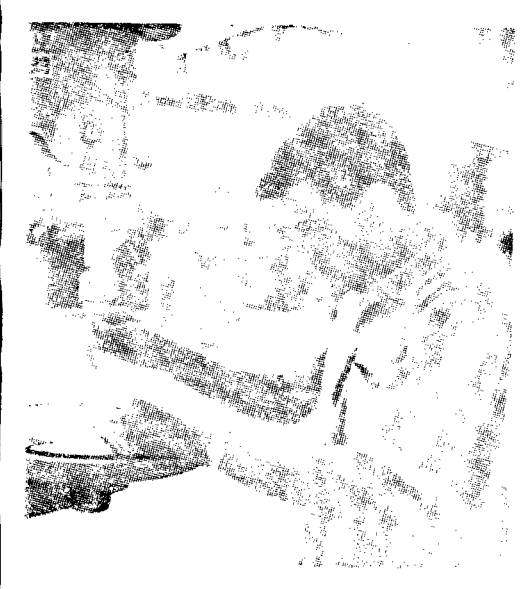
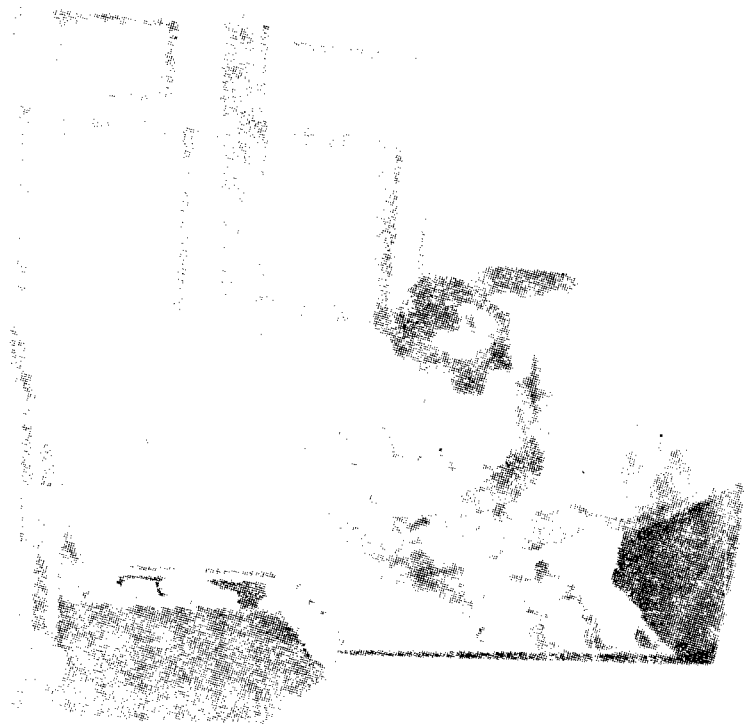
PHOTOGRAPHS BY K. NARAYANA SWAMY

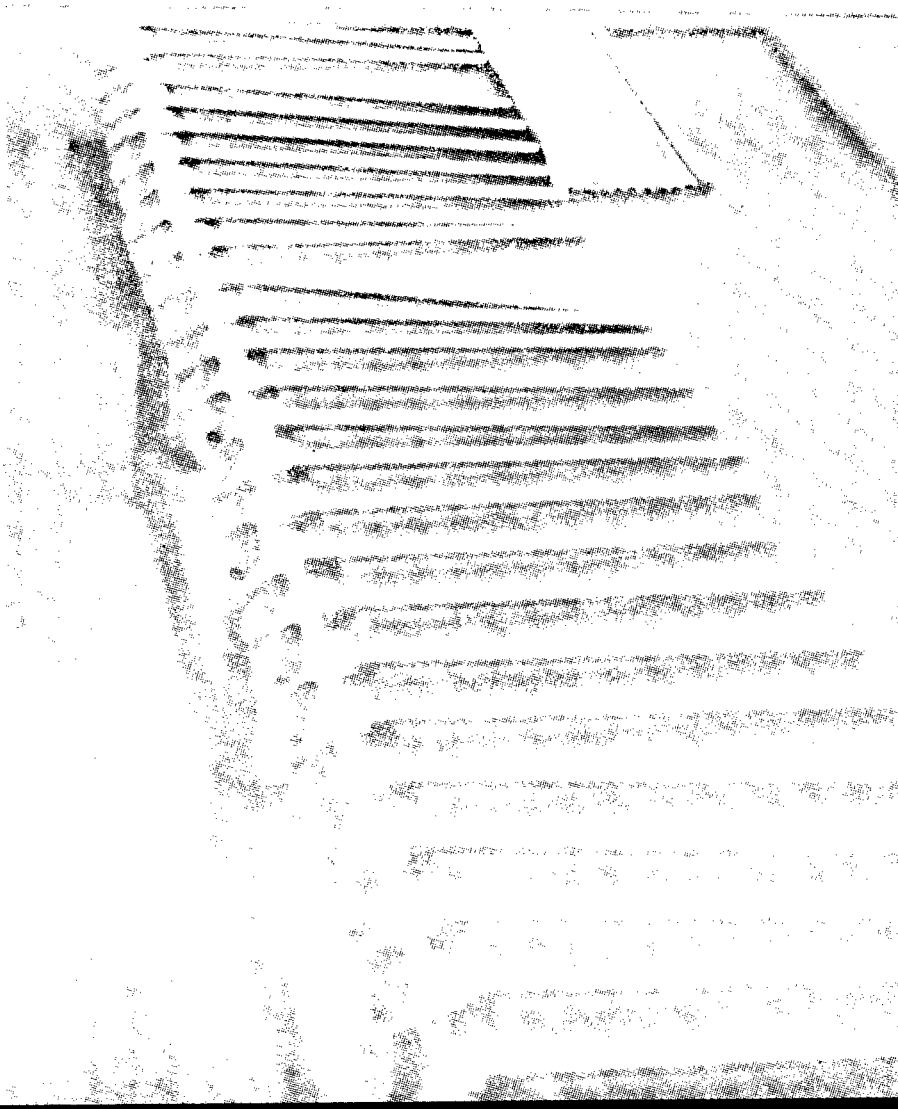


Some facets of the Kota plant are seen here: assembly line (pictures on the right and extreme right) and quality testing (the other two pictures). The instruments made here are used for delicate jobs in industries like fertilisers, atomic power and cement, where cent per cent accuracy is needed. Every part of the instruments is strictly tested for its precision and quality.









YOUNG HANDS

at work

at KOTA

SCIENCE ALONE CANNOT GUARANTEE EQUAL OPPORTUNITY AND DIGNITY TO MAN

DAME KATHLEEN LONSDALE, F.R.S.

This is an edited version of the memorable Presidential Address delivered by Dame Kathleen Lonsdale at the annual meeting of the British Association for the Advancement of Science this year in Dundee. Dame Kathleen is the first woman to be elected President of this august body of British scientists.

Dame Kathleen Lonsdale (65) is one of the foremost scientists of the United Kingdom and one of the most remarkable women of the century. She was one of the first two women to be elected a Fellow of the Royal Society in 1945 and to hold office as a Vice-President of the Society. She has won its Davy Medal for her studies on the structure and growth of crystals.

Dame Kathleen was born in Ireland on January 28, 1903, youngest of ten children of Mr Harry Yardley, a postmaster. A scholarship holder in school and college, after graduation she joined the team of research workers under Sir William Bragg, pioneer of the X-ray method of determining the structure of crystals. She married Dr Thomas Lonsdale, a scientist, in 1927.

Except for a period of eight years, 1927-35, when she brought up her three young children, Dame Kathleen has all along been engaged in research in crystallography.

Slightly-built, grey-haired and quiet, she in her appearance gives little hint of her dynamic qualities. She is a pacifist and is a former British President of the International League for Peace and Freedom. So strong are her pacifist convictions that during the war she refused to register as a fire-watcher (though carrying out the duties voluntarily) unless the regulation carried with it a conscience clause. Prosecuted, she refused to pay the fine and went to prison for a month. She took with her two books, Clark's Applied X-rays and Peake's Commentary on the Bible.

Her husband said of her recently: "She has a tremendous volcanic energy. She will get up at 4.30 in the morning and work all day, and still be fresh in the evening. Her other characteristic, I would say, is her great personal courage."

Well used, Science Enhances Quality of Life; Ill used, It Quenches Life

THIS year, 1968, has been designated as the International Year of Human Rights. Two thousand, even 200, years ago, children, women and slaves had no rights, and only a very few admitted claims.

To a certain extent, a very limited extent, technology has put power into the hands of the underdog, but hardly into those of children, or indeed of slaves. Yet it is in the technically developed countries that slavery has disappeared, at least in its crudest forms. Legalised slavery still exists in only two small States, but it is recognised that in many other countries there still is slavery although it has been declared illegal and is verbally condemned by their present governments. Slaves who want to be free have only to declare themselves to be so and to walk out. Why don't they ? Because if they do they will literally die of hunger. The freed slave has no way of hiring out his labour in a country with few industries or other possibilities of paid employment.

Science and technology could provide those possibilities, but only through the offer and acceptance of technical assistance on a scale much wider than is at present practicable.

