

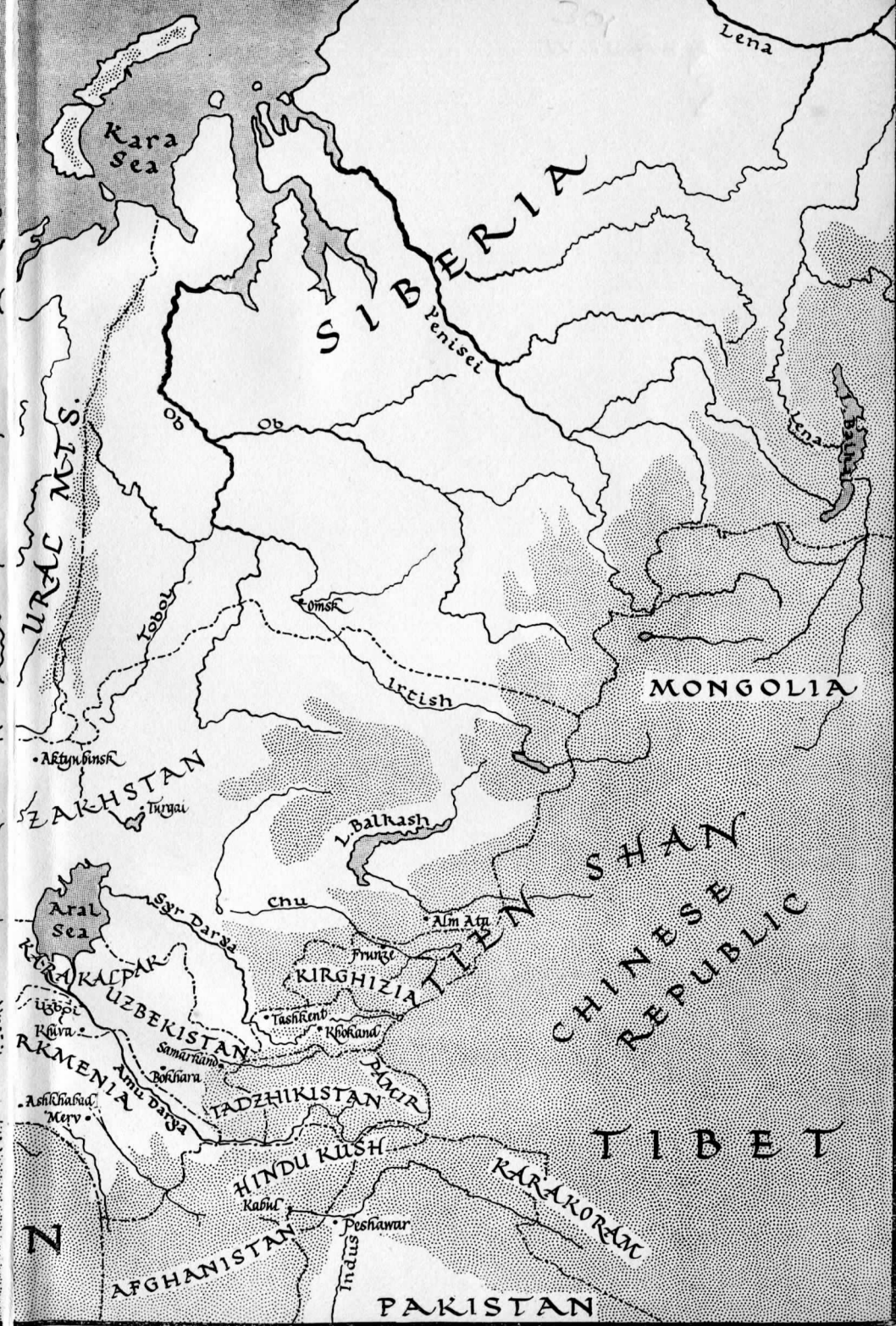
THE SOVIET UNION TODAY

A Scientist's Impressions

by S. M. MANTON F.R.S.

With a Foreword by Lord Boyd-Orr

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The Soviet Union Today

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A SCIENTIST'S IMPRESSIONS

by

S. M. Manton F.R.S.

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Reader in Zoology in the

University of London

With a Foreword

by

The Rt. Hon. Lord Boyd-Orr F.R.S.

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FOREWORD

MANY people would like to know what is happening behind "the iron curtain". The accounts given by different writers give very different pictures. According to some, one would think that the essential features of Russia are the concentration camp, secret police, and a cowed people suffering from hunger and poverty. According to others, Russia is a Utopia for the common people and a model for the rest of the world to follow. It is difficult to know what to believe.

This book is of special interest because it is written by a scientist with an international reputation who describes what she herself has seen. Scientists are trained to make accurate observations and to draw tentative conclusions from facts unbiased by any preconceived ideas. That qualification of the author, and the fact that the limited observations I made in Moscow during the recent International Economic Conference held there are, so far as they go, in agreement with the much wider observations of Dr. Manton, make me believe that the account given in the book is substantially correct. It should therefore be of value in letting people know what the real state of affairs is in Russia.

There is need for a corresponding factual statement from the other side. I found in talking through an interpreter with some of the people in Moscow that they had a quite erroneous conception of the state of affairs in this country and in America. The high standard of living in America and the establishment of the Welfare State in the United Kingdom was news to them. It might be a good idea if the British Government asked the Russian Government to send a Russian scientist, preferably a biologist with an international reputation, to travel through this country and make an honest factual report to the Russian people.

The world is bedevilled by political propaganda which stirs up fear and hatred. If the people of the world could tear down the iron curtain and get together to know each other better there would be less danger of war. A thousand Russians visiting Britain and America, and an equal number of British and Americans visiting Russia every year, would do more to create an atmosphere of mutual understanding and

prepare the way for peace than all the rearmament going on on both sides of the iron curtain.

The present book will make a contribution to a better understanding of what is happening in Russia. I congratulate the author on her book, and hope that it will have a wide circulation.

BOYD-ORR

CONTENTS

<i>Chapter</i>	<i>Page</i>
I. INTRODUCTION	9
II. MOSCOW AND THE NEW UNIVERSITY	13
III. THE HEALTH SERVICE	32
IV. FAMILIES, HOMES AND HOLIDAYS	45
V. STALINGRAD RISES AGAIN	52
VI. CENTRAL ASIA—TASHKENT	61
VII. THE GREAT CONSTRUCTION PROJECTS	81
VIII. BIOLOGICAL RESEARCH AND EDUCATION	97
IX. GENERAL SURVEY	117
INDEX	131
ILLUSTRATIONS (12 pp.)	<i>after 132</i>
GENERAL MAP	<i>Front end-paper</i>
MAP OF CONSTRUCTION PROJECTS	<i>Back end-paper</i>

INTRODUCTION

ONE summer morning out of the blue came a letter asking me if I would like to go to the U.S.S.R. to meet scientific colleagues. I belong to no political organisation or friendship society, and a more unexpected suggestion could hardly have been proposed to me. Scientific work and pleasure have taken me to many parts of the world before the war. A party was to be made up of scientists and medicals by the Society for Cultural Relations between the peoples of the British Commonwealth and the U.S.S.R., and we were joined by nominees of the British Soviet Friendship Society and the Scottish U.S.S.R. Society. We were to be the guests of VOKS, the Soviet Society for Cultural Relations with Foreign Countries. Together we numbered nineteen and comprised a musician, an architect, a trade-union leader, a councillor of Coventry, a member of a peace committee, an agricultural worker, four students and others. We were some of the foreign visitors, numbering about a thousand, entertained by the Soviet Union in 1951.

Most of us knew comparatively little about the Soviet Union when we left England. We were almost all strangers to one another, yet we all came away with the most profound impressions about what we had seen and heard. What we found differed greatly from what many of us had anticipated. Things change quickly in the Soviet Union, perhaps more quickly than anywhere else, and there are marked differences now compared with what British scientists saw in 1945.

"Where do you want to go, what do you want to do?" each one of us was asked in Moscow, as we sat round a table bearing fruit, tea, paper and pencils, biscuits and sweets.

Before we left England we had met to discuss in outline what we wanted to do and where each of us wished to go in the Soviet Union. To Central Asia was our wish, where no British delegation had been since the war, besides a visit to Leningrad and Stalingrad, and if time permitted, to Rostov also. We suggested a visit to Tashkent, Samarkand or Bokhara, and to Tashkent we went, about 2,000 miles from Moscow by plane, since the rail journey of nearly 2,500 miles would have taken six days. The diversity of the party set our hosts a complicated task, but almost every wish was fulfilled in so far as it could be

arranged, and a multitude of alternative provisions were made to meet individual wishes throughout our stay.

Only two requests were refused. I wanted to join one of many zoological expeditions operating in the Kara Kum desert, and our agricultural worker wanted to stay and work on a collective farm for several days. The reasons for refusal were valid. They wanted to keep the party together as much as possible, and to show us as much as could be seen in this our first visit, and to allow a guest to work would be quite incompatible with the ceremony of Russian hospitality, as we soon came to understand full well.

We moved about freely and often alone. On many occasions we walked about Moscow for hours, two or three persons together, without guides and interpreters. Sometimes we took ourselves about by taxis unaccompanied by anyone, and did a considerable amount of shopping alone by signs. We had the same freedom everywhere we went.

Our hosts provided us with everything down to cigarettes, postcards and stamps, the hotels did our washing and mending, and if we wished to buy a book it was given to us. Three of our number could speak Russian, and they conversed with whom they wished without the aid of interpreters, and frequently interpreted for other members of the party. Many Russian scientists spoke English. On our way our luggage was examined with the minutest care by the customs officers at Lwow, printed matter being removed and later returned to us. At Kiev we touched down for three-quarters of an hour and ordered ourselves beer at the aerodrome buffet, suggesting that the bill be charged to VOKS. The waitress was a little surprised. At any rate we had our drinks, and all that was asked was a signature.

Besides fulfilling our individual requests for visiting special places or institutions, or meeting named persons or types of persons, such as writers, musicians and architects, our hosts arranged for us to see what may be considered a fair sample of a very wide variety of Soviet institutions and activities. We asked to see the worst as well as the best of what existed. We were conducted round a sample of the modern historical museums and art galleries. We were received by the Deputy Ministers of Health and of Education in Moscow and Tashkent, by the chief architects of the new Moscow University and of the city of Stalingrad, by the Chief Engineer of the Moscow Metro, by Metropolitan Nicholai the head of the Greek Orthodox Church in Moscow, by directors of industrial concerns, medical institutions, cultural centres and research laboratories, receiving lectures from them, availing ourselves of the opportunity to ask questions, and being conducted over

the several establishments. We met many committees, such as the Peace Committee, the Women's Anti-Fascist League, and representatives of the trade unions.

We had lectures from authoritative persons on the national construction plans for power and irrigation and for the expansion of cultivation over vast areas of steppe and desert. We saw a sample of the cultural facilities existing in all places which we visited. Theatres, opera and circuses were fitted into our programme, and spare time was filled with documentary and modern films put on specially for us. We travelled outside Moscow for short distances to visit rest homes and holiday centres. Our programme was usually settled at the last minute, which precluded anything being put up specially for us. Little or no warning went before us; for example, our visit to Tashkent was arranged by telephone, no other method being sufficiently speedy, and the details as to how we should spend our time there were settled by us after we arrived.

Why write about the Soviet Union? Why should a busy scientist trouble to record the impressions gained in a short time of something so vast that they can only be described as superficial? There are many things about a country, both good and bad, which can hardly be disguised even from a superficial inspection, such as the general conditions of a town, its health, housing and cleanliness and the opportunities it offers for relaxation, education and spiritual uplift. The appearance of thousands of persons going undisturbed about their ordinary business, taking holidays, attending church and so on, shows much which cannot be disguised. Widespread misery and conspicuous abuses cannot be hidden.

In a short time it is difficult to get to grips with what lies below the surface, but glimpses of this were provided by the many contacts which we made with all sorts of persons, and we came away with many clear impressions of what the people of the Soviet Union think about many things, what they hold most dear and what they are striving for. Our opportunities for observation were great, far greater than I have personally experienced in any other foreign country. Our impressions of conditions and peoples within the Soviet Union are so very different from what is suggested by the many uneasy relationships, full of friction, which seem to exist on the borders of the U.S.S.R. today, that an attempt has been made to record everything of note which I saw and heard.

Statistics relating to population and economic matters were mainly withheld from us in accordance with the 1947 decisions of the Council of Ministers of the U.S.S.R. For example, questions concerning the

sizes of populations or of the industrial enterprises which we visited, the number of private cars per thousand of the population, or medical statistics were usually not answered. We were, however, told by the Deputy Minister of Education that, in 1950, 26 per cent of the national budget was expended upon education and culture. Published statistical material does not usually contain absolute figures, but only percentages of increases or other changes.

The following pages record impressions of the Soviet Union, and nothing has been omitted save detail resembling that with which I am familiar in this country or which to me had no significance. No one aspect is stressed, and incompleteness is due only to the impossibility of going everywhere and seeing everything in a short time. The few photographs reproduced here in the plates which show children or other persons are not specially selected, they represent conditions which I saw to exist everywhere I went. Doubts, suspicions and misunderstandings loom large not least because of the restriction of entry into the Soviet Union. It therefore behoves those who have been privileged to travel freely, even into Soviet Asia, to report faithfully upon what exists the other side of the "iron curtain".

CHAPTER II

MOSCOW AND THE NEW UNIVERSITY

ALTHOUGH half of our time in the U.S.S.R. was spent in Moscow, this period sufficed only for a very partial examination of what there is to see in this city of more than 6 million persons. However, our hosts worked us hard, and I think that we became familiar with a fair sample of the capital. Its area has doubled since 1935, and the intention is to attract some of the population away, to maintain a city for something over 5 million, and to develop the industrial side no further. In viewing all that there is to see in Moscow one must realise that the whole is being rebuilt, a most gigantic task. In 1917 the streets were mostly narrow, 70 per cent of the houses were one-story structures, and 50 per cent were wooden.

Water is a prime necessity for a modern city, so a large ship canal connecting the Volga with the Moscow River was built by 1937, 80 miles of it in four years, a canal which we saw on several of our excursions outside Moscow. The level of the water in the Moscow River was thereby raised 10 feet, and this made all the existing bridges, with their many arches which look so attractive in etchings, unsuitable, and all had to be replaced. By 1951 eleven large modern bridges had been built, and as with all their architectural work, the construction is excellent and the decoration is not spared; the balustrades differ on each bridge with pleasing designs in iron or bronze. In fact, I did not see a plain piece of railing anywhere. Next, the banks needed attention, and so far 11 miles of granite embankment have replaced the untidy shores.

Wide streets up to 100 yards across are now replacing the narrow ones, and a ring road lies on the site of an old town wall which has been removed. The principal streets allow six lines of traffic to run on one side of the road and six on the other, with a neutral zone marked off down the middle. Along the latter pass processions, or parties of children returning from holidays, etc. It is impossible for pedestrians to get across a main road on the green of the traffic lights, and they may have to wait in lines while the cars rush by on either side of them. The driving is fast and hideously noisy, horns being sounded continually and with no necessity, but there are few traffic jams. Heavy vehicle traffic is prohibited by day, and the result is the most noisy

nights on the main routes, such as outside our hotel, where I closed the double windows in order to shut out the noise.

Width of street is obtained by the simultaneous construction of high multi-storied buildings, seven to nine floors or many more. Such buildings do not appear unpleasantly tall because the roadway is of a sufficient scale. Shops may form the ground floor, with flats above. Before the war 54 million square feet of new living space had been provided (this excludes kitchens and bathrooms), and the proposed speed now is 10 million square feet a year.

Many large blocks of flats and other buildings put up fairly recently have been found to lie in the wrong places: they interfere with a proposed road widening or the construction of an open square. The procedure has been bodily to move the building at the cost of 20 per cent of that of constructing anew. The well-known edifice housing the Moscow Soviet, for example, with its half-dozen heavy columns on either side of the entrance rising up to the fourth floor, has been moved back several yards, and blocks of flats were shown to us which had similarly been moved. The museum in which we saw some of Stalin's seventieth birthday presents, spread over seventeen halls, is going to be shifted a distance of about 250 yards.

The method was demonstrated in a museum devoted to the reconstruction of Moscow. A building is undercut and steel girders progressively laid below it at intervals of about a foot or less, set in the direction in which the building is going to be moved. Below the girders, and at right angles to them, lie wooden rollers very close together, and below these another set of girders. Foundations are made on the new site, the bottom set of girders connect with "railway lines" to the new foundations, steel hawsers are attached to the upper girders, and power is applied. Blocks of flats are moved with the occupants inside, their drains, water and telephones being temporarily connected with flexible pipes, and the building is speedily transferred to its new site. People returning to Moscow are finding certain familiar landmarks in quite other settings.

Shops and Shopping

The shops of every nation are liable to be characteristic, and in this I found the Russian stores no exception. The window dressing was pleasing, national in form, and differing from what I have seen in other countries. The general displays were artistic, and restrained as to number of objects shown, and no perishable goods were put out in a window. Their place was taken by plaster imitations of joints, fish and fruit, which advertised the nature of the shop or the section of a

multiple store. The perishables, bacon, meat, fish, etc., were lodged inside large glass-covered counters, the curved tops and fronts of which were directed outwards towards the customers; below lay a refrigerator system screened from view and keeping the goods cool in summer; and behind worked the serving assistants (see Fig. 2). I did not see meat hanging up exposed to the air anywhere in the Soviet Union, either in small shops in back streets or in large ones.

In residential areas multiple stores of considerable size occupy the ground floor of one block of flats among several others entirely devoted to living accommodation, and the prices of goods were frequently displayed in long lists on some of the walls.

Shopping for many people entails little walking, and the hours of opening are adjusted to the public needs. Sunday is a workers' holiday, and many shops remain open on that day, closing on Monday instead. The hours of work in industry and offices are staggered to give the requisite hours of labour without congesting the transport system and so avoiding "rush hours" as far as possible. Workers in eight-hour shifts cover the whole 24 hours in some industries, in others the time of starting work in the morning ranges from 6 to 9 a.m. Office workers usually start at 10 a.m. Thus, people take their leisure at very different times of day, and the shops remain open long hours to cater for this, often working two shifts of assistants, and many of the food shops remain open until midnight.

Food and Other Goods

I was surprised by the abundance of food and the complete absence of rationing. We watched housewives filling their shopping-bags. "If this joint is too small or too fat or too lean, would you like that one, or pork or something else for a change?" was the sort of conversation which we overheard. There appeared to be plenty of all essentials, such as meat, groceries and vegetables. Bread was displayed in more variety than I have seen in any other country, both white breads and black (see Fig. 2).

Fruit was in short supply, there being in July and August only small, rather unattractive green pears and apples ripe from the local orchards, and although presumably some fruit from the abundance that grows in the south is transported to Moscow, it was arriving in such small quantities as to lead to the only shopping queues which we witnessed. I saw no citrus fruits of any kind, which may mean a shortage of vitamin C, but having seen all that is being done to promote the health of the people, I cannot but believe that it will not be long before Moscow will receive an adequate supply of oranges. There seemed to

be no dearth of roubles in the purses of the women for the buying of their domestic supplies as we watched them in the shops.

We examined the manufactured goods on sale in the multiple stores. There was plenty to buy and to choose from. The hardware was well made; there were plenty of domestic appliances. The footwear was not as good in quality as it is here or in Czechoslovakia, but it was serviceable and it was there in plenty. It must be remembered that a supply of boots and shoes sufficient for the population is a recent achievement. Carpets, dress materials and furnishings presented great variety. Made-up clothing was adequate, although not outstanding in quality and left room for improvement in design, heavy warm clothing for winter was not on show in the summer. Artistic handwork was present in plenty: men's shirts with embroidered borders up the front and round the neck, embroidered tablecloths, painted woodwork and plastics, objects turned and carved out of marble, etc. Toys were abundant and in great variety, together with coloured posters to delight little children, and educational and constructional toys.

Prices and Wages

There are several reasons why it is difficult or impossible to make direct comparison of prices and purchasing power of Soviet citizens with those of other countries. In the first place, people in Russia receive much of what might be regarded as wages in the form of services, which are freely available for them to take as they wish, or which cost very little, namely, the medical services, the domestic assistance in the form of crèches, kindergartens and meal facilities, education in the form of free schools up to the age of fourteen and a nominal charge for higher or technical education, and the cultural openings found in the "Palaces of Culture" which are available to everyone and are described on p. 57. And there are the arrangements for inexpensive and attractive holidays for both children and adults and assistance in travelling long distances for this purpose.

Then rents are usually 3 to 7 per cent of the wages earned by the principal wage earner in the household (other wage earners are not included), and this may cover heat, light, water, gas and radio in flats. Income tax is low, $\frac{1}{2}$ to 6 per cent of the income of wage earners, and a different system operating for agricultural workers. Most of these things take a large proportion of a person's income in many countries, and we were thus ready to find that goods or entertainments which on the basis of the actual exchange value of a rouble appeared expensive to us might not be so to a Soviet citizen.

The lowest wage of unskilled workers in industry we found to be

700 roubles a month. The income of the workers and engineers employed on the new university site, for example, ranged between 700 and 2,000 roubles, and the skilled workers in the ball-bearing factory we visited earned between 1,300 and 1,800 roubles. Unskilled workers on farms receive part of their recompense in the form of produce which they may either use or sell (see p. 76), and their earnings in roubles therefore cannot be directly compared with those of industrial workers. Medical doctors with the minimum qualifications earn only 950 roubles, specialists 2,600 to 3,000 roubles, and research workers more still. Country doctors, we were told, received up to 20 per cent more than those in towns.

However, the exact earnings of most people is determined by their skill and effort. Piecework prevails in industry, and all performance above the norm is paid for above the basic wage, and outstanding productivity of a factory, in competition with other factories, brings not only monetary reward to each worker, but increased cultural and other facilities. In some factories almost all the workers are "Stakhanovites" and habitually exceed the norm.

We were informed by Englishmen living in Moscow that the purchasing power of a rouble lay between 5*d.* and 6*d.*, that is, 40 to 50 roubles to the pound, and this was our general impression also, although the relative prices of goods in the Soviet Union are very unlike those in England. For example, a packet of twenty good quality photographic postcards of views of Moscow cost 30 roubles, while a quarto book with 150 half-tone illustrations was obtained for but 50 roubles. Books in general were relatively cheap. A bottle of what they call champagne could be bought for the price of the packet of postcards, and a bottle of vodka for about the same. A fair-sized refrigerator standing about four feet high cost 750 roubles which represents about £15, and in terms of labour most people could pay for one with a fortnight's earnings or less. Another exchange rate, that of about 10 to 13 roubles to the pound, exists for the small amount of money which can be directly exchanged by a bank, but this is not a real value.

The prices of theatre seats lie within everybody's purses owing to dramatic art being considered an essential of civilised life. Some theatres, such as the "Maly" in Moscow, we were told, do in fact pay their way, but the salaries of qualified actors are met by the State, and the whole mechanism of training artists and supplying all that is needful for their art is lavishly provided for.

Other activities for leisure vary in expense. Two of our party were entertained privately by two Soviet citizens employed in a government

office. They took a meal in an attractive restaurant overlooking the river, participating of the best of everything, and the bill was 800 roubles (£16). Doubtless this case was a special occasion, but the restaurant was full.

Standards of Living

The general standards of living are much influenced by the rate of growth of the modern buildings. Families with three children from well-off parents were living in three rooms other than kitchen and bathroom, and some even had to share a kitchen with two other families in a modern apartment house owing to the shortage of space. The fact that a Soviet citizen earns more money does not mean that at the moment he can live more commodiously, the rent he pays is related to his income, not to his home, and the larger spaces go to the larger families. Conditions in the back alleys not yet rebuilt were poor, squalid and very cramped. However, all these appear to be but rapid transitions to better things; the annual building of about 10 million square feet of new living space in Moscow means the rehousing of something like 33,000 families annually. When housing is further advanced a more luxurious house may be available for those whose personal efforts receive the greater recompense.

The standard of clothing was adequate. I did not see a ragged or an unsuitably dressed person anywhere in my 6,000 miles of travel within the Union. Neither did I see a beggar; they may, of course, exist, but there cannot be large numbers of them or some would have been seen by one of us. The weather was wet and cool in Moscow, and the dresses of the women were not as smart as they were in the south. In warm towns there were plenty of little boys running about with little on and bare feet, but judging by the clothing of the girls this was due to preference, and not to lack of the means to buy clothes.

The absence of perambulators in Moscow was surprising. They were few and simple, while the prams of Prague were conspicuous for their magnificence and abundance. I did not discover whether Moscow citizens cannot obtain good prams or whether babies as well as older children were largely on holidays.

The streets contain plenty of cars and they appear in thousands to carry their owners to athletic stadia. However, relatively fewer citizens own cars there than in Britain. Only four types of cars were being made for private ownership: a baby car, a commodious four- or five-seater family car, used also as a taxi, which appeared to us to have remarkable power of endurance to withstand the bumpy country roads away from the properly made main trunk roads, and two much larger cars.

That real incomes have been steadily rising is shown by the expanding consumption of goods and food. Sales to the public in the second quarter of 1951 compared with the second quarter of 1950 show, for example, an increase of 22 per cent on cotton goods, 23 per cent on silk fabrics, 18 per cent on hosiery, 23 per cent on knitted goods, 28 per cent on furniture, 43 per cent on bicycles, 46 per cent on gramophones, 24 per cent on watches and clocks, 26 per cent on sewing machines and 65 per cent on cameras. The production of foodstuffs in 1950 exceeded that of 1940 by 57 per cent on butter, 7 per cent on meat, 20 per cent on sausages, 27 per cent on fish, 48 per cent on canned goods, 17 per cent on sugar and 23 per cent on confectionery. In April 1952 food prices dropped 15 to 20 per cent.

The city is clean and tidy. There appeared to be no dearth of labour for this purpose; women were seen everywhere sweeping with poor quality besoms, and powerful water-carts wash down the roads early in the morning and often again during the day.

Little money is expended on advertising as we understand it here, although there is adequate advertisement in trade journals of machines and commodities. We saw these publications on farms and in factories. More advertisements can be seen in the streets than I expected. Hoardings bear instructions as to what to do in case of fire or accident. In the city, and on roadside placards outside it, there were also advertisements of tinned foods and what appeared to be luxury articles of diet. New supplies to the public are advertised in this way.

Moscow Building

The modern buildings of Moscow and their method of construction interested not only the architect of our party but all of us, because of the speed of erection and the varied form and the needs which they serve, needs which may be regarded as spiritual as well as material. Flats, tube stations and lecture rooms are essential, but although the need is urgent they are not built in the simplest possible manner. Far from it, and no opportunity is missed of building something pleasing to the eye, or of erecting a station like a cathedral, which can hardly fail to have an uplifting influence on anyone who has to pass through it daily or occasionally. Marble, stone, plaster work and sculpture, painting or mosaic, and a wide variety of lighting effects are used in producing something beautiful for everyday needs, and expense is not spared. The accepted designs for the buildings are in many cases the result of keen competition between architects, prizes being awarded for the best.

The Metro

One of our first excursions was a tour of the underground, under the guidance of the chief engineer of the Metro, and I do not think that I have ever been more surprised by anything, not even by what I saw from a diving helmet on a Pacific coral reef, than I was by the eight stations opened in 1950 on the Moscow Metro. First we visited the original sections of the underground system opened in 1935, marble or porcelain lined, spotlessly clean, and lacking all advertisements. Here are just efficient stations adequate for material needs.

The eight 1950 stations are on an entirely different level, even if somewhat the same in general layout. Much has been learnt since 1935. Each of these stations is different, and the architects of some if not all of them won prizes. One station was designed by two architects, husband and wife. Muscovites are critical of their artists, and these stations appeal differently to the members of the populace. The general layout consists of what may be likened to a nave of great size, with marble floor, decorated walls, and a curved ceiling elaborately embellished (see Fig. 1). At one end lies the escalator, which is also a thing of beauty. The "nave" is connected by arches with "aisles" on either side through which the trains run.

A subterranean building has an asset denied to all surface structures, and that is the scope provided for artificial lighting. This has been elaborated by Soviet artists in a manner which I have not seen anywhere else. A variety in both the points of origin of light and of masked light has been used on these stations, and the colour of the illumination is not everywhere the same, the differences being often slight and subtle. In one "nave" the far end appears to be formed by a huge white archway closed by a wrought-iron gate, and beyond there appears to be blue sky. On approaching this striking diorama one finds that the gate is functional but locked, and behind lie some steps descending to a "housemaid's cupboard" or some switches. In another station the corresponding position is taken by a magnificent carved relief of many figures.

In fact, the space provided by the very large "naves" has been utilised to display the best that modern Soviet art can turn out, and magnificent it is. One "nave" is mainly marble, fifty-two kinds having been brought from the Urals for the purpose; the necessity for ventilators has given scope for perforated artistic wall panels, and receptacles for ash are things of beauty: no cigarette end or match is allowed to remain on the floor, and no speck of dust lay on the carving, or on the polished surfaces near the escalators. There is some general theme appertaining

to each station: the different ceramic panels or sculptures all along the "naves" commemorate heroes, victory, peace, etc. There is enough detail to keep the sightseer occupied for hours.

The wall and ceiling decoration of the "aisles" is in keeping with the "nave". The lighting may not be of the same tint everywhere; on one station the pinkish light in "nave" and "aisles" is interrupted by a masked bluish light picking out the ceiling above the openings from "nave" to "aisle", themselves rather elaborate in form. The escalator lighting is of slightly different colour from that of the "nave" on some stations, and parts of the booking-hall were illuminated by a greenish light while a yellow light prevailed elsewhere. The escalator was lit by victory torches on one station, and on others by various types of light points, often very elaborate, or by masked lights. Odd corners were embellished with crystal work of large and small dimensions which served as sources of illumination.

The design of the booking-halls and exteriors of the stations has advanced since 1935, and as far as is possible they also are works of art. As one mounts one deep escalator a red star first becomes visible, then a more than life-sized statue of Lenin, carved out of stone with his hand outstretched towards the public, and on reaching the top, two panels of mosaic, perhaps fifteen feet high or more, are seen behind and on either side of the statue, both of them outstanding in craftsmanship. In fact, we had to go close up and examine the detail to assure ourselves that all the delicate features expressing various emotions in the figures were really made in chips of stone and were not just painted.

On another occasion near the new university site I noticed a new imposing white building with a green dome of considerable height. In answer to my inquiry I was told that it was the new underground station. Some of the older station entrances are little more than covered openings to descending passages, but the newer ones project into the air on a grand scale for no fundamental purpose other than that of pleasing the eye. The exteriors of other stations bore reliefs of modern carving, in fact everything to beautify them, but no name of the station to inform the passer-by of his whereabouts! When we pointed out this defect the reply was that everybody knew which station was which, since all were quite different in architecture. The proposed plan of the Metro consists of a spider web of several separate diagonal lines crossing variously below the centre of the city, and connected by a ring line farther out. It is to be hoped that when the system is fully completed the names of the many stations will be shown above ground; they are clearly marked on the outer walls of the "aisles", so that they are visible from the platforms and from the trains.

Not only does the Moscow Metro build railways, but it has its own housing estates, cultural and welfare institutions such as "Palaces of Culture", polyclinics, kindergartens and nurseries. We were told that the third of the large blocks of flats built by the Metro in the last two years was nearing completion. The Metro workers belong to the U.S.S.R. Railway Workers Union, and the central committee of this organisation has forty sanatoria and rest homes in the Caucasus, Crimea, by the sea near Riga, and outside Moscow. Anyone employed by the Metro can stay in these places, paying but 30 per cent of the cost of maintenance, the rest being paid out of the State social insurance fund administered by the trade unions. The Metro employees receive two free travelling passes a year.

Flats

The construction of blocks of flats in Moscow, which we were told go up in six months, the brickwork in forty-five days, was in evidence on a large scale. Conspicuous features on the building sites were the giant cranes standing alongside the blocks, and the simplicity of scaffolding (see Fig. 6). Few bricklayers are employed, but they are highly skilled, and there are plenty of assistants, passing the bricks which are sent up on conveyor belts or lifts from ground-level. The architect of our party had no faults to find with the construction. They are not luxury flats, but are labour-saving, with modern kitchens, and open balconies. The gardening carried on from window-boxes and balconies was conspicuous in Moscow; many rooms must be very dark behind their screen of plants and flowers.