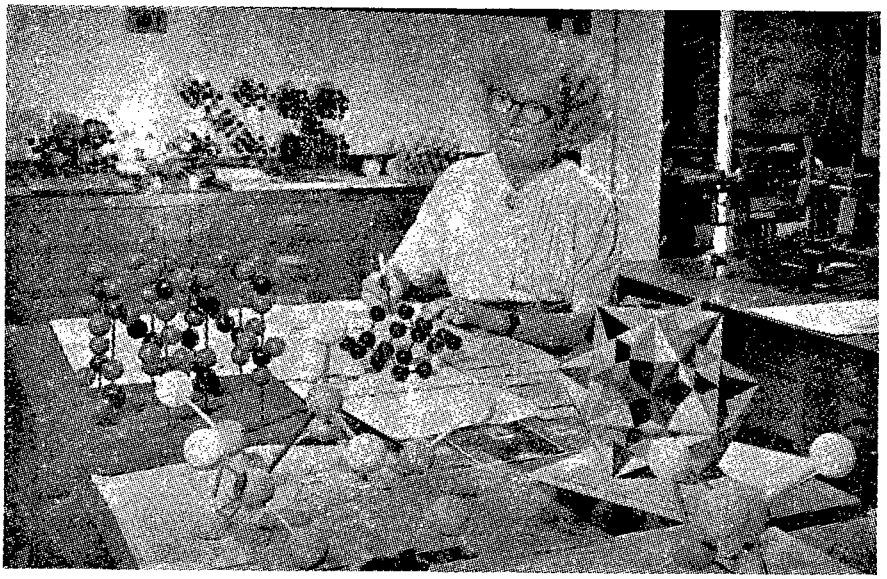
It is a curious fact, however, that technical development has brought with it a marked development of conscience on the part of those who actually wield power: perhaps because technical develop-

A Top British Scientist analyses the capacity of Science to build A Good Life and some related problems of modern world.

The longer we live with the terror of nuclear weapons, the more we get used to it. But these weapons do not make future wars impossible.

The technically-developed powers sell arms to the developing countries on the plea that if they did not do it, others would. It is the same as the argument advanced by brothel-keepers, black marketeers and sellers of stolen goods. The real need of the majority of the common people in these developing countries to which arms are exported is for teachers, doctors, engineers, know-how and social security. At least the developed countries should pay a "transfer fee" to the developing countries for draining their trained people.

A society in which some 50 per cent of the people are dissatisfied with their daily work or their monthly salary is hardly a happy community.



The author in her study

ment originated in the nominally Christian countries.

Generally speaking, we do feel uneasy when we hear of people starving in India who are only a few hours away by aeroplane and a fraction of a second away by radio, because we also feel that, with all our modern scientific resources, we ought to be able to do something about it, and should. We feel guilty or annoyed about technological disasters because we feel that we ought to have been able to anticipate and prevent them, and as science and technology advance, so the range of our control over nature advances also and only human nature eludes us. Perhaps that is one reason why social science is becoming so popular among university entrants. We want to understand ourselves, although we shudder, rightly, I believe, at the thought of being scientifically manipulated against our will.

Science can indeed, if usefully applied, minimise starvation and alleviate sickness; and labour can be reduced by mechanisation and automation, but only if re-education and perhaps redirection are accepted so that unemployment does not follow. **Science can release men from the domination of frightening superstitions if they are willing to be released but cannot guarantee equal justice, equal opportunity and equal dignity without discrimination which have been defined as the universal rights of every man, woman and child.**

But the modern scientific world is not the Kingdom of Heaven on earth. Far from it.

Most scientific and technological debris, for example, is so ugly; slag-heaps, hideous mining districts, specially those that have become derelict, the detergent foam on little streams, the tar and the oil on the beaches, the sulphurous fogs, the paper and the tins, the smells and the noise; especially the noise. **Surely scientists cannot altogether wash their hands of these horrible consequences of the commercial application of their work.**

Of course, I realise that life in prehistoric and medieval times was not one long ecstasy. My home life today gives much more time for

enjoyment of the countryside and of the arts than my grandparents had, because I have ample supplies of water, electricity, gas and easily washed textiles. And yet my uneasiness persists because I so deeply sympathise with those of whom Egan Orowan, a Fellow of the Royal Society, wrote recently : "The vast majority of the Earth's population regards science and technology as an increasingly mortal threat to their lives. They feel themselves powerless at the mercy of a few, as if they were on the operating table in the hands, not of healers, but of irresponsible playboys driven by curiosity."

IMMORAL SPECTACLES

There has, of course, been opposition to the applications of science at every stage, some of it amusingly irrational. The Royal Society was castigated three centuries ago by the vicar of Chew Magna in Somersetshire, who, wanting a stick with which to beat the scientists, seized the newly invented "optick glasses" and denounced them as immoral. He claimed that they perverted the natural sight and made all things appear in an unnatural and, therefore, false light. He argued that society at large would become demoralised by the use of spectacles, which were sinful because the eyes were adapted to the capacity of the individual, whether good, bad, or indifferent. They would give one man an unfair advantage over his fellow, and every man an unfair advantage over every woman since women could not, on aesthetic and intellectual grounds, be expected to wear them.

It is easy to laugh off such bigoted nonsense. It is not so easy to be really quite sure that the ability to get to New York or Moscow or Melbourne in a few hours is worth the fact that bombs and chemical or biological weapons can be and are being dispatched and delivered in the same way. Oh yes, I know that we can have holidays abroad, and that many international scientific conferences would be impossible if we were not able to fly to them. I'm not even sure whether that might not be a good thing.

The expense and the consumption of working time involved in the proliferation of scientific conferences, however, pale into insignificance compared with the amounts spent on nuclear physics and on space travel. I am not trying to crab nuclear physics and space research in particular, just because they get the largest slices of the financial cake. It is true that the first incentive to huge expenditures of money and manpower on nuclear research was for the production of atomic weapons, weapons which were supposed to make future wars impossible but which in fact have done nothing of the sort, as Korea, the Near East and Vietnam bear witness. **The horrifying fact is that the longer you live either with terror or with guilt, the more you get used to it.** So far, the horror of nuclear weapons and the inevitability of retaliation have prevented their use in war between the great powers, but for how long? Until we breed another Hitler? But chemists and biologists do not have clean hands either, even though the cost of what they do is much less. Chemical and biological warfare could end life on this earth just as nastily and much more cheaply than nuclear weapons, and leave the world to the bacteria. What price the good life then?

HORROR OF WAR

Our children and our children's children have no certainty at all of a good life unless the horrors of possible future scientific wars are eliminated. As a so-called professor of chemistry and a grandmother I cannot avoid the issue. When, during the Korean war, the West were accused of using chemical and biological weapons, the accusation was indignantly refuted. Now, there is no attempt to deny that the weapons themselves are being made and that some of them have been used in Vietnam. The first reports of this that leaked out in March 1965 provoked an immediate storm of national and international protest, but this died down, as such protests always do die down with time and familiarity. We were horrified at the use of napalm once, and before that at the bombing of civilians from the air. Of course, horrors are never on one side only in war. But we can and I think should protest against what is done in our name or by our friends. It is because I like and admire many Americans that I say that what is done by an enemy is no excuse for following suit, nor for producing and using new methods no less uncivilised for being scientific.

Those of us in the British Atomic Scientists Association and in the Federation of American Scientists who, after Hiroshima and Nagasaki, thought that we could help to inform the public and so to promote a quick agreement on the International Control of Nuclear Weapons, found that we were mistaken. People either did not want to listen or, if they did, became frightened; and frightened people do not act sensibly. One result was the anti-communist scare associated with the notorious Senate Committee on Un-American Activities. It takes more than facts to create judgment.

STUDENTS REJECT OLD MORALS

An alternative reaction is that of many young students today : a rejection of the whole system of old-fashioned morals which failed to prevent the horrible situation into which they were born. As I write this lecture I have just been reading, in *Science*, an account of a police raid on Stony Brook, the new State University of New York, at which our next year's International Crystallographic Congress is to be held. Some 49 students were arrested for selling or possessing drugs. One of them, described as "an extremely bright science major of about 20 years old", said in an interview with *Science*, "at first we used to look over our shoulder when we took 'pot' but we never saw anything, so we even stopped bothering to look. You know", he added, "it's like atomic weapons. When you first learn about them, you're scared. But they never go off, so you stop worrying about it". Many of the students, the report continues, feel little but pure disgust for the performance of their elders. They know that the law proscribes drugs, but they regard the law as inane. "They say we can have alcohol", said another student, "but we cannot have marijuana. This university is made up of scientists; they know there's nothing in the literature that says 'pot' is harmful, but you can fill a library with data on the harmfulness of liquor."

I am not defending the behaviour of these students and of course I don't agree with them that "pot" is harmless. I think I understand their feelings but I wish that a study of science and of scientific method had taught them more commonsense. And when I hear (as at the time when Mr. Malcolm Muggeridge resigned from the Rectorship of Edinburgh University) that a young woman student says that they want the "pill" because it is the done thing nowadays for men and women students to sleep together, I am not shocked—I'm much too old for that--but I just wonder "How silly can you be ?"

Science has ameliorated the punitive consequences of folly to a certain extent: unwanted children can usually be avoided and although, according to WHO, venereal disease is on the increase, one no longer sees, in Britain anyhow, the evidence of the inheritance of venereal disease on the faces of the third and fourth generations. **But don't these stupid boys and girls (especially the girls) realise that there is a real ecstasy about sexual love, when it is accompanied by deep affection and mutual respect, that they are throwing away for the sake of a kick?**

ARMS AND THE MAN

But aren't we stupid too? Forty years ago some of us were worried by the activities of arms manufacturers. We could not shut our eyes to the fact that modern weapons were the product of modern science and technology. We knew that during the First World War British boys had been killed by weapons made in Britain and exported, and we knew that Disarmament Conferences were being disrupted by arms manufacturers' agents. We thought that, failing complete disarmament, it would be better to have the arms industry nationalised, so that arms would only be made for national use if required and not for export. How wrong we were ! This infamous trade still goes on.