Many experiments and many mistakes have been made in the building of apartment houses. The blocks put up from 1920 to 1930 are often unpleasantly plain or else smothered in decoration, and a few show what to us are the most wild architectural ideas. In contrast, the modern flats are more uniformly pleasing, and none of them is lacking in decorative effects, which are not overdone. We were told that some of the 1920 buildings are so disapproved of that they will either be pulled down, or refaced in some way, so that they may be in keeping with what is regarded as the good architecture of the city. I was told that there was much building by means of prefabricated sections, complete with pipes in the wall and an interior finished surface, but this I did not see.

Tall Buildings: New University

Tall buildings are now being constructed; eight "skyscrapers" are planned and some of them are finished, one for flats on the bank of the

Moscow River, and one nearing completion in the Smolenskaya Square, containing 850 offices, a conference hall, a restaurant, a bank, and a post office. Projecting from the unfinished upper parts of tall buildings are the giant cranes which rise with the building as it grows. The cranes are illuminated at night. The construction of thirty-seven-story buildings takes only two years. The most interesting of these to me was the new university. The old university, opposite the Kremlin, and next to our hotel, has been able to admit but 2,500 students yearly from the 7,000 who apply. From this year the old building will be taken over by the arts faculties, while science, engineering, astronomy, mathematics and agriculture will be rehoused.

On the Lenin hills, a ridge overlooking the river, a new suburb is being created. The existing wooden ski-jump-stands situated on the slopes of this ridge will lie in the grounds of the new university. The project was decided upon in 1948, started in 1949 and, except for the observatory and botanic houses, finished in December 1951, after but two years building time. We visited the site and were received by the chief architect, who gave us a lecture and took us over some of the building.

The whole will accommodate 10,200 students, 6,000 will be residential, and there are 200 flats for professors and staff who do not already have suitable accommodation in Moscow. The height of the building is 850 feet (that of St. Paul's is 365 feet) and the circumference of the main block is 1.7 miles. The central part contains thirty-seven floors, and the lateral extensions eighteen, nine and six floors. We went up to the twenty-sixth floor and on to an outside gallery at this level overlooking the city. The lift ceased to function on the way down for some minutes and the lights went out, but we were assured that there were safety catches as in mines, and under no circumstances should we make an involuntary descent to the bottom (see Fig. 3).

This central part of the building is to house the departments of geology, geography and mathematics, a hall, lecture rooms, the university offices and a library for 1,200,000 books. Faculty libraries elsewhere will take another 200,000 volumes each, and an agricultural museum is to be set out on the uppermost floors.

The equivalent of the Students' Union, with numerous rooms for the activities of societies and a gymnasium, is also lodged here. We went into a great hall humming with activity: marble was being cut and fitted to the walls, factory prepared plaster mouldings were being set into the ceilings and into curved cornices where they were being finished off by hand, and the workmen and women gave us a greeting as we passed.

On either side of the central block the building rises to eighteen floors and spreads out in four directions. These sections house the students' hostel, where one bathroom serves every two rooms. The undergraduates' rooms are 86 square feet in area and those for graduates 125 square feet (Fig. 5). Each floor has a buffet and dining-room.

At the four corners lie the professors' flats. A sample one was furnished and contained a commodious hall with marble-patterned floor, decorated wooden doors, a large sitting-room, a study, furnished perhaps a little heavily for our taste but convenient and spacious, a kitchen modern in every way, and two other rooms. Further extensions of the building rise to nine stories, and will also be used for the students' hostel.

The windows are double, as in all Moscow buildings, this being a climatic necessity, and for the first time in the U.S.S.R. I saw steel window-frames, which are here being tried out. Wooden ones are used for the hostel. The capacity of the building is 92 million cubic feet. The air-conditioning plant is externally housed, and we saw the gigantic half-built open pipes which will extract the air from the internal space.

Four huge cranes topped the corners of the eighteen-story sections, and a giant crane still lay on the thirty-seven-story part, but has now been replaced by a steeple covered with golden ceramic. These cranes spanned most of the building, moving about the hanging cradles from which workmen were applying the cream-coloured ceramic facings, which can be seen in Fig. 3.

All parts of the structure were progressing simultaneously. The brickwork was growing in parts and in others it was being faced. A sufficiency of decoration is being incorporated below each window, a central rose-like effect, two lateral motifs and a beaded moulding, while the projecting faces between the windows are plain, and run uninterrupted right up the building. The ceramic facing above the twenty-sixth floor was streaked here and there with green flecks, while that below was evenly coloured. Doubtless this was no accident. The architect of our party had nothing but praise for the details of the construction.

The main university building stands on a site of 445 acres. Outside the central block lie separate physics and chemistry units, placed symmetrically, and a biological block, all of six stories. The laboratories are designed each for its own particular purpose, and lecture rooms and equipment will be of the most modern design. There is, in addition to the main university building, a block for administrative offices and an observatory. The whole surrounding site was being churned up by

bulldozers and roads were being laid. One hundred and seventy-four acres will form park and athletic grounds, including the existing ski-jumping runs down to the Moscow River. Ninety-one acres will form a botanic garden, complete with hot-houses and other glass-houses for controlled climates; these will be used both to grow plants from different regions, and to carry out experiments on Michurinist lines. Tree-planting had started, and 70,000 trees are to be brought in, besides bushes and other plants. A swimming-bath will lie in the grounds.

In addition to these main university buildings a permanent workers' settlement for the manual workers and technicians employed in the university is to replace the temporary one used by some of the workmen engaged on the site. This settlement will cost £10,000,000, and will provide not only flats, but all the other things considered necessities of life: the polyclinic and hospital, the children's facilities, schools, "Palace of Culture", rest home, shops, etc. It is intended to develop the whole neighbourhood; other scientific centres will be placed there, and roads and communications generally are being attended to. It is anticipated that 1½ million persons will ultimately be housed in this new suburb.

The main buildings were finished in 1951, leaving till September 1952 for the installation of furniture and apparatus costing one milliard roubles (£20,000,000), and then the students will arrive. The cost of the whole is 3.5 milliard roubles, that is about £70,000,000. The buildings will cost 2 milliard roubles (£40,000,000) of which 20 per cent represents the cost of labour, leaving one milliard for fittings and half a milliard for the workers' settlement.

We asked how such prodigious operations had been put through in so short a time. Twenty-two thousand workmen were employed on the university site, a small proportion of whom were Red Army engineers who came in shifts. One horse-power of machinery was being used per man engaged on this work. Fifty of the workpeople were taking evening classes, in the hope of passing the entrance tests and studying in the university they have helped to build. We saw the settlement of the workers employed on the site who do not live locally; there is no doubt whatever that they are free, normal workpeople. Their pay depends on skill, qualifications and performance, and all who exceed the normal output for their particular job receive an extra payment. The skilled engineers, receiving as much as 2,000 roubles a month, greatly exceed the earnings of many medical doctors, other than specialists. The interior of the immense building is plastered with notices and slogans for speedy output, for safety precautions, and chalked on a wall was the familiar urge and expression of a desire for

universal peace with all nations, which we saw so often in all manner of public places.

The whole new university forms a picturesque silhouette, the size of which is difficult to appreciate owing to its skilful composition and to the immensity of the open space around it. As with the Metro, Soviet architects have clearly learnt much since they erected their first skyscraper, and in the new university they have made a much more pleasing edifice than in their earlier multi-storied buildings. From the air as one approaches Moscow on the southern side, the new university stands out boldly long before any other detail of the city becomes visible.

Palace of the Soviets

The eight high buildings in Moscow are situated at about equal distances from the centre. Models of them all can be studied in the museum for the reconstruction of the city. A central tall building is planned to overshadow all the others, but its construction is to be delayed until the reactions of the people to the eight are felt. The central building is destined to be the "Palace of the Soviets", and it will stand in the largest square in the world, to be created by bodily moving large new blocks of flats now standing near the Kremlin. This projected palace will be 1,300 feet high and will bear a statue of Lenin in stainless steel 280 feet in height on the top. At the farewell party in Moscow given in our honour we had the pleasure of conversing with the architect of this bold project, and with his wife, who speaks good English. The main hall within this palace will seat 21,000 and another will provide 6,000 seats.

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The scale on which we found the new university building being planned exceeds that of any other in the world, and the whole city is being rebuilt on lines designed to provide not only material needs but cultural and spiritual needs as well. The existing religious freedom will be considered later in Chapter IX. Whether the whole will turn out as beautiful as its planners desire remains to be seen, but Moscow cannot fail to become a city of great majesty, lacking nothing that money can devise.

The building operations in Moscow, however, we found to be not without their inconsistencies. In the middle of a very large road outside the Kremlin a hole was being made, and enclosed by some fairly extensive wooden hoarding. We looked in and found a few girls leisurely wielding shovels. A small hand windlass pulled up a basket,

in a bad state of repair, containing earth from a deeper part of the lesion. We inquired the meaning of this extraordinary glimpse of the primitive in such a major situation, and the surmise of our interpreters was that there was no hurry about this particular hole; the road was so wide that the operations were causing no inconvenience, and the more efficiently equipped building force was better employed elsewhere.

Our first five days in Moscow were marked by almost incessant heavy rain, and so the general properties of the surface drainage system were at once appreciated. Wide roads became very wet, veritable rivers flowing quickly round bends in the roads before they became absorbed by gutters and drains. The pavements were in very many parts, even outside new buildings, equally damp, because drain-pipes from the roofs empty at the base of the walls, and send their cascades of water across the pavement to the roadway. Only in parts did we find this water being conveyed below the pavement.

Parks

The parks of Moscow are several and large—the Gorky Park of Culture and Rest extends for over four miles along the banks of the river. Here can be found not only grass and trees, flowers, seats and illuminations, but open-air theatres, music, a modicum of merry-go-rounds and refreshment booths. A number of raised covered forums, with seats for the audience in the open, are used for many purposes. One showed the back wall covered with a large relief map, and the platform was used for lectures on the international situation and on home affairs. There were children's playgrounds containing model boats on dry land whose decks and cabins could amuse a number of children at once, besides other items with which we were already familiar.

On a hot Sunday afternoon we sat on a tier of carpeted steps, built into the granite embankment on the outer side of a great bend of the river, among a large crowd assembled to see a Red Navy display. A series of events, set at rather long intervals of time, assembled somewhere out of sight and progressed along the bend of the river, both arms being visible from our central position reserved for official persons. We also had a fine view of the new buildings situated along the opposite bank.

A flotilla of sailing-boats slowly made its way past us. A number of rowing events in different sorts of boats, most of them rather heavily built, plugged along. One boat manned by a few girls was completing the long row from Leningrad. I felt very glad that I had never been required to row a heavy boat so far. A crew of men were about to

perform the same feat. Surf-riding girls sped behind motor-boats, and all went well until an engine stopped and the girl behind it fell into the water, just opposite the steps of honour. She refused to be rescued, and when the boat got going again she held on to her board for a tow.

Spectators' eyes were fixed on the surface of the water opposite us for some time. A few bubbles were seen rising but nothing else. At last just in front of us a man climbed a ladder, appearing from the river; he had walked across the bottom from the other side with a compressed-air apparatus and a weighted suit and, removing his mask, he unfurled a large blue flag, dripping from the water, and followed by fifteen other men emerging from the bottom, they marched off behind their flowing wet banner. The display went on for a very long time, but having sampled about $1\frac{1}{2}$ hours of it we moved on to our next engagement.

Considerable interest is taken in sport. We saw plenty of young people taking out boats of all kinds on the river. Football is played in the summer, snow preventing it in the winter. Games take place at 8.30 p.m. in the cooler part of the day. We watched a match at the Dynamo Stadium, accommodating 80,000 spectators. Loud hissing greeted all unpopular actions of the referee, and the interval was occupied by runners on a track surrounding the football ground.

Theatre

Little need be said here concerning the Soviet theatre, since the facts are so well known. Theatre seats at from 5 to 25 roubles are within the reach of all. Our visit in the holiday season was bad from this point of view, as the Bolshoi Ballet was on tour and the building shut, as was also the puppet theatre. We visited a large hall-like "summer theatre" opening widely into gardens. The night was cool and wet, and the theatre was obviously most suitable for hot weather. The performance, a musical comedy *The Clown's Son*, lasted for four hours, and we enjoyed it enormously. The composer in our party considered that the standard was very high, comparable to our symphony orchestras, and the singing and incidental ballet were excellent.

On the stage here, and in a cartoon in an art gallery, we met a Soviet joke. The comment made about a subdued lion in a circus act was that "it must be a British lion, the Americans have twisted his tail and eaten his heart", and in the cartoon a weary beast with amputated tail and paw in sling, carried a jubilant Uncle Sam on his back.

Another night found us at the Maly Theatre for a play, *The Armoured Train*, written in 1925, about the 1917 war at Vladivostock. Much of the scenery was very elaborate and large, depicting partisans on the

roofs of houses, a railway embankment along which an almost full-sized armoured train steamed at night, and amid great suspense it crushed to death a patriotic Chinaman lying across the lines who shot the engine driver from below as the train passed by. This was followed by a longitudinal section of the armoured train, from which a trapped general endeavoured unsuccessfully to escape; and finally a large railway shed covered the stage into which the armoured train arrived. It was an ambitious and exciting play superbly produced. In the intervals we walked about the spacious halls and sampled the restaurant; this 150-year-old theatre has been rebuilt and modernised.

Films

In the pre-revolutionary merchants' palace used now by VOKS, the U.S.S.R. Society for Cultural Relations with Foreign Countries, our spare time was fully occupied with modern and documentary films, which were shown specially for us. Their cinema is fitted with loud-speakers, so that when necessary an interpreter gave us a running commentary on the film. A "rest night" consisted of films from 8.30 to 10.30 p.m., followed by a meal at 11.15 p.m.! We very much enjoyed *The Brave People* and *The Cavalier of the Gold Star*; both are exciting, with stories of historical interest, and produced with the well-known skill of the Soviet film industry.

The documentary films in colour of individual Soviet states we found interesting. Most of them showed us places that were not on our route, and much of what they portrayed we appreciated as the counterpart of what we saw later in different places. There is, as might be expected, a striking uniformity in the buildings and in the realisation of the Soviet régime in widely different localities, but we were nevertheless surprised to see how similar the cultural provisions were, for example, in Riga, Russia proper, and in the formerly backward colonies of racially different people, such as the Uzbeks whom we met in Tashkent.

Pets

Being a zoologist with many domestic pets in my own house, I was interested to see how many such animals I could find in the U.S.S.R. There are far fewer dogs in Moscow than in London, but a few very fine animals were seen walking in the streets. More could be found in the suburbs, but they are not numerous. In ground-floor windows of large blocks of flats I saw several cats sunning themselves, and a few underfed rickety kittens roamed the streets. Some of the portraits and photographs of Lenin in his later years in the public galleries showed him cuddling a cat. Plenty of geese and poultry were seen in the

country around Moscow. I saw tame birds of considerable size in Tashkent kept in cages on tables, as well as cats and dogs, but in Stalingrad I met no pets.

Industry

Half a day spent at a ball-bearing factory gave us our first glimpse of Soviet industry and an opportunity of seeing the conditions under which their people work, and how a large industrial concern is managed. We received a lecture from the manager, we went over much of the factory, we conversed freely with persons we happened to meet in the workshops, and the knowledgeable members of the party, who included a trade-union leader, asked many detailed questions. This particular concern was started in 1929. Previous to this all ball-bearings were imported, and during the war the factory was moved piecemeal to beyond the Urals. It supplies all Russia with ball-bearings, and is so large that we could make no clear estimate of its size. Sixty per cent of the employees are women, and we were surprised to find girls doing foundry work, manipulating molten metal and removing red-hot castings from furnaces with tongs.

We were shown a sample of all types of workshop; some contained at least 280 large lathes each, and the best workmen, who habitually exceed the recognised basic output, had their places marked by red flags. We examined precision tools and apparatus in a research laboratory concerned with the standardisation of parts. The factory contained a variety of retail shops as well as restaurants.

The adjuncts to the industry were many. Outside was a large housing estate; many blocks of modern flats were separated by tree-lined roads, or roads where trees were about to be planted. We went over the four-floored polyclinic where the medicals of our party made a full inspection; seventy doctors were employed there. The next building housed the club or "Palace of Culture", which supplies every facility for recreation and cultural activities. These centres we found to be uniform wherever we went, and those seen in Stalingrad are described later.

The workers' children were provided for by crèche and nursery which were similar to those recorded for Stalingrad. About 3,000 children had this year spent summer holidays at camps run by the factory, located both near Moscow and on the Black Sea coast. We did not see these particular places, but spent some days going over camps belonging to both coal-mining and industrial power concerns. The workers receive from two to four weeks' annual leave with pay and additional days off after five years' service.

The way this factory was run was not quite the same as in others over which we went in Stalingrad and Tashkent, but the essentials were similar throughout. Plans of output are agreed upon in relation to national needs, by a council composed of workers and administrators. The workers pledge themselves to fulfil the plan, and the administrators agree to the implementation of new or improved methods and to the betterment of conditions and expansion of services. Details are worked out and discussed by freely elected committees at all levels, and these plans pass both from below upwards and from above downwards, until general agreement is reached. Everyone seems to feel that he is personally responsible for part of the plan, the successful fulfilment or overfulfilment of which results in benefits to all. There is no division of interests, all are working for the same objects, and increases in total output means not only bonuses to all individuals but a proportion of the profits passing automatically into the "directors' fund" which is spent on amenities. The plant has its own technical school, and evening classes are held in an apprenticeship school.

Increase in skill brings its monetary reward as also does the initiation of new labour-saving or speedier methods of production. A portrait gallery of best workers is maintained in a conspicuous place, and the faces there were of many nationalities. Success in output competition between factories brings prize-money and banners of distinction. A red banner won the year before was shown to us with pride. In talking to workers from several levels we gained a clear sense of their feeling that the whole organisation belongs to them, that they each have an equal share in it and responsibility towards it.

CHAPTER III

THE HEALTH SERVICE

OUTSTANDING features of the Soviet medical service are the emphasis placed on medical education of the public, preventive medicine, and the scale on which the whole medical service is provided.

The Health Service is in fact one for *health*, a preventive service in which the object is to maintain people in health, and the treatment of disease is but part of the larger whole. The scale on which the service is provided surprised the medical members of our party, who were at first incredulous of the figures given to us in Moscow by the Deputy Minister of Health. Our route was chosen by us in England before we left and not by our hosts, so there was no question of our being taken to selected places which might have possessed medical provisions above the average.

Wherever we went we asked questions designed to check the general statements made to us. We were told, for example, that over the whole Union approximately fifteen beds were provided for every 1,000 of the population, whereas a number of around five is familiar to our ears at home. In support of this we can say that we failed to find anyone in a hospital bed who had had to wait to get in. Treatment, for example, of cardiac thrombosis is given extending over twelve weeks, while hospital detention of such cases in England is normally only six weeks. Our doctors considered that twelve weeks in hospital was an unnecessarily long period, but this treatment could hardly be given in the U.S.S.R. if there was a shortage of beds.

Dr. Mary Barber visited Stalingrad just after we did, and she questioned as many women with young children as she could find as to where the children had been born. All had been born in maternity homes. Again this would hardly have been possible if there were not enough beds. We asked questions such as: "How long do you have to wait to get into hospital for this or that?" Often they could not at first understand what we meant, and then they said, "But why not go in tomorrow?" We ourselves saw many empty beds and unoccupied doctors both in Moscow and Central Asia, but things may be different in the winter. What the service is like in Siberia or in country districts I do not know, but the provisions in Tashkent, 2,000 miles from Moscow, a region which until recently had no proper medical service

at all, were of just the same standard as in the other towns which we visited.

Incredulity about the scale of the medical service was expressed by some of us on the ground of the colossal expense which it must entail. However, there is not the slightest doubt about the immensity of the cost of the present developments for hydro-electric power and irrigation (see Chapter VII), which will bring a climatic change to an area of steppe and desert three times the size of Britain, France and Germany. The medical service appears to be a priority of comparable importance and is budgeted for accordingly. By contrast, expenditure on roads is largely restricted at present to the main roads: these are very good, but the country roads are bad, and at the moment are certainly not considered to be a priority claiming immediate finance.

We went over a general hospital in Moscow, polyclinics (health centres) in all the towns on our route, and a maternity home in Stalingrad. The doctors of the party went over medical colleges, and had conversations with Soviet doctors and directors of medical institutions, including the Central Scientific Research Institute of Sanitary Instruction, which is an institute for health education. Certain aspects of the campaign of preventive medicine were seen only in films, but they accorded with all the conversations which we held with people whom we met quite casually. We saw over the Micro-Biological Laboratory in Moscow, and shortly after our visit Dr. Barber, Reader in Bacteriology in London, visited the bacteriological laboratories in Moscow and elsewhere.

Medical Education

The maintenance of the health of the people is approached from many angles. The general medical education of the public, both of adults and of children, is carried out on a very large scale. It is combined with frequent mass radiography and medical examinations of all persons in order to obtain early diagnosis of disorders. And full use is made of prophylactic measures.

The general public is medically enlightened in many ways.

We visited an open-air forum held on a Sunday afternoon in a Moscow park, where seven doctors, including some top-rank specialists, were at the disposal of the public for some hours. Written questions were being sent up on slips of paper and were being answered by the doctors. "If your question is not fully answered, if you do not fully understand, please send up another question" was the attitude; and the enthusiasm of the medicals increased rather than waned as the afternoon wore on. Every doctor is obliged to spend eight hours a

month teaching preventive medicine, answering questions, or holding discussions, in places such as parks and lecture rooms of health centres and hospitals. Discussions and lectures on preventive medicine are also held at the bacteriological laboratories, one of which lies in each district of Moscow. Among the subjects of lectures in one of these centres during the two months previous to our visit were: hygiene, vitamins, rodents, health and sport, prevention of gastric infections, and prophylactic injections.

A visit, as a patient or otherwise, to any hospital, health centre (polyclinic) or maternity home gives an opening for medical education of a general nature. We found the wall space of waiting-rooms, halls and passages where people are likely to stand about, largely covered with improving displays of information. Popular outlines are set up of common disorders and diseases, their symptoms, course and cure, and the preventive measures which may be taken to avoid their occurrence. The somewhat "tabloid" information is well illustrated by diagrams, photographs and models. On stands resembling those bearing picture postcards in shops, but illuminated from within, either revolving or stationary, are series of coloured transparencies illustrating the same sort of thing. These popular displays of information concerning the progress of medical science and the incidence of disease, are not in the least morbid, and in the institutions which we visited were being read and examined with evident interest by persons waiting for attention.

A Soviet citizen confined to bed in a hospital or polyclinic may be given a popular illustrated booklet about his or her disease to read. It may contain information which is merely interesting to him, but it may also help him to understand how to avoid being in the position of needing further hospital treatment at a later date.

A visit to a maternity home in Stalingrad illustrated the advantage taken of this kind of opportunity. A large two-floored building was set in its own flower garden. Before the entrance a fountain played and appreciably cooled the surrounding air on a hot August afternoon. At one side of the building was an entrance used by women visiting the home at monthly intervals during pregnancy. Here a comfortable waiting-room was abundantly supplied with improving literature. On the table lay illustrated books showing what clothes can most suitably be worn, what equipment should be obtained for the home, etc. Many of these could be taken away without payment. On the walls illustrated posters showed the vitamin necessities of life in general, and the food requirements of an expectant mother in particular, set out in terms of the locally available articles of diet. In some institutions models were

seen displaying the growth of the human embryo, and we were told that this series is also exhibited in some girls' schools. A mother who has no inclination to open a book on the subject of motherhood can hardly fail to pick up a great deal of information from these displays which she cannot avoid looking at.

After the babies are born the mothers normally get up after the third day, and take at least a midday meal in small dining-rooms pleasantly furnished with tables for two to four. The wall space here is devoted to pictorial and other information on how to bath the baby, how to clothe it, how to avoid getting this and that disorder, how to feed it during its first year, together with pictures of the sort of things that small children are likely to do with fire, gas, kettles, electric irons and so on, so that accidents caused in these ways may be forestalled as far as possible. Again, a meal cannot be eaten without the eye wandering around the walls and some of the information being absorbed.

The medical members of our party visited the Central Scientific Research Institute for Sanitary Instruction, the headquarters of the propaganda for preventive medicine. Here the published matter for the general public is prepared, and we were given samples of it to take away with us. Education in preventive medicine and hygiene is carried on with vigour in the schools, as well as in medical institutes. Much of it is pictorial, with suitable morals printed alongside. The posters for children illustrate the washing of hands, brushing of teeth, cutting nails, and why this should be done, a small boy politely coughing in the opposite direction from his sister at table, two small children drying their hands on separate towels hanging from their personal hooks, why children should wear very little in summer and splash about in clean water to their heart's content, and so on.

Health Measures

Apart from enlightening propaganda, the preventive medical service was impressive. We were told that the aim now is to X-ray every member of the population between the ages of seventeen and forty once a year; seamen are being X-rayed twice a year, miners at the coalface once a month, and other categories of persons at different intervals of time. A general medical examination every year is now compulsory. We tried to check up these statements, and could not find anyone in Moscow who had not been fairly recently X-rayed, and at one centre we were informed that now nearly everybody presents themselves for their "compulsory medical examination" while formerly only 60 per cent did so. This result, they claim, is due to medical propaganda and education of the public.

National problems of tuberculosis appear to have been solved. Babies at birth are inoculated against this disease. There is no waiting to obtain entry into ordinary sanatoria or hospitals, though if a patient with tuberculosis wishes to go to a special sanatorium in Yalta, there might be a delay of two or three weeks.

A nation-wide campaign has been launched towards the elimination or curtailment of the incidence of cancer in the U.S.S.R., stress being laid on early diagnosis. The results of American and British research, which shows a correlation between heavy smoking and cancer of the lungs, have been accepted without waiting for Soviet scientists to repeat the work, and the desirability of avoiding heavy smoking on medical grounds has been widely publicised. The result of this, we were told, was a drop of 10 per cent in the tobacco consumption of the Union in 1950. This reduction in smoking is certainly not due to any blind subservience to higher authority.

Citizens of the U.S.S.R. are accustomed to discussing and analysing the economic, developmental, cultural and medical plans of their country. They have witnessed a spectacular improvement in their conditions of life and in their opportunities, and they take a part or a great interest in the plans for their future. Thus it is understandable that they pay such heed to the advice of their specialists.

We came across a sequel to this tobacco story when an English doctor visited a tobacco factory just after we had left. The director of the factory, a woman, was asked about this claimed drop in the consumption of tobacco, and at once she plunged into a tirade about the absolute nonsense put forward by Soviet doctors concerning tobacco. All the employees of her factory smoked, they always had smoked, of course it could not make them ill, "look at these lovely leaves, smell them, how could they possibly give anyone cancer!"

Full use is made of the known prophylactic measures. Besides the inoculation of babies at birth with B.C.G., vaccination is also done in the maternity homes before the babies leave, and diphtheria injections follow at a later date. We asked if these measures were compulsory and received conflicting replies. It was finally established that they were not compulsory. "How then do you deal with the persons who elect not to use these precautions for their babies?" we asked, and were informed that no Soviet citizen was so uneducated as not to want these things.

The scale on which bacteriology is practised is also remarkable. A bacteriological laboratory is provided, for example, for each of the twenty-five districts in Moscow. No child can go to a summer camp, rest home, or similar institution without being tested for diphtheria

and dysentery. And the staffs of these laboratories are encouraged to develop individual lines of research, so that the detailed work of these centres, outside the basic routine, has become different. The microbiological laboratory is occupied, among other things, in producing vaccines and anti-biotics, and the methods of producing penicillin, devised by my former biochemical colleague Dr. Norman Heatley, were seen here in full swing. Samples of their products of penicillin and other substances were given to Dr. Barber to take away. Much progress has been made in the preparation of dry vaccines which will keep for six months to a year, since the wet ones do not last long. This is of great importance in a country the size of the U.S.S.R.

Rest Homes

The length of the annual holiday varies with the nature of the employment, and extra leave is given if it is considered beneficial in any particular case. Rest homes, often called sanatoria in the U.S.S.R., are provided by all large industrial concerns and by many farms for their own workers. We went over a small rest home on a collective farm in Tashkent and much larger centres near Moscow. Everybody, whatever his walk of life, has access to these facilities. These centres are either free or subject to a contribution which is considerably less than the cost of maintenance.

We saw students and elderly people taking holidays in rest centres near Moscow, but many people are enabled to travel great distances to sanatoria in the south. We visited a students' rest home belonging to the Moscow Institute of Energetics (Industrial Power) and named after V. M. Molotov, approached by a country road lined with birch-trees growing much larger than they do in this country. A woman doctor of engineering was in charge of the rest home. A number of well-built dormitory houses with balconies were situated in their own woodland, with a central building containing dining-rooms, a large hall with a stage, all pleasantly decorated, and other offices. The home catered not only for students of the Institute sent there on medical advice, but for elderly people and also little children (Fig. 8). The students' sleeping rooms contained from four to eight beds, and walls were painted different colours in successive rooms.

In the house designed for older persons the decoration was more elaborate, a painted design, different in every room, was added to the basic wall colour. Each room had a radio and the beds were fewer. We met a Professor of Energetics taking a month's holiday with his wife here, and his grown-up daughter left her work in Moscow 20 miles away at week-ends to join them. On a balcony a group

of tables was covered with posters, sketches and other artistic efforts.

Rough but brightly coloured gardens surrounded the main buildings, and in the clearings in the woods we found games of various kinds going on, especially volley-ball, which is very popular in the U.S.S.R. Elderly people sat in deck-chairs watching the students, or enjoying quieter parts of the grounds.

In a more distant wood some students were camping in tents, and to the accompaniment of a loud-speaker emitting songs from the trees, an instructor was directing physical exercises. Ropes hung from high branches, weight-lifting was in progress and other apparatus was lying about. The sunburnt students looked very fit and well, although they had come originally under medical advice. Some of them dived into their tents to fetch cameras with which to photograph the English delegation. Relay races were being run round an ornamental lake, and a mile away a delightful lake at the foot of a wooded hill provided excellent swimming, diving-boards having been built on the shore. Some of us bathed, and our hosts, swimming out into the lake, gave us bunches of white water-lilies.

The students in our party were then monopolised by those of the rest home—Russians, Georgians, and some olive-skinned eastern races. They got along without interpreters, one of our students speaking passable Russian, and some of the Russians speaking a little English, and they were clearly prepared to talk for the next few days on end.

Besides this tremendous effort to prevent disease by giving everyone who needs it a rest or a holiday, the effects of housing on health are closely studied. While the housing shortage lasts the existing living space is put to the most generally advantageous use. The larger flats automatically go to families with the larger number of children, not to those earning the larger salaries.

Medical Institutions

For the treatment of disease and of accidents, and for the work of the general practitioner, there exist both large general hospitals and smaller specialist institutions, while the principle of health centres, or polyclinics, as they are called, is put into practice on a very large scale. The medical service in Russia has always been a public service; it existed as such in the last century, but on a grossly inadequate scale, and only in the towns. And the public service functioned alongside private medical practice. The polyclinic is the more modern institution, where expansion is stressed. It is the place where people meet their family doctors, and from which the doctor goes to visit his rota of patients.

The training of Soviet doctors occupies six years, and includes work carried out in both hospitals and polyclinics: this means that training includes work as a general practitioner. After the first three years' service all doctors return to special hospitals for further courses, the duration of which may be from two to six months. Doctors work in shifts of 6½ hours of day duty or 12 hours of night duty, and both nurses and doctors on night duty have two nights off per week. No doctors are called from their beds after a long day's work.

We were told that 60 per cent of the doctors in the U.S.S.R. were women, and the directors of the institutes which we visited were usually women. In fact, the director of a London hospital in our party jokingly remarked that "this sex equality can be overdone", and as a further example he noted that all the women of our party had luxurious private bathrooms in the hotel in Moscow, while most of the men had none! However, the competence of one of the 190,000 women doctors of the Soviet Union was appreciated later, when he had occasion to seek medical aid at 1 a.m. in Tashkent, from the doctor on duty at a polyclinic, and he did not find her services wanting. A drug was prescribed which was obtained from a chemist down the street, open at this hour.

The medical service provided by hospitals and polyclinics is free, but simple drugs have to be paid for privately. The medical service is recognised as part of the things which every citizen should want to have, and which is provided for out of the profits of industry which are spent on behalf of the public.