Few people, and certainly **very few of the Members of Parliament to whom I have written, feel any sense of uneasiness or shame that in order to improve our own balance of payments our country is making and is selling vast quantities of armaments and that we have an arms salesman to promote such an evil trade.** These sales of arms by the technically-developed powers are justified by all of them on the grounds that if they did not do it, the others would; and that the supply of arms to friendly gevernments is a means of sharing the cost of maintaining the balance of power, and of helping the developing countries to maintain their internal security.

BROTHELS AND BLACK MARKETEERS

These arguments simply do not hold water. "If we did not do it, others would." Would that be regarded as an adequate defence for a drug pedlar, or a receiver and seller of stolen goods? It is the same argument that I heard inside Holloway Gaol in 1943 from keepers of brothels and black marketeers, quite nice women really, who thought I was a little crazy and were kind to me.

"We need the money we get from exports, and the developing countries need internal security." **In fact, the majority of the common people in the countries to which we or others now export arms (including those where a white minority holds power) have a high degree of illiteracy and a low standard of living, much lower than ours. Their real need is for teachers, doctors, nurses, engineers, knowhow and social security.** In many cases we are importing their doctors and nurses, their scientists and engineers here into Britain to replace our own whom we have lost to America, although the need of under-privileged people is much greater than ours. What chance have they of a good life; illiterate, hungry, and often diseased ? Well, it can be argued, and with some justification, that the good life, in the best sense of that word "good", does not depend on possessions or surroundings, and that happiness consists in the fewness of one's wants rather than in the multiplicity of belongings. But that is a comfortable doctrine for those who have power, and even if true it only applies after elementary needs have been supplied.

RECOMPENSE FOR BRAIN DRAIN

What we should do, if we wish to increase our own exports, is first of all to pay for the doctors, scientists and other trained people whom we are draining from the developing countries. We cannot expect the technological gap to close if we import the best-educated young people of the poorer nations without any recompense to the countries concerned. I have suggested this kind of "transfer fee" before, and I do so again now. Then we could offer for export, not arms, but more of the things they really need.

Many of those countries who are asking for jet fighters need water and irrigation systems far more; we could step up arid-zone research on a much greater scale than at present. We could stimulate a bigger popular demand for, and could build or help to supply them with, more roads, drains, artesian wells, agricultural equipment, fertilisers, improved seeds, schools, technical colleges, teaching aids, school equipment, books, radio sets, bicycles and other means of transport. It is possible to stimulate a demand for things worth having, by skilful international advertising. We all do it to a certain extent: not enough. The Germans have built technical colleges abroad and have filled them with German-made engineering equipment in order to gain the market for such goods. The Americans have done the same with hospitals and medical colleges.

If our customers can afford to pay for armaments they can afford rather to buy the material fundamentals of a good life for their peoples when we have the wit and wisdom to provide these for export. We need to step up our present efforts in this respect.

INTERNATIONAL SERVICE FOR SCIENTISTS

Moreover there are many of our own scientifically-trained young people who would be not only willing but glad to put in a period of international service abroad where their skills were most needed. What I am suggesting is not an unpaid voluntary or semi-voluntary service, admirable although that is, but a properly-organised, pro-

perly paid-for period of international service abroad for young scientists, young engineers, young doctors, young teachers in those countries who need them, but who cannot afford them, and whose scientists and doctors we are draining away. One of my former students, an Indian who is now professor of physics in a provincial university in his own country, tells me that he cannot keep any lecturer, who knows enough nuclear physics to be able to teach it; they emigrate. I believe very strongly that young British physicists who went out for, say, two or three years to teach in such universities would get as much as, if not more than, they gave. They would, in the first place get to know people whose whole background has been very different from their own. They would gain some experience of the application of their own scientific knowledge to the real needs of real people.

I am not suggesting that the only justification for scientific research is that it should be useful, or that the man or woman with the rather rare capacity for creative and fundamental research should be re-directed to some kind of social service. I am saying, however, that the person who begins to specialise in science at the age of, say, 14, and who then becomes more and more concentrated in one narrow field, and even along one narrow line, who stays on as a postgraduate in the department from which he graduated and then becomes a member of staff and eventually a Reader or Professor, may achieve high honours and may enjoy that kind of life in his own way; but I doubt whether it is the best kind of life, or whether that is the way to ensure the kind of scientific teaching or research that will help to forward a good life for men everywhere, even in the long run. My own research life has been greatly enriched by having been broken into by periods of enforced change. I was not idle while I had my three children: far from it. But it gave me the opportunity of standing back, as it were, and looking at my work. And I came back with new ideas.

My picture of the one-track scientist is not a caricature. Every academic scientist knows that many of his colleagues do aim at retaining their own best students for postgraduate research and eventually keep them on the staff because they are well-trained in just those branches of knowledge for which the department has gained a reputation for special excellence.

It is no wonder that many middle-aged men, not only scientists, look back at their period of war service with something like nostalgia. Discomfort, danger, anxiety are at least a break in the routine. It is quite certain that such a one-track life sounds terribly boring to most school boys and girls.

Some 11 years ago Margaret Mead and Rhoda Metraux reported on a nation-wide survey carried out on behalf of the AAAS to find out what was the image of the scientist among American high-school young people. They found **the scientist is thought of as very intelligent, patient, dedicated and open-minded; but his work, although essential to the well-being of mankind, is (apart from occasional discoveries) uninteresting, monotonous, tedious and time-consuming,** while he himself bores his wife, his children and their friends (for he has no friends of his own except other scientists) by talking, eating and sleeping nothing but science, or so the youngsters thought. While it was interesting that these young people did not reject science itself, such an opinion among schoolchildren is not likely to produce many future scientists.

But does the real scientist find satisfaction and fulfilment in his work? Not if he is employed in industry, according to a survey recently published by the Graduate Appointment Register. Out of the sample tested, which included 850 graduate scientists and engineers employed in industry, 39 per cent had determined their future careers by the time they took "O" level, 86 per cent by "A" level; but after a few years 50 per cent of the scientists and 65 per cent of the engineers said that they would have chosen a different career if they could go back and choose again; whereas out of some 550 graduates in non-scientist commercial jobs only 40 per cent wished that they had chosen differently. Given a fresh choice of occupation, only 13 per cent of the whole dissatisfied sample would have chosen a scientific job and eight per cent an engineering job. **A society in which some 50 per cent of the people are dissatisfied with their daily work or their monthly salary is hardly a happy community.**

I don't know whether this sense of dissatisfaction is universal or whether the sample taken, although large, was not representative enough. I don't think that there would be the same reaction among academic scientists, or not at least among those who enjoy teaching and the contact it brings with young minds or among those who are able to pursue the study of pure science with an adequate grant for apparatus and a clear conscience.

But the plain fact is that **a pure research worker, if not conditioned by an earmarked grant, usually investigates something simply because it is not known and interests him and not because it is likely to be useful.** The incentive is similar to that which drives a painter to paint or a musician to compose: it is a creative urge; and happy indeed is the man or woman who, having such an urge, is able to fulfil it.

Knowledge and privilege do bring with them great responsibilities, not merely the rather easy responsibility of informing others and of leaving them to take the consequences, but rather of foreseeing what the "fall-out" from one's research is likely to be over a wide area of human happiness and of devising "feed-backs" to give warning of potential dangers.

The scientist then could and, I think, should exercise his powers of influence and pressure as an informed citizen to see that, as far as in him lies, a right choice is made and right action taken. I think also, although this is a more debatable question, **that one should not work in any field, however pure, of which the immediate and obvious application is evil and the good application obscure.**

The responsible use of science will enhance the quality of life. Its irresponsible use could quench human life as we know it.

DANDAKARANYA'S DECADE OF PROGRESS

Ramayana Sanctuary Is New Home for Refugees

DANDAKARANYA, once the legendary land of the Hindu epic of Ramayana, has become the field of a great rehabilitation experiment which is bound to have far-reaching repercussions. Comprising an area of 25,000 square miles and covering the Koraput district of Orissa and Bastar district of Madhya Pradesh, it has offered an opportunity to thousands of homeless refugee families from East Pakistan to begin a new life in its sylvan surroundings.

It all started with the setting up of the 8-man Dandakaranya Development Authority in September 1958 by a resolution of the Government of India. The object was not only the expeditious rehabilitation of displaced persons from East Pakistan in Dandakaranya but also the integrated development of the area with special reference to the tribal population.

Once the die was cast, things started moving. Land released by the Government of Orissa and Madhya Pradesh began to be reclaimed; villages began to be planned and essential rehabilitation facilities, including financial assistance, provided to the intending settler families of displaced persons and landless tribals.

In a decade, that is from September 1958 to September 1968, out of the 2,24,702 acres released, over 1,31,000 acres had been reclaimed and over 1,13,000 acres harrowed. As many as 241 settler villages had been set up by the Authority, besides 61 tribal villages established by the two State Governments. A total number of 12,272 displaced families had been resettled. An expenditure of Rs 32.20 crore had been incurred on the entire project by June 1968.

A village in Dandakaranya is carefully planned. Normally, 40 to 60 families are accommodated in each village where facilities essential for rehabilitation are provided. An agriculturist-settler family is provided about six acres of agricultural land and 800 square yards for building a homestead. Besides, a house building loan of Rs 1,700, an agricultural loan of Rs 1,015 and an irrigation loan of Rs 150 for sinking a well in the homestead plot is given to each family. In addition, maintenance subsidy at prescribed rates is made available to each settler family. So far, Rs. 15.68 crore have been spent on the resettlement of displaced persons.

Since tribals constitute the bulk of the total population in Dandakaranya, their welfare also forms the cornerstone of the Authority's development programme. The Authority provides funds to the two State Governments to finance the settlement of tribals. Each tribal family is given Rs 2,600 as outright grant for its settlement on reclaimed land. Each new tribal settlement must have a minimum of 40 families. So far, Rs 4.66 crore had been directly allocated to tribal welfare. Reclaimed land measuring 12,043 acres has been distributed by the Orissa Government among 1,936 families constituted into 45 villages, while on the Madhya Pradesh side, up to July 1968, 5,482 acres had been distributed among 495 tribal families comprised of 16 villages.

During the last 10 years, a good deal of work has been done in the direction of developing communications. The Project has built 198 miles of main roads, 341 miles of link roads, 151 miles of roads for tribal villages, 165 bridges and 1,289 culverts. All these have facilitated the economic and social development of the area. Further, 212 wells and 950 tubewells have been constructed for providing water for drinking and irrigation.

In the educational field, the Authority has established 212 schools, including 9 Middle Schools and 3 High Schools, spread over the entire area. In the sphere of public health 6 hospitals and 10 primary health centres and dispensaries have been opened. As many as 40,954 indoor patients and 41,15,552 outdoor patients have so far been treated at these medical institutions. By systematic measures, malaria has been completely eradicated from the operational areas of the Project and anti-malarial measures are regularly in force.

Various measures have been adopted for the improvement of agriculture which is the primary occupation in Dandakaranya. A number of minor and medium irrigation works have been constructed. New varieties of paddy as well as cultivation of Rabi crops have been tried successfully, with the result that Dandakaranya has now become self-sufficient in foodgrains.

Attention has also been paid to the development of animal husbandry, fishery and dairy and poultry farming. As many as 3,272 cows and heifers have so far been distributed among settlers. Pisciculture is being increasingly adopted as a subsidiary occupation. A dairy unit and a Central Poultry Farm have been set up. By August 1968, 15.15 lakh eggs were produced and 2.13 lakh chicks hatched.

To give an agro-industrial bias to the developing rural economy, an Industrial Training Institute has been set up at Ambaguda. Other training units impart training in toy making, umbrella assembly, carpentry, blacksmithy and other handicrafts such as weaving.

A notable landmark in Dandakaranya has been the re-entry of settlers in the national political life. About 13,000 settlers were enrolled as voters and the majority of them participated in the last General Elections. In short, Dandakaranya is vibrant with new life and vigour. It is on the march.

BAILADILA PLACED ON INDUSTRIAL MAP OF INDIA

ASIA'S BIGGEST MECHANISED IRON ORE PROJECT

REPORT BY M.V. KHER

ABOUT three quarters of a century ago when Mr. J.N. Bose, a reputed geologist, located the iron ore in Bailadila hills, he might not have hoped that it would one day develop into one of the most leading national projects of India. The Bailadila Iron Ore Mines will be one of the biggest foreign exchange earning public sector industries in the country. During the first year of its working, 1968-69, it would earn Rs 13 crore as foreign exchange.

Bailadila means 'hump of an ox' in the local tribal dialect of Bastar District. The area of the mines here is 32 kms. long and 4 kms. wide and rises up to a height of about 1,250 metres above mean sea level with a surrounding table land.

The Bailadila range of hills infested with wild life, such as tigers, panthers, bears, wild boars, bisons and deers, was, probably, one of the most inaccessible parts of India, unconnected by even jeepable roads. Ten years ago, it used to take about a week to reach the area from the nearest railhead at Raipur or Visakhapatnam. Sal wood of good variety is found in abundance here. Teak of medium quality and Bija, both hard and soft varieties, are also available. The temperature throughout the year is normally below 30° C., except from mid-May to mid-June when it goes up to 41° C. During winter months it usually goes down to 6° C. The total yearly rainfall is nearly 300 cm. Different rivulets from Bailadila merge into the river Godavari.

In 1957 Mr Asada, a leading Japanese expert, representing the Japanese Steel Mills Association, visited the area and made a study of the iron ore deposits. He suggested a more detailed study in depth. The Asada Mission, which incidentally stayed in a hut located at the hill top, paved the way to an agreement in March 1960 between the Government of India and the Japanese Steel Mills Association for the export of 4 million tonnes of sized iron ore to Japan.

The Bailadila Iron Ores are claimed to be one of the world's best iron ore deposits. The percentage of iron ore here varies between 65 and 70. Reserves of iron ore containing more than 65 per cent iron content are estimated to be 121 million tonnes, while that of blue dust having 66 per cent iron content are estimated to be 40 million tonnes.

A NEW PORT

The Bailadila Project has offered to supply to Japan ten million tonnes of iron ore annually from 1972. The Bailadila Iron Ore Deposits, with its total deposits of 3,000 million tonnes, are quite capable of supplying iron ore to Japan for 15

years at the rate of 10 million tonnes a year. At present Kiriburu is supplying the iron ore to Japan. There is a proposal to divert Kiriburu supplies to the Bokaro Steel Plant and entrust Bailadila Project with supplying six million tonnes of iron ore to Japan from 1970. A new port 'Gangavaram' is being built near Vizakhapatnam to handle traffic of 6,000 tonnes of ore per hour against the present 2,000 tonnes per hour.

Detailed prospecting of two deposits, No. 5 and No. 14, was taken up six years ago, after the near completion of the exploratory work at No. 10. In 1961 the job was handed over to the National Mineral Development Corporation (N.M.D.C.). The exact deposit which had to be exploited for meeting the export commitments was not decided till early 1963. On the basis of preliminary projects prepared by Mr. K. L. Sehgal, the then Chief Engineer of N.M.D.C. and now the General Manager of the Project, a Japanese team under the leadership of Dr. Sugamata of Yawata Settl selected Deposit 14 for meeting Japanese orders. Construction work began in 1964.

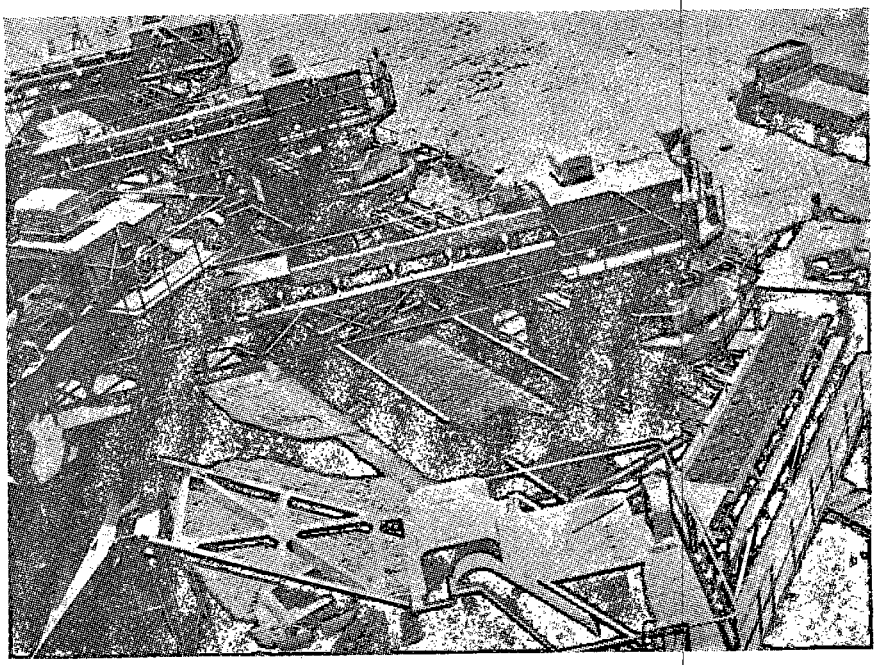
The Madhya Pradesh Government has linked Bailadila foothills with Jagdalpur by a tarmac road over a distance of 100 kms. Work on this road for straightening various bends and for the construction of new bridges is still going on. The National Mineral Development Corporation has made an equally good road to Deposit No. 14.

IRON ORE PLANT

The iron ore plant has a capacity of 1,500 tonnes per hour for sized up lump ore meant for export and 500 tonnes per hour for fines to be diverted to stockpile. Individual components of various sections of the Plant have rated capacity as high as 2,500 to 3,000 tonnes. Huge ultra-modern mechanical equipment has been installed at Deposit No. 14 for drilling and for treating the ore at different stages of crushing, screening, wagon loading and fine ore disposal. These include 15 drills, one blast hole drill, nine shovels, 25 discharge dumpers and 18 bulldozers. The crushing plant of Bailadila is the biggest in this country.

The plant has an automatic sampling and quality control which enables the management to know the details of the ore being mined and despatched on different dates or during different periods of any working day. Provision has been made for an automatic sampling plant. The sampling plant, first of its kind in India, has provision for screens which give an idea of the percentage of fines going along

The ore coming out of the crushing plant, the biggest in India, is stockpiled.