The remuneration of country doctors, we were told, is greater than in the large centres. The lowest paid doctors with the minimum qualifications receive much less than a working engineer or factory foreman; but in the polyclinics which we visited these doctors appeared to have plenty of free time, and nothing to prevent their working for higher qualifications which would bring an increase in salary. Medical research workers receive much higher salaries than specialists. Some figures have already been given in Chapter II.

Health Centres

The polyclinics, or health centres, are large hospital-like institutions which serve, for example, the workers of a particular industrial concern, together with their families, and other residents in the neighbourhood. Each has its dental as well as medical and surgical units, and 250 or more beds.

The basic layout was the same everywhere, but the architecture of the polyclinics in Tashkent (Fig. 14) and Stalingrad was more pleasing

than that of the older ones in Moscow. Seventy doctors were employed by the polyclinic of the ball-bearing factory in Moscow. One to six or eight beds were usually arranged in rooms opening off a wide corridor, set rather too close together, but if the corridor space is considered the total floor space per bed, or internal volume of the building per bed, was not inadequate. The operating theatres were simple: we usually viewed them only through glass doors, and the lighting was not always of the best. The equipment of the polyclinics was good. We asked to see the sterilising plant in Stalingrad, and were shown apparatus of English make. The doctor taking us round had not been there long and did not know the history of the steriliser. All polyclinics which we saw had X-ray apparatus, and many had an electro-cardiogram. I was interested in the laboratory facilities. In the polyclinic at Stalingrad I examined Soviet-made microscopes in use by pathologists. In design and optical standard they were equal to those made by Zeiss before the war and exported to all parts of the world. There appears to be little shortage of scientific apparatus for laboratories.

In the polyclinic the Soviet citizen sees his equivalent of a private doctor, and the personal relationship between doctor and patient is being fostered. Moreover, the doctors work as a team. From the polyclinics doctors go out to see patients in their own homes. A function of the polyclinic doctors is to see that their patients, usually located in certain streets or areas, are in good health, and they visit them for this purpose, quite apart from illness. There is freedom for the citizen to choose his doctor, which need not be the one on whose beat he lives.

Considerable efforts have been made to unify the service and to maintain even standards. A system of national inspectors is operated. All doctors in polyclinics and schools must now spend part of their time working in the larger hospitals. In this way the discrepancy between the preliminary diagnosis in polyclinics and the final diagnosis in a hospital has been reduced from 25 to about 10 per cent. Further, specialists of all kinds work partly in the polyclinics.

In Tashkent we noticed large numbers of people with gold fillings in their teeth; it almost appeared to be a popular fashion. Here at any rate the dentist's chair had no terrors. In the polyclinic belonging to a cotton factory we found no less than three dental chairs in the same room manned by charming young women dentists, and an interested group of people behind the chairs waiting their turn!

There is a highly integrated emergency service in large towns, which is put into operation by dialling 01, as is advertised on large hoardings

in Moscow and elsewhere. An ambulance with a doctor and an orderly arrives, and they have a detailed hourly knowledge of the state of the beds in the various hospitals, so enabling the case to be sent to the place where it can best be dealt with.

Major accidents go only to first-class hospitals with traumatic apparatus, unless they cannot be moved so far. It was the opinion of the medical men of our party that if the same practice were adopted in our country it would save hundreds of lives. We were told about the aeroplane service which operates in country districts for emergency cases, and the medical helicopters designed for difficult country.

Hospitals

The hospitals of Moscow are both city and regional, and we went over the Botkin general hospital with 2,200 beds. Again there were small rooms with six to fourteen beds, and there were also single-bedded rooms, in one of which we found the wife of a sick man; she was at liberty to be with him when she wished. She was wearing the white overalls, such as we ourselves were wearing, which are supplied to visitors, and the arm-chair she sat in was also covered with white. The room was as good as in a nursing home. Our doctors spent many hours in the medical wards talking with doctors and patients, and their conclusion was that the treatment was on the whole orthodox, and that the provision in hospitals and polyclinics was more than adequate. There appeared to be no waiting for treatment. Operations for hernia, tonsils, etc., which on a Monday are considered desirable are dealt with that same week. It was not difficult to make many minor criticisms of this large hospital and of others. The grounds were more unkempt than they might have been, the beds were not so good as ours, the operating theatres were less magnificent; but the important things remain, a service that is "more than adequate" in treatment, and beds for all who need them without waiting.

No difficulty is experienced in obtaining a sufficiency of nurses, and there appeared to be plenty of ancillary labour. The Botkin hospital employed 900 trained nurses and 600 in training. The course occupies three years, and a former nurse in our party considered the training to be adequate, if less academic.

The reasons for the ease of supplying the nursing staff were not far to seek. The working hours were six by day or twelve at night, and a housing settlement was at hand. In the Botkin hospital 80 per cent of the nurses were married. Those with children enjoyed the same type of crèche and kindergarten service as is provided in factories and farms, and there was also the hospital school for little children. Dinners were

provided, and if the nurses did not want to cook a meal after leaving work, they could take home cooked food from the canteen; and, as already mentioned, food shops remain open for up to sixteen hours a day, and most shops are open on Sundays. It is thus not difficult for a woman to run a home and rear her children as well as nurse in the hospital.

Some of us went over a children's hospital with 750 beds. In attendance were 250 doctors, 450 trained nurses, 450 nursing orderlies, and about 200 other persons, a total of 1,350 persons, including school teachers for the older children when they were well enough. We noticed the informal attitude of the nurses, however junior. When our doctors were conversing with Soviet doctors and patients, passing nurses would stop, and a crowd of a dozen or more persons would listen to anything interesting that might be going on.

The hospitals are managed by elected soviets or committees, and are financed nationally in five-year plans with an annual budget. We were told that no difficulties or friction were experienced by a local body administering national funds. The directors were always medical men or women with a knowledge of the medical work they were directing. A director is not a dictator; he or she is mainly a co-ordinator, summoning conferences of various sorts. Every three months there is a meeting of representatives of a cross-section of the hospital. Most, but not all, doctors belong to their trade union, and there are daily meetings between the director of the hospital, the head of the trade union and other persons.

In medical as well as in other sciences the Soviet workers have elaborated their own particular lines of approach. This is no place for the presentation of an account of this aspect of Soviet medicine, but a few words may be said on the subject. They have followed up the work of their great physiologist Pavlov, a pioneer in the elucidation of the functioning of the nervous system, whose teachings and research are accepted the world over. They have shown that some disorders or conditions can be treated not directly, but indirectly through attention to the nervous control of the organ concerned. We were told that gastric or duodenal ulcer can be treated not only by diet, drugs and surgery, but by deep narcosis. From the psychological aspect the whole manner of life and living conditions of the people are of importance.

We were told that the "Pavlovian system", which corresponds with the system advocated by Dr. Grantly Dick Reid here, for relaxing methods of painless childbirth is widely practised. Doctors are trained in the method at a centre in Karkov, and go out to all parts of the Union. During the visits of the expectant mothers to the maternity

homes they are given six lessons in voluntary relaxation of muscles. The number of cases failing to respond to the treatment, we were told, was small, but when a woman was not responding, the method was dropped and an anaesthetic given in the normal way.

Medical Films

Anxious for us to make the fullest use of our time in the U.S.S.R., our hosts at VOKS showed us documentary films in all spare time; the substance of some of these we had opportunity to check for ourselves. Of particular medical interest was a film illustrating the work of the world-famous eye surgeon, Professor Filatov, and of his institute devoted to the treatment of eye disorders, which we did not visit. In the Soviet Union there are many cases of blindness in children and adults due to a malformed or opaque cornea, the lens and retina of the eye being normal. Before the war Professor Filatov succeeded in grafting a new cornea on to such eyes, and restored the sight of many persons. His method has also been practised in Bristol, but the number of cases of blindness due to cornea opacity in England is very small.

The film illustrated the gradual perfection of the surgical method of cutting a circular disk out of the cornea of the living eye without damage to the iris or lens within it, and an actual operation was shown. The opaque disk is replaced by a corresponding disk cut from a normal human eye, which is obtained as opportunity offers, and preserved in cold storage in an "eye bank" of considerable size, each eye being kept in a closed glass container. The graft is kept in place by a thin covering layer of sclerotic, which is later removed when the graft has healed in its place.

The institute in which this work is being carried out resembled other institutes of a medical nature which we had seen. The patients were lodged in small rooms containing a few beds, and as their recovery progressed they were seen writing and reading, and some of them were using their eyes for the first time. The clerical department was also interesting. Files recorded each case, with photographs of the eyes before, during and at the end of treatment. Faces with repulsive, asymmetrical, deformed and opaque eyes gradually approached normality; the transparency of the grafted window in the cornea being followed by many other corrections, differing in each case, and finally many faces were restored to normal. Professor Filatov, despite his age, performs up to five operations per day.

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One of our doctors asked a young interpreter whether there was any

private practice left in the Soviet Union, and the answer was in the negative. This was not accepted, so an English watch, in the absence of any roubles, was bet against twenty of the interpreter's roubles. The question was put to the Deputy Minister of Health, who said that some private practice still survived, including a few homeopaths. Private practitioners are not encouraged by the State, and will probably not persist for very long. So the interpreter lost his roubles, and in the future will be careful to say that he has personally never come across a private practitioner, but that the Ministry of Health says that they do exist.

CHAPTER IV

FAMILIES, HOMES AND HOLIDAYS

I WAS particularly interested in the conditions affecting the lives of all types of women in the U.S.S.R. Many Soviet women carry on outside work as well as rear their families, while others prefer a purely domestic life. A sense of fulfilment can be obtained from either choice according to the temperament of the individual, provided that the home can be adequately cared for in both cases. As is well known, women enjoy complete equality of status with men throughout the whole Soviet Union. Even in the states of Central Asia, we observed the conditions for women of the many black-haired races to be the same as for the men, although in 1918 most of them were veiled and lacking in social rights. At that time these women were not only completely uneducated and living in harems, but subject to the will of husband, brother or father, and denied medical aid in childbirth and at other times. In pre-revolutionary Russia itself only 13 per cent of the women were literate, while now the opportunities of education and employment are equal for men and women. The Soviet Union has 400,000 women engineers; of the 1,230,000 teachers, 900,000 are women; one-third of the scientific workers are women, as are 51 per cent of the high-school graduates.

Conditions in the Soviet Union change with great rapidity, and their legislation is revised according to these conditions, and to their experience of successes or mistakes. The object of a 1944 decree was further to strengthen family ties, and to increase the sense of responsibility to the family, and one of the prime tasks of the State is regarded to be the encouragement of stable family ties. We asked many questions concerning marriage and divorce and conditions of life, not only from our hosts, but from the persons with whom we casually conversed. "What is your present system concerning marriage and divorce?" we asked a young mother of three. "If you wish to get married in the Soviet Union," she answered, "the first and absolutely essential thing is to fall in love."

Marriage is a secular matter independent of the Church. Both parties must have reached the age of eighteen, and must have freely given their consent; marriages between close relatives is prohibited, but there are no restrictions of nationality, race, religion or social

position. The relations between husband and wife are based upon absolute equality in all respects, both as to property and personal affairs. Property belonging to husband or wife before marriage remains his or her own, and that acquired after marriage is their common property. Parents are obliged by law to support and care for their children, and the parental right to decide all matters concerning them is strictly protected, unless the parents abuse their rights and neglect their children.

Marriage costs nothing and is easily arranged, but divorce is less easily obtained, and the cost varies with the conditions of the case. Divorce is permitted, but the legal procedure excludes the possibility of inconsidered or frivolous divorce action. Attempts at reconciliation are made, and if these fail, each case goes before a sufficiency of authorities before a separation is allowed. The charge of the children usually remains with the mother.

The State does a great deal to strengthen family ties and to encourage home life. Monetary assistance is given for the rearing of children, and abundant crèches and kindergartens help the housewife, together with holiday facilities. The sums paid to mothers on the birth of a child rise steeply after the third, and there are regular allowances for the rearing of large families, together with medals such as the "Motherhood Medal" for mothers of five or six children, the "Order of Maternal Glory" for those with seven to nine children and the "Heroine Mother" for those with ten children. We saw the medals which bore reliefs of a woman surrounded by children, executed with the usual skill of Soviet artists.

We were informed that the birth-rate of illegitimate children rose during the war, but has since fallen to a low level. We kept late hours in all towns which we visited, and none of us saw any evidence of prostitution. There is no social stigma attached to illegitimacy, but the State does not welcome it. The same monetary payments are made to unmarried mothers as to married ones, but with additional allowances. An unmarried mother may receive her allowance to bring up her child or she may place the child in a home, where it is brought up at government expense; but she retains the right to take her child back at any time.

Housing is not yet ideal for the Soviet mother, but the best of what there is goes to the larger families, and at the present rate of building which we saw in Moscow, Stalingrad and the devastated areas, the time cannot be long distant before this whole society of nations will be adequately housed. All the modern flats are labour-saving to the extent of heat, light, wireless and telephones being laid on. Washing machines and refrigerators at prices within the reach of most people are now on

sale. It was my impression that shortage of floor space rather than the cost is at the moment the strongest deterrent to their purchase. The available living space is cramped, and it must be of the greatest service to all housewives to be able to leave their children of all ages for at least short periods in the nurseries where they have space to play.

Social Services for Children

We went over some crèches and kindergartens attached to industrial concerns in Moscow and Stalingrad and on a collective farm in Tashkent (see Figs. 4 and 13). The general layout and plan was the same in all, and I have no reason to doubt their being fair samples of what is, or very soon will be, available everywhere. The crèche and kindergarten of the tractor works in Stalingrad are described in Chapter V. All these facilities are open to residents of the neighbourhood as well as to the employees of the factory, and the expansion of the service has been rapid. We were told that in the Central Asian State of Uzbekistan over 1,000 kindergartens had already been started, in addition to those on the collective farms.

The provisions for children, which I saw, were of such high standard in buildings, equipment and most of all in the personality of the women in charge of the children, that I would gladly have sent my own children to such places when they were small.

Young lives are not being "mass produced"; they are treated in small units, where eminently suitable women, trained for their work, give them individual care. An easy change of toys from the available selection must be a great boon; variety can be obtained without cluttering up the all-too-small living space in the home. And every child who spends part of his time in these nurseries learns from the first that he is not the only pebble on the beach, and the beginnings of social behaviour.

Before my visit to the U.S.S.R. I had some sympathy with a view often expressed in England that the social services available to mothers in the Soviet Union might undermine the stability of the home, and have other undesirable effects. Having seen the standard of these services and the system in operation I am, on the contrary, of the opinion that they strengthen the family unity.

A sufficiency of domestic help enables a mother fully to enjoy her children and home, which is not easy if one pair of hands has to minister unaided to the needs of a large family and to provide space and occupations for the children at the same time. The nursery facilities enable a mother to provide the best for her children, who also benefit by their short spells in a social environment where their needs for

occupations are fully met, and I think that the children appreciate their mothers the better.

For the mother who wishes to take on industrial, farm or other work, the services provided enable her to do this without detriment to the family. She is normally released from work for 77 days for pregnancy, 35 days before and 42 days after the birth of a child, with full pay for most or all of this period, according to the circumstances of employment, and she receives a lump sum when the baby is born. She may not be sent to work away from home after the fifth month of pregnancy of the first child, and refusal to employ a pregnant woman or a nursing mother, or an attempt to reduce her pay, is an offence meeting heavy punishment.

The crèche we saw in a Stalingrad factory is typical of the provision for mothers. Babies from two months of age are looked after by trained nurses while their mothers do spells of two to two and a half hours' work in the factory in between visiting their children. Every encouragement is given for natural feeding, and in many places those mothers who have an excess of milk contribute it to an organisation supplying human milk for babies whose mothers cannot feed them. The arrangements for meals in industry and on the farms relieve the mothers of much cooking, and both parents can return home with their children, and enjoy their home and family more fully than is sometimes possible when a woman remains at home coping with everything single-handed.

We also talked with married women who carried on a profession as well as a home. The increased income enabled them to employ a full-time domestic help, who was paid at a recognised rate. The wife of a surgeon, with several children and a full-time post, told us that her domestic helps had always been so satisfactory that she herself hardly did any cooking. Her children did not like her going out when they were not at school, but she spent much time with them and they valued her company.