The ore-loading plant automatically loads the ore into wagons at 9,000 tonnes per hour. While loading, the ore is weighed simultaneously. Six wagons each of about 59 tonnes are loaded in 3 minutes.

with the lump ore. Mining benches, places of digging/blasting and scheduling of shovels can all be adjusted in the light of the results of the sample assay. The conveyor of the iron-ore handling system is 1.84 km. downhill, perhaps the longest of its type in the East.

The wagon-loading plant has been designed in such a way that it can handle any type of railway wagon. A rake of 40 wagons, each with a capacity of about 60 tonnes, can be loaded in about an hour. Travelling beams of the six leading conveyors to six differnt wagons ensure uniform central loading of the wagons.

The Bailadila deposits are connected with Visakhapatnam port which handles export from the plant by a broad gauge railway line over a distance of about 480 Kms. Completed at a cost of Rs 55 crore in April 1967, the railway line is capable of carrying 8 million tonnes. It is proposed to raise it to 12 million tonnes with suitable modifications. Visakhapatnam port can handle 4 million tonnes of ore. The capacity is being raised to six million tonnes per year.

The number of employees working in the various sections is over 3,600 who include about 700 Adivasis. A township of 475 quarters with modern amenities, a 30-bed hospital with modern equipment, primary and higher secondary schools, clubs, social centres and welfare centres makes the employees' living pleasant.

KOTA

(from Page 15)

lities at the Kota plant have been supplemented, besides other programmes, by Research and Design which provides the technical base responsible for indigenous development and substitution of imported components and material. A number of instruments have already been developed with indigenous know-how and these are expected to be introduced in production next year. Development programmes have also been undertaken with the object of providing instruments with greater accuracy, speed, miniaturisation and digitisation. Several production orders to meet defence requirements as well as development orders for a sophisticated instrument for atomic power projects have also been undertaken by the management.

The two major problems facing the management are the slackening of demand due to our difficult resources position and outlays for setting up of basic industries, and the tendency of some of the major customers to look to foreign sources for their requirements due to lower rate quotations and also because their confidence in indigenous instruments has yet to get fully reposed. Also, in view of the comparatively higher production costs, the indigenous enterprise finds it initially difficult to supply its products at competitive rates. Efforts are being made to reduce production costs by economising on capital investment by deleting certain imported equipment or phasing out indigenous supplies. Particular attention is being given to the maintenance of quality standards and to standardisation aspects to ensure interchangeability of various components and also to achieve economies of scale for manufacture.

The management also has not ignored the development of human resources in this field and the requisite technical and production expertise. Out of the present personnel strength of about 700, with an average age of 26 to 27, some 140 are engineers and technologists. Labour-management relations are excellent and all personnel are attuned to make this enterprise one of the best public sector units in the country. Manpower planning caters for the growth of these personnel to about 1500 by 1974.

WORLD SPOTLIGHT

ISRAEL

Computer Helps Distribution of Its Scanty Water Supply

Israel is a semi-arid country. Rainfall occurs mainly during the four or five winter months and ranges from a 1,000 mm. annually in the mountainous north to under 200 mm. in the arid south (known as the Negev) which contains most of the country's arable land. Most of the crops depend on artificial irrigation, which has become the primary limiting factor to the expansion and intensification of agriculture. Surface water sources, such as springs and streams, are relatively rare, and water is obtained by drilling into aquifers--the water-holding rock formations. This water is supplied to the consumers through a network of pipelines, boosters and reservoirs.

During the early days of Jewish settlement water supply problems existed only on a small scale and were solved locally by farmers and communities drilling wells on their property. In the 1920s, a number of co-operative water-supply companies were organised. As the rate of agricultural settlement rose, the problem became more acute and, in 1936, the Jewish authorities founded a national water company, which grew rapidly over the years. Its scope included the construction of water works, their operation and maintenance, as well as supply to consumers, who were generally villages or towns rather than individual farmers.

With the birth of the State of Israel in 1948 it became necessary to settle the Negev. The problem of water supply to this area became a major concern of the Government.

During the early fifties, local supply in the Negev was practically exhausted. Water import was possible from only two areas: the springs of the Yarkon River in the centre of the country, and the upper Jordan River and Lake Tiberias in the north. The Yarkon-Negev Project was designed to carry water from the former area. It became operative in 1954, but, within a few years, prolonged droughts and over-pumping caused a heavy depletion of its sources. Simultaneously, a new Government agency named Tahal (Water Planning for Israel) was created for hydrological research and the planning of water projects. Together with Mekorot (the National Water Company) it undertook the design and execution of the National Water Carrier Project. This was designed to pump water from Lake Tiberias at 210 metres below to 117 metres above sea-level and carry it through a succession of channels, tunnels, reservoirs and pipelines to connect with the Yarkon-Negev system. The two systems together today form the National Water Carrier.

From the very beginning Israel has been water-conscious. Too scant is this most precious resource. First, for agriculture, for more than 50 per cent of Israel's exports are farm produce—principally citrus. Ever-increasing irrigation is required to grow food for her rapidly expanding population. Another mounting demand for water stems from the nation's swift rise in industrial production, a prime essential for Israel to help close the gap between imports and exports. Moreover, Israel's rapidly swelling cities demand more and more water for domestic consumption and to elevate further already high standards of living.

Facing this challenge, Israel has made a thorough inventory of all her land and water resources. Every inch of soil has been earmarked for the best possible use—irrigation, dry farming, grazing pastures, forests and orchards and vineyards on slopes of re-built terraces. To make full use of all her resources, Israel has formulated and launched a Master Water Plan. Designed to co-ordinate and to integrate all her water resources into a comprehensive, country-wide network, the programme involves the assembling of water wherever it is available and funnelling it to the areas where and when it is needed.

To understand Israel's need for more water, one must bear in mind that in 1948 only 17 per cent of the country's potential water resources were being used, whereas today that figure is fast nearing the 90 per cent mark predicted for 1970. At present, approximately 60 per cent of waters in Israel are made up of ground water requiring pumping from wells. Another 30 per cent consists of perennial surface flow; the remainder will be in reclaimed sewage from cities and salvaging of winter flood flows. To continue to grow, Israel must have additional water.

In 1962, the execution of the national carrier approached its final stage. The engineering staff at Mekorot was entrusted with its operation and integration into the national network. It became apparent that the operational philosophy for the past twenty years for small-scale, independent water-works would not suit a large, inter-connected system. When it was discovered that the salinity of Lake Tiberias was too high for certain crops, it was decided to dilute the water of the Jordan Project along its way south with less saline water from the northern aquifer. This would be pumped into the carrier from boreholes by boosters distributed along the pipe-line. They now constitute the Mixing System. Under pressure

from farmers and agricultural communities, the Government passed a law defining the tolerated salinity in water supplied by the national carrier. The increasing demand for water made it necessary to pump the maximum amount from the Lake, which meant approaching the tolerated limit as closely as possible. A delicate balance would have to be maintained, for which advanced control and calculating devices were needed.

In addition, the energy consumption of the water distribution system was evidently going to be extremely high. Efficient control of current energy expenditure, which had not played a big part till then, could no longer be avoided. Finally, the scope of the new system made it possible to consider large-scale manipulation in case of faulty conditions and breakdowns which could not be carried out locally. It was decided, for example, to discharge quantities of water underground during the winter as artificial replenishment and storage. All these considerations indicated a need for centralised operational control and planning. It was decided that the new techniques of operations research, systems analysis and the use of computers should be employed in attacking these problems. Experience in Israel of these technique was limited at that time, and the management of Mekorot concluded that it should seek expert advice from abroad. A British firm was selected for the purpose and a joint team was formed in the summer of 1963. In 1964, the national water carrier went into operation.

The joint team functioned until 1965. It laid the foundations for operations research department and the computer unit. It initiated work on both the scientific analysis of operational problems and the systems analysis of the company's administrative and commercial activities. It introduced the systematic use of computers. The salinity problem was solved by a computer programme which simulated the activity of the actual system. This made it possible to examine operational plans and to choose the most adequate. A hydraulic simulator was developed as a first step towards more efficient energy control. A basic master plan for control was outlined and the design of the first centralised regional control centre was put in hand. The team was instrumental in the establishment of an operational control centre at the headquarters of the compay in Tel Aviv to supervise and co-ordinate the operation of the national carrier.

In 1965, Mekorot decided to rent another computer for delivery in January 1967. Work on the scientific analysis of operational problems continued in the operations research department. The hydraulic energy simulation programme for the national carrier was completed, as also an automatic optimisation programme for one-reservoir systems. A new method of consumption forecasting was developed and tested. All these efforts were integrated in the plan for a pilot project, where information would be automatically transmitted to the computer, which would display, log and analyse it for more efficient control. This pilot project was developed with the aid of IBM and is at present being considered in detail by the management of Mekorot. According to present plans, it should be operative this year. By 1970, it will be possible to control the central section of the water distribution system by means of a computer connected online to the system. At the same time, the same computer will be performing commercial data-processing work.

VASECTOMY IN THE SEA

For the first time in India, a vasectomy operation camp has been successfully carried out in the sea as a part of a mass Family Planning compaign in Jamnagar in September this year.

Dr. S.B. Trivedi, the District Health Officer, Jamnagar, arranged a Vasectomy camp in the sea. A large cargo tug of Bedi Port was converted into a temporary Operation Theatre. Care was taken to disinfect the tug. The Port Offlcials, Mr Dave and Mr Rana, gave all help.

The operations were carried out by Dr M.S. Patel and Dr S.B. Trivedi. In all 11 sailors were sterilised in the camp.

A NEW CHOLERA VACCINE

The Indian Institute of Experimental Medicine (CSIR), Calcutta, has developed a new live vaccine which, orally taken, can afford better protection against cholera. The vaccine is based on a naturally avirulent El Tor vibrio strain isolated from water sources in calcutta. Existing injectionable cholera vaccine has been found inadequate by recent field trials carried out under the auspices of WHO.

The new vaccine strain had been found to be apathogenic in animal models and capable of inducing protective immunity against virulent cultures of both classical and El To vibrios. It had also been shown to multiply in the rabbit gut giving rise to serum and copro-antibodies. The protective effect has now been shown to result mainly from an antitoxic immunity, although definite antibacterial immunity was also produced.

The safety of the vaccine for human use has been fully established. Now controlled field trial will have to be conducted to assess its value in comparison with those presently in use.

The Rajasthan Government proposes to spend Rs. 40 lakh for the development of new industrial areas during the Fourth Plan period. Another Rs 60 lakh has been earmarked for completing the work in the existing industrial estates. The State Government has plans to expand the industrial activity and has started discussions with several foreign Governments for collaboration agreements.

●

The Governing Council of the UNDP has allocated to India $ 2.5 million per year for the next four years 1969-72 from its technical assistance component.

Octopus-Hold of Industrial Power

INDUSTRIAL COMBINATIONS By M. L. Kothari. Published by Chaitanya Publishing House, Allahabad. 235 pages. Price not given.

M.K. Dharma Raja

GROWTH of industries in India, as elsewhere, has naturally brought in its wake the problem of industrial combinations. Grave it is, viewed in the context of a socialistic pattern. The emergence of industrial combinations forms the subject of this commendable monograph. Mr Asoka Mehta in the foreword speaks of the need to perfect the legal framework so that entrepreneurial talent is not choked off just because the financial and physical resources at its command are small. Also, it is paramount to ensure that society is not held to ransom because some of the industrial combinations have access to almost unlimited resources. A new element in the situation is our public enterprises. The public naturally expect of them to set the norm of a correct attitude and, if possible, rectify the imbalances.

Dr Kothari introduces the subject by explaining the basic concept of 'Concentration' and its technical aspects, and goes on to elaborate on its growth in the Indian context both during the pre-war period and through the years after Independence.

Industrial combinations forming as they do a feature of modern industrialism have aroused serious controversies and considerable thought has been given in many countries to the serious repercussions arising from their organisation. The author cites the examples of trust-bursting legislations in countries like the United States, Canada, Australia and New Zealand, specially to counter price discrimination and monopoly development. High-power Commissions of Inquiry have gone into various facets of the problem. A recent case in the United States was the action ordered by President Johnson against the steel cartels after they had rigged up prices.

In India, the problem has engaged serious attention over the years. The objective of Government policy stems from the Constitution itself enjoining upon the state to direct its policy towards ensuring that the operation of the economic system does not result in the concentration of wealth and means of production to the common detriment. Concrete expression came through the acceptance by Parliament of the socialistic pattern of society as the goal of future economic and social policy. The basic promise of the Five Year Plans has been to prevent the concentration of economic power and the growth of monopolistic tendencies.

The author has with remarkable objectivity and balance traced the growth and ascendancy of the few Indian business families, how they have enlarged their industrial empires out of proportion, partly through partnership with foreign companies and partly through mergers and amalgamations. The total picture that emerges is of industrial power in a few houses which, through their octopus-hold, constantly endeavour to defeat the purpose of legislation heralded by the Companies Act. Dr Kothari, it can be stated, has succeeded in reflecting the tempo of repeated demands for steps to suppress self-perpetuating oligarchies. The inescapable conclusion is that accumulation of excessive economic power in relatively few hands not only disturbs the balance of power in a democracy but also exposes the social fabric to strains and tensions which impede the diffusion of economic opportunities.

This study has the object of pinpointing the managerial aspects of industrial combinations as an important device of cornering capital resources. The techniques of integration have been analysed in detail to show how even after the enforcement of the restrictive provisions of the Act of 1956, the industrialists have managed to retain their control over a large number of companies. The ubiquitous and ingenious methods of converting managing agency rights into those of Secretaries and Treasurers, and the devices of multiple directorates and holding companies leading to the interlocking of firms have all been explained. Also explained are the various and dubious ways of financial integration helped substantially by foreign capital and industrial assistance policies.

In the final analysis, arguments have been advanced in favour of comprehensive legislation to regulate and control concentration and the monopolistic tendencies in the private industrial sector. The author favours the appointment of a permanent body to study and investigate monopoly combinations and practices in India.

A series of tables and statistics have been used by the author to buttress his main arguments against combinations of all varieties, horizontal, vertical or circular. The various reports on company reforms have helped the author in formulating his proposals based on information and data available up to 1961. In the Postscript are included the findings of two later studies, reports of the Monopolies Inquiry Commission, and the Managing Agency Inquiry Committee. In subsequent editions, Dr Kothari may also take note of the analysis made by Prof. Hazari in his report on licensing policy. Now that the managing agency system is to be finally done away with, the question how the institution of managing directors will herald an era of healthy co-existence in our economy should be a subject for future study by economic investigators like Dr Kothari.

ECONOMICS OF VOCATION

Introduction to Vocational Economics. Edited by B.N. Pal. Published by Vora & Co. Pvt. Ltd., Bombay. Pages 301. Price Rs 15.

S.C. Seth

THIS book tries to establish multi-dimensional correlations between education and economics from the point of view of vocational economics. It certainly is a pertinent point of view.

The message of the book is simple, which is that the vocational spread contributes to economic growth and each stage of economic activity in turn adds to the vocational potential and, therefore, there is considerable need for vocational planning which should become an important element in a developing society's economic and social planning.

This study tries to explain the intricacies of economic development, socio-economic planning, population and manpower analysis, demand for and supply of literacy, adequacy of wage levels, recruitment trends in different occupations, and general occupational distribution.

In the words of the author:

"Most economic and social maladjustments can be considerably alleviated through vocational and occupational guidance. Still, the fact remains that technological and other advances have not improved the common man's lot: there is general insecurity—social, economic, political and cultural. There is unrest, impatience, irritation, and hurry, which mark today's civilisation. The problems of backward and developing regions is how to steer clear of all these evils. Economic and technical progress is so rapid that no individual can keep pace with it; he lags behind socially and culturally. Vocational guidance cannot provide answers to these urgent and desperate problems. But vocational economics does suggest some remedies, as these issues are economic, and not merely vocational."

This study in spite of its refreshing slant and scholarly analysis fails somewhat on purely technical grounds. Its chapters are unwieldy and the thought process does not flow from one to the other. Thematically, therefore, there is lack of sufficient coherence in the arguments advanced either for or against an issue. Perhaps a more ably edited version of this work would have made it appear more logical. Presently many oddities occur. The correlation of vocational economics to questions of war and peace, for example, is a little out-of-the-way, though not totally irrelevant under certain circumstances.

After going through nearly 200 pages of academic acrobatics in nearly 19 chapters of analysis, where do we really reach and to what effect? It would be wrong to say, as the author's logic would guide us to believe, that in the context of India, our manpower analysis and educational development have not been fully matched with the economics of Indian planning. If that were so, can this book help us in overcoming the imponderables of the Indian failings with respect to vast unemployment, underemployment and brain drain. The answer is obviously no.

Essentially this book remains what its title suggests: "an introduction to vocational economics", and nothing more.

The get up of the book is good, and it is supported by a fine subject index.

A Block Survey Report

Needs, Facilities and the People—A Socio-economic Survey of Simalwara T.D. Block II by N.N. Vyas and O.P. Goyal. Published by Tribal Research Institute, Udaipur. 1968. 146 pages.

A.N. Mehra

THIS is a survey of the socio-economic development of a Tribal Development Block in Rajasthan's Durgapur District.

The Block covers 5 V.L.W. Circles comprising 96 villages with a population of 45,405. The distribution of institutions in the tribal and mixed villages is uneven. The tribal areas covering as many as 64 villages have only 28 village institutions, while 42 mixed villages account for 91 such institutions. Again, large-size villages have almost every type of institution. Villages of small size have been neglected as regards development.

The mixed villages have a higher sex ratio of 938 women to 1,000 men as against 909 to 1,000 in the tribal villages. In the age-group 0-4, the ratio of females to a thousand males is 1,021. This is interesting. Perhaps inaccurate collection of figures has led to these figures.

In all, 92 households were selected from 4 villages, located in the Bandela and 3 in the Jhalap V.L.W. circle of the Block. The other 3 Circles, namely, Simalwara, Dhambola and Chadoli, were not represented. The authors would have done well to include families from these circles also. The number of families to be studied could have been distributed proportionately among the five circles.

From the sampled population of 575, 66 persons were married when they were below the age of 14 years. Of these, nearly 76 per cent were females. Out of the 92 families, the majority was engaged in agriculture with one or more subsidiary occupations. The percentage of families having subsidiary occupation(s) was the highest among the non-tribals. The tribals did not take to traditional occupations of the castes. They would be engaged in sundry occupations and still would be holding an equal social status with other tribals. But they would not take to the occupations of the so-called untouchables. Where non-tribal population was dominant, they might work as watchmen or as messengers and where they were politically and economically strong, they utilised the services of the lower castes such as Balais, as messengers.