A woman in any employment or profession, or one who prefers to lead a purely domestic life, has no financial anxieties if she desires to rear many children. Her income in money will always be sufficient for her needs, and all the children she can produce will have adequate opportunities of growing up in happy and pleasant surroundings, with free education up to the age of fourteen, and higher education which can be achieved by the payment of modest fees. Moreover, she can start to produce her family at a biologically suitable age. During the first five post-war years about 18,000 million roubles have been paid in State allowances to mothers. The size of this sum can be judged

by the fact that it exceeds the 1950 budget of such a large republic as the Ukraine.

In answer to my inquiry of a mother, who was also employed on professional work, as to what happened when a child was ill, she replied that the doctor visiting the sick child issues the mother with a chit authorising her to remain at home until the child is well or out of infection, her salary and post remaining secure.

Holidays

We had several opportunities of seeing the holiday provisions for children which, in suitable happy and healthy surroundings, are considered to be a prime necessity. Very few children were seen in the streets and parks of Moscow at the end of July and early August, apart from happy parties returning from holidays, each child carrying a small bag and often a large bunch of flowers. We visited a "Pioneer Camp" for six- to fifteen-year-old children of employees of the Ministry of Coal near a place called Tourist, less than an hour's journey from Moscow.

Here, on a hill among woods and fields and spread over a large area, were the dormitory houses with double windows, and central buildings with dining arrangements on airy verandas, hall and stage, etc. The whole, when completed in 1952, will have cost about £300,000 (16 million roubles) and will be used each year for two shifts of six weeks, accommodating 800 children at a time.

Everything was provided for organised and unorganised games, dancing, gymnastics and competitions both indoors and outside. Hobbies and handwork of all kinds flourished, separate rooms dealing with the several branches. Small groups of children were returning from the woods laden with wild raspberries.

Songs about peace were heard on all sides, here as elsewhere, "Peace is the most powerful force on earth", and we enjoyed a very varied display of music, ballet, dancing, gymnastics and other activities by the children on their stage. Although shoes were muddy, the children were otherwise clean and tidy. There were few rules, good discipline and no punishments. My own children would delight in such a holiday.

We spent some time with the Soviet children here and elsewhere, observing their activities, talking and playing with them; sufficient not only to appreciate their health and happiness, but their sense of freedom, and in the case of the older children, their sense of responsibility and of appreciation of a future offering so much within their grasp. They are sometimes shy, but I was struck both by the absence of self-consciousness and the absence of showing off. These may be inherent

characteristics, or may perhaps be fostered by the system of oral rather than written examinations. We heard many small children address a large audience quite naturally and easily.

At the rest home near Moscow of the Institute of Energetics (industrial power), primarily built for students, we found a separate set of buildings catering for toddlers, as well as another for elderly people. Here, in a dormitory bungalow with large verandas, the three- to six-year-olds were sleeping. Other bungalows provided play-rooms and opportunity for handwork of all kinds. We found all sorts of sewing, cutting out, paper work, posters, models, basketry, collections of flowers and insects, very much as in the Pioneer Camp. Suitable music was laid on from loud-speakers in a clearing of the wood, and other little ones were returning from games and a ramble in the neighbourhood. They showed us their tame rabbits, mice and hedgehogs. Our arrival, as usual, was prefaced with hardly any warning or opportunity to make any special preparations. Behind one bungalow in the shade of the trees lay a collection of miniature potties each with a wooden cover to fit. These little children, in their cotton frocks and overalls and sun hats, were a very happy group (see Fig. 8).

Some of our party visited an orphanage, where they found similarly attractive conditions to those in the camps. The girls' summer dresses were almost alike, but cut on quite an elaborate pattern making full use of the woven design of the material.

A Soviet woman can send her children to a camp one year and take them on a family holiday another year. The cost of sending children to holiday centres is nominal. Of the maintenance cost of 700 roubles for each child at the Pioneer Camp at Tourist the parents contribute 200 roubles. It is possible for parents in all parts of the Union to send their children far afield for holidays, travelling from the Moscow region as far as the Black Sea. In 1950 we were told that over five million children spent their summer holidays in pioneer camps, sanatoria and other children's institutions, the camps and summer playgrounds being provided by the State and by public and industrial organisations. We also noted family holidays being arranged where parents and children were taking a house in the country for the summer.

All these opportunities provide also great liberty for parents in the way of holidays. One of our interpreters was proposing to take his wife and children away the following week. We asked where he was going, and he said that he had not decided, probably the Urals or the Black Sea coast! We expressed surprise at indecision so near the date of departure, and he said that all he had to do was to go to his union and something would be arranged. We also met a professional couple

in Moscow who habitually took a fortnight's holiday together each year, without their children, in the Caucasus or on the Black Sea coast, travelling out by the two-day train journey and returning by plane. They took holidays with the children as well.

Holidays for adults are as easily arranged as for children. Sanatoria on the lines of the Students' Rest Home of the Institute of Energetics (described in Chapter III) are built in many attractive places. Here sleeping accommodation is provided in small separate rooms, and communal rooms are used for feeding and other purposes.

Complete freedom of choice of occupation clearly existed at the holiday centres. Meals, sleeping accommodation, sport and recreational facilities are provided, but the choice of occupation for both adults and children, excepting the youngest, is free. Those who prefer the open country or peace and quiet away from man-made attractions can easily satisfy themselves. We found an abundance of deck-chairs provided for the use of elderly people in flower gardens, nearby woods and quiet places out of earshot of loudspeakers or of young people's noise.

All the permanent buildings which we saw in every place we visited were reasonably pleasant to look at, and nowhere did I see anything modern that could be called a shack, other than on the outskirts of Stalingrad, where small wooden homes made by their owners replace the devastated city and the air-raid shelters. The buildings used only for holidays or for part of the year were found by the architect of our party to be thoroughly good. A sufficiency of decoration, both inside and out, is incorporated into all buildings going up today.

CHAPTER V

STALINGRAD RISES AGAIN

SOME of our party left Moscow for a few days in Leningrad, and found a city in which the war scars had already been entirely removed. Others, including myself, chose to visit Stalingrad, which we reached at 10.45 a.m. after a 4½-hour flight from Moscow. The journey carried us over the well-watered north European plain with its ample supply of rivers, woods and fields. The black earth of the fertile region near the Ukraine reminded me of the Fens at home. We flew south-east, passing over Voronezh, the only large town on our route, and reached the drier steppe as we approached Stalingrad. The general colour of the landscape became browner, and the drainage valleys quite unlike those which we had hitherto seen. Instead of the rounded contours of the land sloping evenly towards the rivers and streams, and covered by a carpet of vegetation, the dry earth fell abruptly from an escarpment down to the water-courses, many of them dry at this time of the year.

The highly indented escarpment round each drainage system showed the extent of the erosion, and resembled the miniature drainage systems seen on a sandy beach at low tide where streams of water flow into the sea, and the sand falls away abruptly into the little gulleys so formed.

Parts of the huge construction projects, which will control erosion and better the climate, were seen from the air and will be described later. The scars of war were evident. The marks left by gun emplacements and the trenches became more numerous, particularly after crossing the Don. After this the only green to be seen was in the bottom of the water-courses; there was little flowing water in the meandering gullies, many being dry, and the land was parched and featureless. Very soon wide stretches of the Volga came in sight, and we landed on the bare steppe outside Stalingrad.

Signs of the past struggle were conspicuous. People were living in dug-out air-raid shelters, here a chimney, and there a cutting leading to a small window below ground-level. It did not need much imagination to realise what life in such quarters must have been like during the last eight snowy winters. The ground was covered by short dried-up plants, mainly *Chenopodium alba*, the goosefoot grass, which grows as a weed in my garden. We saw it later in the Asian semi-desert regions and realised what a remarkable physiology this species possesses

which enables it to thrive in such varied conditions and where most plants are unable to grow.

The roads near the aerodrome were a series of tracks on the baked earth, which converged eventually on to a macadamised road. Near it were numbers of wooden chalet-like houses, simple rectangular boxes, and newly built, these being some of the 30,000 houses privately built and owned since 1943, and which represent but 5 per cent of the total projected living space. Some were surrounded by rough gardens, and there were plenty of young trees.

The City

No one could enter Stalingrad in 1951 and not be moved by what was seen. At the end of the fighting not one habitable building remained in this city which straggles along the west bank of the Volga for 35 miles. It was a long drive from the aerodrome, along roads lined in part by utter desolation. Large areas had been cleared, gaunt broken walls stood out against the sky, deep ravines, destined soon to be parks and gardens, were choked with rubble and destroyed brickwork. It was hot and dusty, our hosts wearing linen suits. Near the centre of one of the three main sectors of the city many new blocks of flats with balconies stood at the sides of streets planted with trees and flowers; these blocks are being put up in six months or less, as in Moscow, and this type of building was only started in 1947.

Facing the new Pavshikh Bortsov (Fighters who Fell) Square stands the theatre, a large building in classical style to which the finishing touches of its reconstruction were being applied. Facing this large square stands the restored departmental store from the cellars of which General von Paulus surrendered, and in a side street flanking the store we found the "Intourist" hotel ready to receive us. The walls were scarred, but its two floors had been rebuilt. The simple rooms made attractive by fine carpets and running water, even if highly chlorinated, seemed more than a visitor should accept in such a city.

The street did not extend far. The patched-up remains of the building next to the store served as the city architect's offices, and beyond was a zone of desolation and rebuilding shut off by a hoarding.

From the square we walked to the Volga, passing through a park ablaze with petunias, verbenas, *Phlox drummondii* and tobacco plants, and formal beds of carpet gardening. Fountains were playing, beyond the trees could be seen the new flats, the giant cranes towering above everything and ceaselessly at work, and the debris. Within the park lay a simple war memorial.

The shores of the Volga are reminiscent of the sea, so wide is the

river. The land rises steeply from the water, commanding a fine view. The whole river-bank used to be occupied by docks and the railway, leaving no free access from the residential areas, but the gaps in the built-up areas made by war are being cleared and planted as parks along the water-front, and the railway will shortly be moved inland.

From a promenade made attractive by trees and flowers we looked down on a station siding, and many baskets of perishable market-garden produce waiting to be moved. The battlefields just outside the town and the cemeteries for 100,000 German dead have been planted with fruit which is already bearing, and supplies both Stalingrad and places farther away.

A section of the railway will remain, being already organised as the "children's" railway. This feature is seen in many Soviet parks where the children drive full-sized trains (see p. 66).

The farther bank of the Volga bears an extensive area of woodland reserved as a park, and used by thousands of people on Sundays. A little detail could be seen with binoculars. Large wooded islands lie in the main stream, and freight vessels were loading at the near bank. Bathing-pools surrounded by floating booms were much in use.

Returning by another street, we passed odd bits of patched-up cellars serving as living quarters. From one of these projected a stove-pipe, and the occupants, three elderly women, sat on debris knitting in the sun outside their "home", the only one in an area of some acres. They were proudly looking forward to a new flat in October.

Between 1918 and the beginning of the war the population of Stalingrad had increased fourfold. A visit to the War Museum demonstrated to us most forcibly the part played by Tsaritzin, later named Stalingrad, in the resistance of both 1918 and 1942, and there, among other things, the sword given by King George VI to the people of Stalingrad was displayed.

Replanning

The chief architect on the city's reconstruction programme spared us more than two hours of his busy life; and in his office, surrounded by plans, drawings, maps and models, he delivered us a lecture, which became more and more enthusiastic in spite of the heat, and then he patiently answered our questions.

As soon as the fighting ceased the whole population started to move the rubble and rebuild the industrial concerns. The huge tractor factory—the result of the first five-year plan—was completely destroyed by approximately 5,000 bombs per square mile, but already by the summer of 1943, only a few months after the German retreat began,

production was resumed and the first tanks to leave for the front were labelled "The Answer of Stalingrad".

The Architects' Academy produced a plan for the reconstruction of the town which was accepted by 1945, and much of this plan has now been executed. A riverside road linking new residential areas will replace the railway. The original narrow road which ran through the whole of Stalingrad is being remade, work being in progress on about twelve miles of wide modern highway at the time of our visit, and a new by-pass road running to the west of the town will carry fast traffic. The three main sectors of the town will be connected by viaducts carrying the main road over the deep ravines which run at right angles to the Volga, and each will have its own park. Industry will be concentrated, and the oil stores and warehouses will be moved from the centre to the landward side of the town along with the railway. Parks and a stadium will occupy the vacated areas. Shelter belts of trees are being planted on both sides of the Volga, and to the west of the town. We saw plans and details of the sewage system, and of the types of buildings being put up; infinite regard is being paid to the appearance of the whole; no tall buildings will lie near the river, and the future skyline of the town is considered with care.

Of the 20 million square feet of living space which existed before the war, 15 million have already been restored; eighty schools have been built; all the original industry, the hospitals and tramways have been restored; and many new cultural buildings, a technical college, a medical school and a large agricultural institute have been created. Of the 1,500,000 square feet of living space built in 1950, 200,000 were provided by the City Council and 1,300,000 by industrial enterprises. We walked along many fine streets of modern buildings, all less than four years old. Many of the new blocks of flats back on to open roads or squares reserved for children, who could be seen riding tricycles and playing, undisturbed by traffic. In "Peace Street" a shallow bathing-pool beside the pavement was very popular with small children. In Moscow the children were few, being largely on holiday, but the Stalingrad children were at home and very well fed, healthy and sunburnt.

The Tractor Factory

Cars were ready to take us about the town, and a thunderstorm at night had pleasantly reduced the temperature. Our first visit was to the tractor plant, 13 miles away in the northern part of the originally built-up area. We passed a hill which had changed hands many times, and nothing remained standing in its vicinity. On the landward side

of the old town were many of the small privately-built houses, with their cultivated gardens and their poultry, situated behind the devastated zone, and thus not interfering with its reconstruction. Their untidy layout formed a rather unsightly fringe to the new buildings which have sprung up over considerable areas, but how much better than the air-raid shelters! Giant cranes, so characteristic of Soviet building operations, are illuminated by night, and conveyor belts carry up the bricks. Visitors to Stalingrad in 1946 have remarked upon the healthy looking German prisoners of war who were seen employed upon constructional work. We saw no evidence of foreign labour anywhere, all the builders were free, normal workpeople.

In the office of the tractor plant we saw albums of photographs of the whole concern as it was left by the war. Just acres and acres of twisted metal and smashed-up brickwork, with no recognisable piece of machinery anywhere. This seemingly hopeless waste was speedily changed. It was necessary to produce as well as to reconstruct. Of the money supplied for reconstruction by the State, 70 per cent was expended on living space for the workers and 30 per cent on the workshops. Opposite the factory areas lie housing estates of modern flats. The production of tanks was the first necessity, but now they make only 50 h.p. tractors weighing 5 tons on caterpillar tracks. Smaller tractors are made by other concerns. Formerly the tractors ran on paraffin, but last year they started making diesel engines. In the near future electrically powered tractors will be more widely used when the hydro-electric projects are completed. These electric tractors are powerful, capable of drawing several pieces of agricultural machinery, and they wind-up and unwind the cable supplying their power.

We went over much of the Stalingrad tractor plant. Thirty per cent of the workers were women and there were many Stakhanovite workers who habitually exceed the recognised basic output of piece-work. Enormous quantities of machine tools were employed in all sections of the factory. We saw a sample of all stages in the manufacture of the tractors, and a conveyor belt to one exit was delivering finished tractors at the rate of one every three to five minutes. Gangs of men put the finishing touches and added the caterpillar tracks as the tractors were moved along the belt, and each machine was driven away under its own power to a testing yard crowded with hundreds of tractors.

Palace of Culture

Much of the profits received by the enterprise are spent on housing, cultural facilities, health and holidays. We drove to the newly finished

Palace of Culture belonging to this factory, along narrow ways between the rubble and broken surfaces. On the banks of the Volga, high up and set back behind an expanse of future garden, terrace and swimming-bath, a large building was approached from the landward side by a drive through a future park or garden edged with flowers. Leaving the car park, we entered a spacious hall leading to corridors and staircases. On the wall was a coloured plan of the reconstruction projects of the U.S.S.R. Few people were about in the morning, and we understood that the place became alive in the evening when many people take their leisure. A large restaurant provided evening meals; a ballroom with double windows overlooking the river had an abundance of radiators for winter use; a theatre for amateur dramatics provided 600 comfortable seats and a modern stage, and the lighting and interior decoration was of the best. A cinema was also present on similar lines.