The levels of income of the families showed that, on an average, income of the non-tribals was much higher than that of the Scheduled Castes and Schedule Tribes. The income of Scheduled Tribes was higher than that of Scheduled Castes. The report showed that 25.8 of the non-tribals, 17.4 per cent of the Scheduled Castes and 8.4 per cent of the Scheduled Tribes were literate. Despite the fact that a good effort has been made to collect the data, the analytical portion of the report is poor. This mars its usefulness.

Indian Farmers Keen To Adopt Improved Agricultural Practices

PLANNING FORUMS

FOR long the Indian farmer has been dubbed as too outmoded to take to new ideas and to adopt improved agricultural practices and techniques. But the findings of the Bharatiya Vidya Bhavan's R. A. College of Arts, Ahmedabad, help to explode this myth. The Planning Forum of the College surveyed four villages in Kadi Taluka, Sarsa Ardesan, Jasalpur and Untva, to study the farmer's attitudes towards improved agricultural practices and their problems. It found that the farmers there were very keen to adopt improved methods of cultivation. The farmers preferred the improved varieties of seeds and chemical fertilisers. However, their non-availability dampened the farmer's enthusiasm. The lack of interest shown by the Gramsevaks and the extension officers worsened this situation. In Jasalpur, where the Gramsevak and the co-operatives were active, the farmers used more high-yielding seeds and fertilisers than in the other three villages. The Government machinery and the co-operatives have done little in giving guidance or in properly distributing the seeds and fertilisers in the three villages.

The farmers reported that the Taluka officers used to tell them new ideas, a few years back, but now they come mostly to complete their diary and for administrative and inspection work. Follow-up work is lacking. Ardesan's farmers reported that they were impressed by a demonstration arranged two years earlier by the Gramsevak and were willing to adopt the fertilisers combination used in the said demonstration. But no Gramsevak or any other officer since then has ever again explained anything about this to them.

Though all the four villages had co-operative seva societies, only that in Jasalpur was active and arranged for the supply of improved seeds and fertilisers for its members. One-third of the credit advanced by this society was in kind. Sarsav society maintained only a nominal stock of seeds and fertilisers which was too inadequate to meet the demand of its members. Ardesan Society did not deal in seeds and fertilisers. Untva society had been totally inactive for the last five years. It was observed that a majority of the members of the societies were keen to advise their societies and to fulfil the demand for seeds and fertilisers, but because of the indifference of the leaders very little could be done.

Surprisingly, the Taluka Seed Multiplying Farm of sixty acres remains idle, in spite of a high demand for improved seeds.

Improved implements and insecticides and pesticides are seldom used. Among the insects, 'dor' is doing much damage to the crop.

There has been a good deal of development of irrigation facilities in the last two decades. Quite a few pump-sets have been installed and underground pipelines laid. Nevertheless what is urgently needed is a simplified procedure for irrigation loans and rapid electrification of villages. Since the initial and the running cost of oil engines is nearly double the corresponding cost of electric motors, many more pump-sets are likely to be installed, if rural electrification programme is expedited. Most of the farmers complained against the working of the Government tubewells.

THE damage caused by the recent floods to village Kachhiawadi, situated on the bank of the river Purna in Bulsar district of Gujarat was surveyed by the Planning Forum of S.B. Garda (Arts) & P. K. Patel College of Commerce, Navsari.

The survey revealed that nearly 95 per cent of the 278 families in the village were affected by the floods. The total loss came to nearly Rs 10 lakh. Rising waters in 36 hours ate away more than the entire annual income of the village of Rs 9 lakh. The yearly expenditure of the village has been about Rs 8 lakh.

The people lost almost everything, houses, agricultural crops and other belongings. The loss to agriculture and plantation was worth Rs 5.75 lakh and the remaining loss was accounted for by houses, cattle, fruit-bearing trees, wells, machinery, implements and household belongings.

CHEMICAL EXPORTS UP BY 17 PER CENT

India's exports of chemicals and allied products went up by about seventeen per cent during the period April to September this year. It is estimated that the export of such products will reach Rs 25 crore during the current financial year as against Rs 21 crores last year, as there has been a good increase in the exports of these products to East European, West Asian, African and Far Eastern countries.

There has been about a five-fold increase in the value of drugs and pharmaceuticals produced in the country in the last 13 years. The increase has been from Rs 34 crore in 1954 to Rs 175 crore in 1967. Plans are under preparation to increase the value of output to Rs 250 crore in the next three years. The capital investment in the industry is likely to go up to Rs 190 crore by 1971.

7,50,000 acres of land have been provided with irrigation facilities in Gujarat this year.

Development Diary

● The Bailadila iron ore mine, which will be Asia's largest mechanised iron ore mine with an annual production capacity of four million tonnes for export to Japan, has been formally inaugurated at Kirandul in the Bastar district of Madhya Pradesh.

When in full production, the project is expected to earn Rs 27 crore a year in foreign exchange. Set up in the public sector at a cost of Rs 23.5 crore, including financial assistance from Japan, the plant has many new features. One of these is a steel cord belt conveyer, the longest of its type and used for the first time in the country.

● A new plant for the manufacture of engines for cars and trucks has been inaugurated at the Uttarpara factory of Hindustan Motors near Calcutta at a cost of Rs 25 crore. The most modern plant of its kind in the country, the plant has a capacity of producing 38,000 car and 15,000 truck engines annually.

● A new process for the manufacture of corrosion resistant jute fabric by treating the fabric with various inhibitor compositions has been developed at the Defence Research Laboratory (Materials), Kanpur. The process which is simple does not involve any special equipment, and contact and volatile corrosion inhibitors, required as raw materials, are indigenously available.

● A big plant to manufacture high-density polyethylene, a plastic raw material of superior quality, has been inaugurated in the industrial estate at Thana, near Bombay. The project, costing Rs 12 crore, has been set up in collaboration with a West German firm. Asia's biggest and one of the most modern and technically advanced units of its kind in the world, the project is expected to produce 20,000 tonnes of high density polyethylene and other processed products per year. The material can replace non-ferrous metals, jute, paper and glass in a variety of uses.

● The foundation stone for a Rs 29-25 lakh Modern Dairy has been laid at Pondicherry. The project, which is being established by a Co-operative Milk Society, will be completed by the end of next year.

● Work has begun on a Rs 21-crore scheme to bring the Cauvery waters to augment the water supply of Madras city. Water will be brought through a 180 km-long pipeline.

● The keel of the second Leander class frigate, being built by the State-owned Mazagon Dock, Bombay, has been laid. The warship, scheduled to be launched next year, will be delivered to the Navy in 1972.

● A new agreement on air services between India and Switzerland has been signed in New Delhi. It makes a provision for increase in the number of weekly flights of Air India and Swiss Air and also for the future operation of large capacity aircraft.

● India has gifted twenty fat-testing machines to Iran. The machines, built in India according to standards laid down by the Indian Standards Institute, are modelled on the best foreign make.

● A 31-km broad gauge railway line between Dharangadhra and Halvad in Saurashtra area of Gujarat has been opened to passenger and goods traffic. Constructed at a cost of about Rs 2 crore the new line forms an important link in the main Jhund Kandla broad gauge railway line under construction at a cost of Rs 16 crore.

● An airfield lighting equipment manufacturing unit, set up with Czech collaboration, the first of its kind in the country, has been opened as part of the Silver Jubilee celebrations of the Ordnance factory, Dehra Dun. Most of the plant and machinery installed in the unit is of indigenous origin. The factory has received orders or airfield lighting equipment from 22 airfields. One complete set has already been supplied, and another full complement is under despatch.

● The Geological Survey of India has located good deposits of copper in the Hassan district of Mysore.

● Iran has placed orders for the supply of cable coating machine costing Rs 45,000 and manufactured by the National Small industries Corporation with Japanese collaboration.

● A total of 74,594 tonnes of iron and steel products worth about Rs 3.89 crore were despatched from the Bhilai Steel Plants for export in October.

A long-term trade and payments agreement has been signed between Poland and India. An important feature of the agreement is the long-term arrangements reached for the supply of increasing quantities of sulphur and urea from Poland to India. In return India will export substantially increased quantities of Indian engineering goods,

FRUIT RESEARCH NEAR KOTA

GRAPE cultivation in Rajasthan is becoming more and more popular.

While five years ago grape cultivation was considered to be nothing short of a miracle in this State, no less than 300 acres are now covered with vines bearing this luscious fruit. And it has been realised that the climate of this region as a whole, especially the hot and dry atmosphere of Marwar, is well suited for developing vine-yards.

Grape cultivation in this State made a modest beginning in 1964-65 when about one acre of land was brought under vines at the 100-acre fruit Research Station-cum-Progeny Orchard of the State Agriculture Department on the Kota-Bundi road. The experiment was very successful. Grape cultivation has since been extended to Jaipur, Jodhpur, Ganganagar, Bundi and other districts.

It is proposed to develop large vine-yards in Hanumangarh, Sikar and Jalore areas also. Necessary trained personnel have been appointed by the Agriculture Department for this purpose.

The Fruit Research Station's orchard near Kota will itself grow vine-yards in one hectare next year. Some 20 varieties are already growing there, of which Beauty-seedless, Parlete Thomson-seedless, Khandari and Anab-e-Shahi have been quite successful.