A few men were using a very large gymnasium, and in another room some of our party tried to play the Soviet variety of billiards. A series of fine rooms of smaller size were in use for drawing and painting; the work on the easels and the subjects set up the night before remained; music and string instruments were tidily laid out in another room; and we examined a display of the huntsman's and taxidermist's art, where I identified some of the local fauna. A room with a very nicely finished floor was set aside for ballet, and there were reading rooms and a library, all most comfortably arranged.

Among the books lying about I noticed a translation of Shakespeare, scientific books in languages other than Russian, and very attractively illustrated books for small children. Librarians were on duty all day, as well as in the evening. Such cultural facilities are the rule in the U.S.S.R.

From a balcony we looked out on the surroundings. A low balustrade delimited the grounds of the Palace; in the distance, to the south, I counted twenty factory chimneys, close together, and all presumably new; the foreground was entirely covered by gigantic piles of rubble; and to the north the desolate space was broken by one small modern bungalow set in its own well-kept garden next to the Palace of Culture.

In Stalingrad we visited another "Palace of Technique" belonging to a metallurgical concern. Here again was a dining-room, a theatre, a cinema and every conceivable club facility, but more stress was laid on the library service and the aids for studying the technical aspects of the industry. Qualifications gained in such study receive their monetary rewards in the industry. As before, the architecture and building material were of the best, and the decoration was not spared. In

Moscow I saw parts of the corresponding building of a ball-bearing factory, but much of it was under reconstruction. Palaces of Culture of the same size and standard were also seen in Tashkent (see Fig. 15).

Factory Crèche

We spent an afternoon visiting the crèche and polyclinic belonging to the tractor plant. The former lay opposite the main part of the factory. Here was a modern building, both suitably and pleasantly furnished. Nurses were in charge of the babies, which could be left here from the age of two months while their mothers did a spell of two or two and a half hours work in the factory between time off for feeding the babies. The nursery was all that I myself could wish for. Everything was clean and well arranged; some babies were in cots, others on U-shaped fenced tables with a selection of movable, washable toys hanging within reach over them, and there were comfortable chairs for the mothers. In other sections the toddlers were catered for, with their cots in separate rooms for sleep, and in the playroom there was a sufficiency of toys, constructional and otherwise, suited to their age. Little arm-chairs were set at low tables covered with white tablecloths bearing embroidered corners. These can hardly have been put out in such quantity for us, as we had arrived almost without warning. Nothing is considered too good for Soviet children, whose cultural development is started early. The women in charge of the children seemed to me to be of just the right type and to be enthusiastic about their work.

The polyclinic, a pleasant-looking building of three floors with balconies and wings extending in several directions, lay behind its car park and flower garden, and the maternity home, again with its flowers and fountain, have already been described (Chapter III).

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We appreciated the enormous task of reconstruction which is being so speedily tackled by Stalingrad, and the breadth of conception of what a city ought to be. The wide new tree-lined roads where none existed before, the large open squares, the blocks of flats around a central open court or garden, all blended to form a beautiful whole. The extensive public gardening is not done as tidily as it might be, but the wonder is that it is done at all. Water-carts go along the streets, watering the wide flower-beds by a spray directed sideways. We were interested to find so much building devoted to cultural needs before the population had been released from the patched-up basements and holes in the ground.

We attended a circus in a well-ventilated "Big Top" which had been functioning for years. We were told that the circus has always been very popular in Stalingrad, which supports one all the year round, and in a film we saw something of the work of a Soviet circus training school. The artists in the Stalingrad circus were first class. A troupe of Kuban trick riders we had seen before, taking leading parts in a film about partisans behind the German lines which had been shown us by VOKS in Moscow. We recognised a horse which in the film had played the part of being driven to death in a good cause. We were glad to know that his spectacular death in harness in the film, and the close-up of his apparently lifeless head and glassy eye, represented no more than just another of his accomplishments.

The people of Stalingrad carry their past in their faces, in the larger number of women than men, and in the conspicuousness of war injuries. So many have shared both in the suffering and in the common effort for reconstruction. We wondered that they spared time at all for visitors, and were still more surprised to hear that they had recently received a delegation of Germans, presumably in much the same way as they were receiving us. "Why not? They were unarmed Germans", was their reply to our surprised question, "How could you?"

The food in Stalingrad appeared to be as abundant and good as in Moscow, but with more fresh fruit. On our first night we were joined for dinner by representatives of the City Council, and were served with the normal Russian abundance of courses, dishes and wine. Our long table was laid in an alcove off the dining-room, normally used, we suspected, for dancing; and the delegates being reduced in number, owing to half of the party having gone to Leningrad, the freer contacts with our hosts were appreciated by all. A band played in the restaurant, and here we were opposite von Paulus's headquarters and alongside the devastation! The toasts proposed gained eloquence from the setting. The Soviet guests in the hotel regarded us with interest and friendliness.

* * * *

We had a wreath of flowers made locally on the proceeds of some roubles earned by broadcasting, and bearing an inscription in Russian on a wide black ribbon, and we laid it on the war memorial one evening, stepping on a dense bed of red flowers in so doing. A few words were translated by one of our interpreters to a small crowd that had collected round us.

Then we went to meet the President of the City Soviet for the purpose of delivering messages by Councillor Dixon from the Mayor and

City of Coventry to the citizens of Stalingrad, an alliance between these two cities having been made during the war.

We were received in a building surrounded by a flower garden, and were soon seated round a long table listening to words of welcome. From 8.30 to 10.30 p.m. fruit and wine circulated while speeches were delivered and messages read, and the tokens of friendship in the form of books on Coventry and reprints of scientific research were handed over. Questions were asked concerning the absence of acknowledgement of certain letters from Coventry to Stalingrad, and an invitation was extended from the Mayor of Coventry for a visit to that city by a delegation from the City Soviet of Stalingrad. A promise was given by our host to investigate the matter of the correspondence which, if it had ever arrived, we were assured had not been wittingly neglected, and the invitation from Coventry was formally accepted before we left the U.S.S.R., and a delegate from Stalingrad visited Coventry in November 1951.

It was a most cordial and friendly meeting, and as we left, the most enormous bouquets were given to the women of the party. The President and some of his colleagues kindly returned with us to the hotel for dinner, a meal which extended into the small hours of the morning. This, our last dinner in Stalingrad, is not likely to fade from the memory of any of us. We had seen so much of the work of reconstruction and of the spirit of the people, they had extended such hands of friendship to us, and entertained us so generously. I think that every member of the delegation proposed a toast, the full meaning of which could hardly be expressed in words.

CHAPTER VI

CENTRAL ASIA—TASHKENT

OUR next objective was a journey to the Soviet States of Central Asia, which was a prime object of our visit to the U.S.S.R. Covering an area half the size of the United States, these five republics endure wide ranges of temperatures, and desert conditions prevail over half of Uzbekistan and Kazakhstan and 85 per cent of Turkmenia, one of the largest desert areas in the world. Many of the scanty rivers disappear into the desert soon after leaving the hills, and the larger ones drain into the vast inland basins of the Caspian and Aral seas, where their water evaporates. In the desert and semi-desert regions there is no rain in summer, and the rivers, collecting their water only from far-off hills, bring no moisture to the hot parched earth without the aid of irrigation.

Nevertheless the development of this region has been great. We planned to fly to Tashkent, the capital of Uzbekistan and the largest city in Central Asia, and to see something of the agricultural, industrial and social developments of the last thirty years. In Uzbekistan the industrial output in 1913 was estimated at approximately 269 million roubles (£5,500,000), in 1937 it had risen to 1,668 million roubles (£33,500,000), and by 1950 to 2,800 million roubles (£56,000,000).

I was called at 1.45 a.m. in my comfortable room in the Hotel National in Moscow, and we breakfasted at the same time as another party in the next room were having dinner. The fine new road to the airport, raised a little above its immediate surroundings, was chilly and deserted, and we took off at 3.45 a.m., reaching Aktyubinsk, our only refuelling stop, at 8.45 a.m. Daylight soon came, and we flew over the great European plain which we had entered in Belgium and which continues to beyond the Volga.

All this plain is fertile, but the fields become larger as one passes eastward, and the patches of woodland increase in frequency and in extent. From the air the whole appears like a chequered board of variegated colours; all of it is productive and supports an abundance of towns and villages. The flatness of the plain is emphasised by the meandering rivers encountered hour after hour. Those of us who had not fully appreciated our early geography lessons on the meandering of streams were speedily enlightened by our bird's-eye view of not only the present tortuous water-courses, but of their past positions shown

by the banded colours of the vegetation and the crescentic ox-bow lakes cut off from the main bends of the rivers.

We travelled south-eastward, crossing the Volga south of Kuibyshev. Towards the Ural River and beyond, the country changed with its decreasing rainfall. The cultivated land became discontinuous, the meandering water-courses dry at this season, and farther on rounded patches of black or of white soil showed where the rivers degenerate into a series of ponds before drying out in the summer. Trees disappeared and the scene became brown and infinitely desolate, with scant signs of human habitation.

A little green may be seen in the dried-up water-courses, and the earth, looking so bare from above, is in fact covered by almost dried-up plants which in places could be seen to serve for the grazing of small herds. Passing near Uralsk, we flew on towards the southern end of the Ural range. These mountains were not in sight, but whitish wind-swept stony outcrops break the monotony of the desert, and look as if some child had pinched them up out of white plasticine leaving the brown earth and sand to blow over their bases.

Aktyubinsk lies south of this mountainous barrier between Europe and Asia, and here we grounded, on the bare baked earth with its shrivelled plants, instead of the tarmac necessary in damper places. Many planes on the ground and but few hangars surrounded us, and one lone camel in the distance was the only one we were destined to see in Asia. In every direction lay a featureless expanse of dry brown earth, apart from the town situated at a little distance, and one low distant ridge. A more heart-breaking place in which to go for a walk could scarcely be imagined, for hours, nay days, the scene would not change, foreground and distance for ever the same. A fresh wind chilled us and a gay blaze of petunias, tobacco plants, zinnias, bushes and trees pointed the way to the airport buildings. Within, on the first floor, an airy restaurant tempted us with food and drink, and balconies overlooking the airfield and the approach from the road indicated a magnificence planned for the future.

The town of rectangular, white, flat-roofed buildings set in rows could be seen from the airport, and again as we took off. Our western eyes missed the tidy streets and demarcations into gardens, pavement and roadway, for broad strips of bare earth separate the rows of buildings. Some distant factory chimneys indicated the presence of industry.

We took off again at 10 a.m. The dryness of the land increased, and the curious round marks left by dried-up seasonal ponds and lakes became larger and more numerous. Wells were frequent in parts,

appearing from the air as rings, made by the beasts' footmarks, surrounding a central object. Cultivation and human habitations disappeared. Turning farther south-eastward we sighted the Aral Sea and its indented shores far to our right, and could just discern the mouth of the Syr Darya River and the town of Kazalinsk. Thereafter we followed the course of this river and the railway running alongside.

This is the only line connecting Uzbekistan, the most important of the central Asian republics, with Moscow, and it runs across the republic of Kazakhstan which stretches 1,600 miles towards China from the Volga and 1,000 miles south to Uzbekistan. The Syr Darya contrasts with most of the rivers so far crossed in that it is fast-flowing, in parts deeply cut into the surrounding desert, and it lacks the meanderings of the rivers of the northern plains. This river carries life-giving water from the Tien Shan mountains, and, harnessed for irrigation since time immemorial and more recently for power, supports industries and millions of people in the oases of Uzbekistan. For over four hours at our speed of about 200 miles an hour we crossed the desert, following the river and the railway.

The earth, either black or brown, is marked here and there with white salty patches, where the rain collects and dries up, unable to form a river; occasional tracks were seen disappearing out across the desert, but no roads. For hours we saw no towns, nor villages, no sign of man's activities beyond the railway line and a few trains, and no cultivation. Shortly after 2 p.m. by our watches the misty outline of the foothills of the Pamirs, like a range of cardboard mountains, came in sight. This was the second mountainous mass we had seen on our journey from London, the first being the High Tatra of Czechoslovakia.

Tashkent

Suddenly the sparkling irrigation channels and the green crops and trees of the Tashkent oasis were below us. Such luxuriance and colour had not been seen for 1,000 miles. The silver streaks of glittering water in the ploughed furrows between rows of cotton plants converted the barren desert into a scene of joyous and inviting prosperity. Our plane circled low over the huge oasis which supports a population of 1,300,000. Trees and waterways lay everywhere shading the footpaths and watering a large spread-out town with its many modern buildings, smaller houses, and the thatched walls, built of mud bricks and smoothed off with a coating of mud, which form the boundaries of courtyards, gardens and fields. The centre of the town passes insensibly into the suburbs and then into the farmland, and beyond the last irrigation channel lies the inhospitable desert.

Down we came over this apparent fairyland to ground on the baked earth of a large aerodrome. No customs or other formalities bother the traveller in this vast Union, a pleasant change after air travel in Europe which is punctuated at such short intervals of time by changes of planes and so much tedious to-do. Disembarking at once, and peeling off the several coats needed to keep us warm at 8 to 10,000 feet, we were almost bowled over by the fierceness of the heat reflected off the hot earth as we stepped on the gangway. Yet the local time was 5.20 p.m., three hours in advance of Moscow and six hours in advance of Greenwich time; we had travelled one-quarter of the way round the world to the centre of Asia, and had covered the 2,000 miles from Moscow in 9 hours 20 minutes flying time.

At the foot of the gangway I was presented with a huge bunch of flowers, such as greeted me at every stop on our journey. Our Uzbek hosts and local VOKS interpreter welcomed us with many handshakes, and we drove off in the eight cars waiting for us. Crossing the centre of the town, and along miles of tarmac or cobble roads and dusty lanes, we reached a "rest house" in the suburbs that had been got ready at almost a moment's notice.

Those of us who had expected to see camels, mosques and bazaars were both disappointed and amazed. Fine wide streets and open squares, imposing administrative buildings, airy blocks of modern flats in an eastern style form much of the centre; pavements shaded by rows of willows and poplars and other trees on both sides, or edged by one row of trees and brilliant beds of flowers, separate the roadway and the buildings. Several large parks divide the built-up areas, and others will soon be in order along the banks of the tributaries of the Syr Darya. The water flowed swiftly; it was the first rapidly moving water we had seen since crossing the Rhine; even that in the waterways along the streets irrigating the trees was quickly moving, and we fully realised that the bubbling river passing under the road bridge represented the life of this great oasis. Electric trams and street lighting, and power to the factories are also the result of the small-scale tapping of the potential water power from the mountains by the recently built hydro-electric stations. In a few years this power will be more fully exploited and the water will irrigate larger areas of desert.

A dusty road edged by trees passed through cotton fields to a walled estate, where a gateway opened into a drive kept cool and dustless by frequent watering. An avenue of trees led to the main one-story building of the rest house where a meal was awaiting us. Several bungalows with airy verandas provided a sufficiency of bedrooms and washing facilities, and we suspected that some hasty rearrangements

had been effected in order to make room for us. The white building with its balconies was surrounded by shady trees and flower-beds, and extensive orchards lay behind. The edges of the flower-beds, built up to hold the water flooded over them once a week by pipes laid in the ground, reminded us that desert would return but for constant care.

A long dining-room with white draped sun curtains provided a great welcome. The Deputy Minister of Education, who was with us daily, plant-breeders and others joined us for dinner at 7.30 p.m., and a more beautifully arranged table we had never seen. It was piled with flowers, fruit, bottles of several kinds of wine and innumerable dishes touching one another, tempting us with cold meats and poultry, smoked salmon, ham, many kinds of sausages and of salads, cheese, butter, breads in variety, and, of course, caviare, both black and red. Toasts start at the beginning of a meal in the U.S.S.R., and with twenty-six or more persons at table, all anxious to speak, the vodka circulated freely and we sampled the many wines. In the interval awaiting the soup our hosts asked us in turn to introduce ourselves, and the eighteen delegates learned a little more about each other from the answers. Delicious soup, with a slice of meat in each plate, arrived from the kitchen across the way, and this was followed by a meat and vegetable course, and then enormous iced-cream cakes were cut, the making of which lacked neither eggs nor fat, and we finished up with fruit about 9.30 p.m.