This part of the year is the harvesting time for grape. At the Fruit Research Station's orchard the vines are full of bunches of grapes. The varieties which have seeds are harvested from 12 to 15 thousand kilograms in one acre, while production of the seedless varieties like Thomson and Parlete is from 10 to 12 thousand kilograms per acre. A well-known vine bears as many as 100 bunches of fruit.

MODEL PIGGERY

A model piggery is to be set up at Gannavaram in Andhra Pradesh. The Freedom From Hunger Campaign Committee of Ireland would supply to the piggery 130 pigs of improved strain of breeding stock. The estimated cost of the pigs is over Rs one lakh which the Committee would bear. This is under an agreement between the Government of India and F.A.O.

The superior strain of pigs would be multiplied for distribution in rural areas to the bona fide breeders in the hinterland of a Bacon Factory which is to be set up at the same place at a total capital outlay of over Rs five million. The Central Government has sponsored the scheme. The project is to supply protein rich food of animal origin to our population.

A FISHY BUSINESS

THE bumber harvest last year has taken the country substantially nearer to the goal of self-sufficiency in food. But, this is only part of the problem, because our people are still suffering from nutritional deficiency. The per capita consumption of protein in India is one of the lowest in the world. In this context, the development of fish resources can make a major contribution in increasing resources of animal protein.

Production of fish in India, both fresh water and marine, was estimated at 7 52 lakh tonnes in 1951. The annual average for the period 1963-67 was 12.97 lakh tonnes, while last year it rose to 14.23 lakh tonnes. Despite this, the per capita availability of fish today remains as low as 7.5 grams per day. Even at this low rate, India would require 15.6 lakh tonnes of fish by 1971 when the population is expected to reach 56 crores. Actually, the recommended protein requirement is 75 grams per capita per day. Assuming that 60 per cent of the population is fish-eating and that half of the recommended protein requirement is to be met from fish, India would need 46 lakh tonnes of fish per annum by 1971.

Fishing will always remain a gamble until some idea of the resources available in the sea is gained by reliable and scientific methods. Exploratory surveys conducted by the Government of India's Deep Sea and Off Shore Fishing Organisation and the fishery departments of some States are adding to our knowledge relating to fishing grounds, suitable types of vessels, gear, etc. Tagging is a method which contributes to specific knowledge on resources. It involves fixing some identity mark on fish, releasing it again and, on its subsequent recovery, assessing growth rate, direction of migration, population size of shoals. Tagging of sardines and mackerel has been taken up as a priority programme by the Central Marine Fisheries Research Institute, the Central Institute of Fisheries Education and some State organisations. More than 10,000 mackerel and sardine were tagged in the Bombay coastal sea in 1967, while a few thousand fingerlings were tagged also at Gandhisagar in the Chambal valley of Madhya Pradesh in order to assess the availability of fresh water fish.

Carp varieties do not breed in confined waters and the conventional method is to collect spawn in river mouths and rear them to fry and fingerling stage before they can be grown further in ponds and swamps. Wastage can be high in this method. Recently, carp has been successfully induced to breed in confined waters by injecting them with pituitary hormone. Experiments are also being carried out on the development of hybrid varieties of carp for evolving a breed with more meat, faster growth and better taste.

Well-equipped laboratories have been set up for sophisticated biological investigation. An instrument analyses the quantities of Vitamin A and other biological components in fish and fish liver oil and measures the rate of fish spoilage. Another apparatus helps to identify the various proteins.

The transport of fish fry is a sophisticated technique. The fry is kept in plastic bags and the amount of oxygen to be introduced into the bags varies with the distance. Drugs are also administered to depress metabolism.

EDITORIAL TIPS

The following piece from an American journal (*The Weekly Packet,* Blue Hill, Maine) speaks for itself. We would only like to add that what it says is perhaps true of some cities in India, too, so that we are not the only victims of the vagaries of telephone operators.

"We have been asked from time to time just how we go about writing editorials.

"Well, we've stumbled upon a foolproof technique, much like that of P.G. Wodehouse who said he constructed his fantastic plots by seating himself before his typewriter and "swearing a bit."

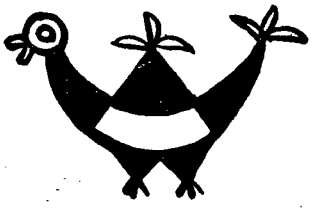
"We pick up the telephone, cock it on our shoulder, dial the operator, and while we wait for her to answer we write an editorial.

"The beauty of the system is that people see we are using the telephone, and so they don't disturb us. And by the time the operator gets around to answering us, the editorial is pretty well sewed up.

"Should we ever get direct dialling, like the civilized part of the country has, we shall probably have to give up writing editorials altogether."

IGNORAMAN
Wants to Know

Isn't brain drain better than leaving the brain in the drain ?



Regd. No. D-876

WORDS THAT INSPIRE

The very essence of democracy is that every person represents all the varied interests which compose the nation. It is true that it does not exclude and should not exclude special representation of special interests, but such representation is not its test. It is a sign of its imperfection.

Surely, timidity has no place in democracy, where people in general believe in and want a particular thing. Their representatives have but to give shape to their demand and make it feasible. A favourable mental attitude of the multitude has been found to go a long way in winning battles.

The truest test of democracy is in the ability of anyone to act as he likes, so long as he does not injure the life or property of any one else. It is impossible to control public morals by hooliganism.

I claim (to be a democrat) if complete identification with the poorest of mankind, an intense longing to live no better than they and a corresponding conscious effort to approach that level to the best of one's ability can entitle one to make it.

I have repeated times without number, for national work, it is not necessary that national workers should have political power. But it is necessary for the people to keep in constant touch with those whom they put in power. These can easily be counted. They are too few. But if the people were to realise their power and use it wisely and well, things would right themselves.

People in a democracy should be satisfied with drawing the Government's attention to mistakes, if any. They could remove the Government if they wished to. But they should not obstruct them by agitating against them. Ours is not a foreign Government having a mighty army and navy to support them. They have to derive their strength from the people.

Let us not push the mandate theory to ridiculous extremes and become slaves to resolutions of majorities. That would be a revival of brute force in a more virulent form. If rights of minorities are to be respected, the majority must tolerate and respect their opinion and action. It will be the duty of the majority to see to it that the minorities receive a proper hearing and are not otherwise exposed to insults.

Claiming the right of free opinion and free action as we do, we must extend the same to others. The rule of majority, when it becomes coercive, is as intolerable as that of a bureaucratic minority. We must patiently try to bring round the minority to our view by gentle persuasion and argument.

I have repeatedly observed that no school of thought can claim a monoply of right judgement. We are all liable to err and are often obliged to revise our judgements. In a vast country iike this, there must be room for all schools of honest thought. And the least, therefore, that we owe to ourselves as to others is to try to understand the opponent's view-point and, if we cannot accept it, respect it as fully as we expect him to respect ours. It is one of the indispensable tests of a healthy public life, and, therefore, fitness for Swaraj.

Intolerance, discourtesy and harshness are taboo in all good society and are surely contrary to the spirit of democracy.

I attach the highest importance to quality irrespective almost of quantity...In the midst of suspicion, discord, antagonistic interests, superstition, fear, distrust and the like, there is not only no safety in numbers but there may be even danger in them...Numbers become irresistible when they act as one man under exact discipline. They are a self-destroying force when each pulls his own way or when no one knows which way to pull.

I would only ask a candidate, "How much of a man or woman you are?" Provided he or she passes these tests, I would select first the one who belongs to the least numerical section. I would thus give preference to all minorities along just lines, consistent with the welfare of India..Welfare of india means welfare of India as a whole, not of Hindus and Mussalmans or of a particular community.

I ask you not to be cowed down by the thought of a small minority. It is sometimes a privilege. I have so often said that I would love to be in the minority of one, because this artificial majority, which is the result of the masses' reverence for me, is a clog in my progress. But for the clog I would hurl defiance.

Democracy is a great institution and, therefore, it is liable to be greatly abused. The remedy, therefore, is not avoidance of democracy, but reduction of possibility of abuse to a minimum.

True democracy or the Swaraj of the masses can never come through untruthful and violent means, for the simple reason that the natural corollary to their use would be to remove all opposition through the suppression or extermination of the antagonists. That does not make for individual freedom. Individual freedom can have the fullest play only under a regime of unadulterated ahimsa.

Democracy of the west is, in my opinion, only so called. It has germs in it, certainly, of the true type. But it can only come when all violence is eschewed and malpractices disappear. The two go hand in hand. Indeed, malpractice is a species of violence. If India is to evolve the true type, there should be no compromise with violence or untruth.

India is trying to evolve true democracy, i.e. without violence.

I venture to suggest, in all humility, that if India reaches her destiny through truth and non-violence, she will have made no small contribution to the world peace for which all the nations of the earth are thirsting and she would also have, in that case, made some slight return for the help that those nations have been freely giving to her.

A free democratic India will gladly associate herself with other free nations for mutual defence against aggression and for economic cooperation. She will work for the establishment of a real world order based on freedom and democracy, utilizing the world's knowledge and resources for the progress and advancement of humanity.

I would make the spinning wheel the foundation on which to build a sound village life; I would make the wheel the centre round which all other activities will revolve.

The idea behind the village industries scheme is that we should look to the villages for the supply of our daily needs and that, when we find that some needs are not so supplied, we should see whether with a little trouble and organisation they cannot be profitably supplied by the villagers.

Gandhiji

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