Parks

Our hosts, anxious that we should waste no moment, invited us to see something of the town, and our cars took us back again to the centre, some miles distant. We drew up outside a park, thronged with people, it being Sunday. The news of the arrival of the first British delegation to visit Tashkent had preceded us, and girls presented the four women with flowers within the park entrance. A pretty Uzbek woman leading a small shy child by the hand touched me, and, speaking about two words of English, she embraced me when I gave her little girl a flower. The whole populace crowded round to see us, but did not push or bar our way; they are a quiet and dignified people and appeared to be delighted to see us.

The park was of recent construction, and a blaze of lights illuminated flowers, trees, fountains and park buildings. A large lake, dug out, they told us, in two months, was surrounded by shady walks, and bore a flotilla of boats. One such carried our party and many other people on a voyage round the lake, a most pleasant trip during which the darkness and coolness of the night lent enchantment to the water, the willows and the lighted parts of the park. Kiosks for refreshments and

larger restaurants and club-rooms were situated among the trees, loud-speakers emitted national songs, with which we were soon to become so familiar, bands played and open-air theatres were in operation.

The Children's Railway

We called at the children's railway—would the English delegation honour the children by being taken for a ride? Of course we would; so entering the "station" with its waiting-hall, crowds of merry dark-haired boys and girls shyly escorted us to their waiting train at a platform.

A full-sized train it was, with old-fashioned corridor coaches nicely painted up for play. The children in command were dressed in grey cotton overalls and caps, by way of uniform. They got us into the stiflingly hot compartments, and then the lights of the train went out to roars of laughter from the platform. In a few minutes the illumination was restored, but a corridor lamp was dark. At once a little boy arrived with a step-ladder, and bulging with pride he put in a new bulb; one of us was tactless enough to offer help in view of his small stature, but of course he could manage! An older boy as engine driver got the train under way, and we rumbled along a line in the park to another station, progressing at a modest speed, and seeing the sights. At length the engine reversed, and we rumbled back again to our starting-place, where cheers greeted us. We shook hands with all our young officials, and also with a woman who was on duty supervising the children's play, and reluctantly bade them all farewell.

Open-air Theatre

An open-air theatre next attracted us, where perhaps 2,000 persons were watching a performance taking place on a raised and covered stage. Some negotiations through our interpreters speedily resulted in seats being found for us in the front row. The performance was one of Uzbek national dancing and music. An interval, occurring in a few minutes, was utilised by an Uzbek to make a speech of welcome in Russian from the stage. Before it could be translated to us the whole audience rose and clapped, and we bowed and waved back to them. Our chairman and a student interpreter climbed the front of the stage and replied, amid a rousing welcome from the audience. A paper arrow was thrown to the front, at which an angry fist was waved by one of the artists, but on opening the paper a message of welcome from the cotton workers of a certain factory or farm was read out, and the cheering and clapping were renewed. Further paper missiles arrived, which were unnoticed by the performers. At length it was possible to

take our seats and for the performance to continue. We watched national dancing, and highly skilled performances on drums and other native musical instruments, played singly and in unison.

Having sampled both the entertainment and the spontaneous enthusiasm of our welcome, we walked further among the crowds which were no less dense at approaching midnight. Everywhere a friendly smile, an interested glance, their shyness disarmed by the gift of a flower, and again as we left the park a girl came up and kissed me.

We drove once more through the lighted streets to our rest house, where, at after midnight, tea, cakes and fruit were served before we retired to bed at about 1 a.m. It was difficult to realise that we had been called at 1.45 a.m. in Moscow the previous morning, and that the Uzbek people about whom we knew so little could offer such open-handed friendship.

This "Park of Culture and Rest" was no extraordinary one; we visited another on a subsequent evening. Flowers were growing in abundance, though not very tidily laid out, and with the music there was the same air of relaxation and gaiety, and the open and tree-covered spaces were pleasantly illuminated. Near the entrance a semi-permanent exhibition of apprentices' work attracted us, arranged in a circle where converging paths met. A lathe stood in the open with tools displayed uncovered on a wooden hoarding. Next a table bore mathematical models and instruments. Books of local and specialist interest were clipped to another hoarding, including an illustrated "Fauna", and models in wood of modern buildings looked like elaborate dolls' houses for children. A large stand displayed printed information concerning all manner of educational, cultural and technological facilities. The crowds of people, both fair and dark, hindered close examination of the exhibits.

We attended another open-air theatre, with a larger and more elaborate stage, on which the scenery depicted substantial houses with outside staircases which were used by the players. A comedy by an Azerbaijan company presented some national theme concerning the establishment of collective farms. However, the consternation of our Russian interpreters was great, because although we had persons with us ready to translate Uzbek into Russian, we had nobody who could translate the Azerbaijan. The acting was impressive, but the whole being unintelligible to us, we left after the first of six scenes, an arrangement having been made by telephone for us to go to the Tashkent Opera House.

All the arts, including stage and opera, are financed by the State, so that for modest box-office payments every citizen may enjoy the best.

Before the revolution Uzbekistan possessed no theatres, and the Islamic religion prevented artists from portraying the human form. By 1946 thirty-seven theatres and 564 cinemas were in operation, and in 1951 the people of Tashkent possessed seven major theatres, besides those owned by industries, which present full translations of the great plays of all nations, ballet and opera, as well as modern products of local writers. An advertisement for *Othello* caught our eyes as we drove about the town. All qualified actors draw their State-paid salary with no anxieties concerning their future, and a growing and enthusiastic demand for their work keeps the standard high. Little did I expect to find in this Central Asian town a performance of *Madame Butterfly* which had nothing to learn from anything which I have seen in England.

Opera House

The building of a new opera house in Tashkent was started in 1938, but interrupted by the war. Uzbekistan had thrown her whole weight into the war drive as her limbless men showed, but in 1943 when the German armies were thrown reeling back from Stalingrad the building was resumed and completed by 1946. The Uzbeks did not wait for the end of the war to continue their masterpiece of modern architecture with its immense areas of hand carving and eastern designs. Theirs is the same spirit found among the Stalingraders, who have completed their theatre, circus, palaces of culture and teaching institutions before a sufficiency of flats and houses could liberate the many unfortunates who have lived up to the summer of 1951 in dug-outs and patched-up cellars. This same spirit seems to prevail among all races of the Soviet Union.

We first approached the Opera House by night. It stands apart, shown up by its enchanting external illumination, and we were ushered into excellent seats at the side of the auditorium. Both outside and inside the beauty of this edifice moved me more than any building that I have ever seen in any country. A Soviet opera house means much more than the British equivalent. The stage and auditorium occupy a relatively smaller part of the great building, which provides space for social activities. The manager suggested that we should spend one and a half hours the following evening examining the public part of the Opera House, which we gladly did. (See Figs. 9 and 11.)

Three tall eastern arches lead from the entrance steps into an outer arcade. They are lit below by lamps in hanging inverted cones cut, as it were, by fretwork into traditional patterns. From the steps four great pillars ascend to the roof, which is mostly flat. Within lies an outer foyer, richly decorated and beautifully lit, giving access to a

central square hall of great size and height, to two long lateral halls, and staircases leading to further lateral halls on upper floors, six in all, with another central hall above the first. The manager's receiving rooms lay at one corner. The interior mural decoration of the whole building consists of white hand-carved plaster work, in which the type of designs found on the ancient buildings and preserved in the national museums predominate. Some motifs are reminiscent of the interlaced Celtic patterns found on stone monuments in Ireland and elsewhere. In conspicuous places, such as the carved panels flanking the stage, the detail of the plaster work is edged with gold. The labour and craftsmanship involved in this carving must have been great.

The designs of the six long halls are each dedicated to one of the principal cities, such as Bokhara, Khiva, Samarkand and Tashkent, and represent styles characterising these places. One hall shows also carved marble, and in another the interlacing plaster patterns are mounted on mirrors. Chairs down the centre of each hall provide opportunities for conversation during the intervals of performances. The large central hall bears pictorial reliefs in delicate pale colours depicting historical scenes, etc., all of great size, and framed by the carving.

The modern auditorium with wide circle and upper gallery, absence of pillars, elaborate decoration, including carved plaster-work lining the dome, and the striking lighting, leaves nothing to be desired, and seen from the first seats which we occupied was of fascinating beauty.

Late-comers to a Soviet theatre may not go to their seats until the next interval, unless they happen to be get-at-able without disturbing anyone. Our late arrival in the middle of *Madame Butterfly* resulted in the delegation being moved from the side of the auditorium to the front row of the stalls at the next interval. The manager, having received us previously in his apartments, appeared on the stage and introduced us to the Uzbeks. Immediately the whole house rose and clapped and waved, those near to us shook hands. Our chairman's reply from his place in the stalls was translated sentence by sentence into Russian, and the ovation continued for some time before we could resume our seats.

A luxurious plain curtain with an elaborate embroidered pelmet disclosed a Japanese setting, perfect in every detail, and singers combined magnificent voices with outstanding acting. The severe smartness of "Mrs. Pinkerton" in her faultless European suiting and plain linen hat at a fashionable angle was more eloquent than any words. The audience composed of Uzbeks, Tajiks, Tatars and a sprinkling of Russians was as enthusiastic as we were of the evening's entertainment.

We visited the Opera House again the following night, when a spontaneous roar of applause greeted our entry. The performance was *Gulsara* in Uzbek, an historical opera illustrating the difficulties undergone by the Uzbek women in discarding the veil and emerging from their pre-revolutionary position of inferior status and lack of social rights. The programme presented the narrative at some length in both Uzbek and Russian. Since most of us could read neither language, nor understand Uzbek, the manager himself before each act gave us a synopsis of what we should see, and other relevant matters, besides providing us with most acceptable cool drinks. This made the 3½-hour performance perfectly intelligible to us.

The production was again of outstanding quality, and showed us much of the riotous colour and design of native costume, the form of their dwellings with cushioned verandas for hot weather, and the customs of the people. The incidental dancing, including that of a Stalin prize-winner, fascinated us beyond measure. Here were not only superb voices and fine music, but everything that colour, dress, dancing and effects could provide. On leaving the Opera House we felt very humble and amazed at our tremendous reception, and full of admiration for the heights to which Uzbek dramatic art and architecture have advanced in so short a time under the Soviet régime. It is hard to believe that these people had no theatre of any kind in 1918 and that their performers are almost entirely natives of Uzbekistan.

Documentary and other films made in Uzbekistan occupied another evening, and again the art and technical skill acquired in recent years was apparent. The past customs and historic buildings of Tashkent were illustrated by a romantic representation of a fifteenth-century poem.

As with the theatre, so with art. In the Uzbek State Museum, where treasures of all kinds are preserved with scrupulous care, we spent all our available time in the halls devoted to local art, several guides taking us round their own particular specialities. The riot of colour strikes one first: the carpets, the pottery, the eighteenth- and nineteenth-century wall ceramics, and carved plaster panels from decayed historic buildings such as we had seen repeated in the Opera House. Elaborately painted tables and woodwork, embroidery, ancient and modern, wearing apparel of great costliness, and so on. Cave paintings of animals estimated at 5000 B.C. not unnaturally attracted me. Galleries followed filled entirely with paintings and portraits of the last thirty years when, for the first time, the Uzbeks have portrayed the human form, up to then prohibited by Islam. Many of the portraits and scenes are of local or historical interest, some evoked the guide's criticism, but all showed

great mastery in execution, colour and design. As in Russia, there is an absence of impressionist, cubist and abstract art. Again we were surprised to find such talented schools of painting as well as of sculpture to have arisen in so short a time.

* * * * *

Tashkent today is a large and hygienic city in which modern buildings have replaced much of the mud-built dwellings. We saw no squalor or mosquitoes and very few flies, in contrast to cities which I have visited in the Middle and Far East. We had no occasion to use the mosquito nets provided in our rooms, the periodicity of irrigation, every twelve days for cotton, and the intermittent drying out of all slowly flowing water channels making it impossible for mosquitoes to complete their life-cycles. The nights were refreshingly cool after the day's heat, which may reach 112°F., and were memorable only for the loud chorus of crickets punctuated by the braying of a donkey.

We saw no ill-dressed person; in fact, the women, clad either in European clothes or in native costume of brightly patterned silk trousers and white or gay coloured tunics, were smarter than in Moscow and quite as smart as in London. Yet the continental climate presents its rigorous winter, with 1 to 2 feet of snow as well as summer heat, as the large stoves in the houses indicated. Everywhere the people looked happy and healthy, and our conversations with them disclosed a pride and faith in their progressive achievements, and enthusiasm for their enterprises, and a gratitude to the Russians who had helped them to attain their freedom and organise their own affairs.

Soviet Uzbekistan

We asked the Deputy Minister of Education to tell us something about the development of his country since the revolution. We wished to understand how such a high level of culture had been achieved by a population in which the literate numbered but 1.6 per cent in the states now united into Uzbekistan. These people, predominantly Uzbek, but of several nationalities, were subjugated with difficulty by Tsarist Russia towards the end of the last century. These former Russian colonies possessed little love for their conquerors, who were regarded with suspicion.

Up to 1918 no general education existed in Uzbekistan. Arabic, used in a few schools for the reading of the Koran, was unintelligible to the populace, and a handful of future officials and interpreters were educated in joint native-Russian schools set up for the children of officials. The local habits and ignorance of the people were fostered,

there was no higher or pre-school education, and no technical education.

Every possible step was taken by the liberators to create as speedily as possible a national state and government, and this was effected by 1924. It was the greatest event in the life of these people, providing the basis for a freedom and for a development of education, economy and culture which had never before been experienced. Progress was rapid, but not without obstacles. By 1924 the pre-revolution schools were closed, and 917 new schools had been built and equipped and their teachers trained in the face of stern opposition from the Islamic clergy, an opposition which led even to the murder of a distinguished Uzbek writer.

Expansion was rapid, the initial 75,000 schoolchildren being increased to 166,000 in 1929-30 with 2,710 schools in operation, and to 5,000 schools catering for 1,300,000 children in 1950.

Now there is obligatory attendance of the seven-year schools everywhere, and ten-year schools are provided in the larger towns. Shortly there will be ten-year schools for all who want them. Illiteracy, except among some of the older people, has disappeared. In the larger centres nursery schools for the four- to seven-year-olds have been established, and this pre-school education is to be quickly expanded.

Up to 1930 the Uzbek language was written in the Arabic script, which is very difficult both to learn and execute. The Latin alphabet was then introduced, but by 1940 the transliteration of the Uzbek language into the Russian alphabet was effected, making the learning of both Uzbek and Russian, which is now compulsory in all schools, much easier. In 70 per cent of the schools and in the universities the Uzbek language is spoken, and in the remaining schools the teaching is in Russian. English and other languages are also taught in some schools.

Racial questions have apparently been most satisfactorily settled on the lines of complete equality, all peoples having the same rights. Uzbek citizens can send their children to either Russian- or Uzbek-speaking schools, where all races are educated together in a spirit of unbreakable friendship among nations. All nationalities appear to work together in friendship without national prejudices, and, it must be emphasised, it is the Uzbek people and not the Russians who occupy the positions of authority and technical skill.

Women in Uzbekistan

Another revolution concerned the women. They went to school for the first time; in 1927-8, 26 per cent of the schoolchildren were girls,

in 1940-1 the number had risen to 44 per cent, and today all girls go to school. The women gave up the veil, but not without opposition from the older folk. We saw only three women in Tashkent wearing heavy tent-like cloaks falling to the ground from their heads, and their faces covered by a horrible black blind-like cloth hanging from the tops of their heads under the cloak. Now the women enjoy full equality of status with the men. The turbans of the men have gone along with the veils of the women, and both sexes wear characteristic square black caps, decorated with bright embroidery, on the backs of their heads, the women's hair being worn in one, two or many long black plaits hanging to below their waists, while the men's hair is cut.

The available man-power has been enormously increased by the emancipation of the women. As in Russia, a woman's first concern is the home and the rearing of children, but in this she is given every assistance, so enabling other work to be undertaken if desired. Crèches and kindergartens form part of the usual services provided by factory and farm, as well as polyclinics and feeding facilities; 1,000 kindergartens have already been established besides those situated on collective farms (see Fig. 13).

On a large collective farm we came to a bungalow divided into many rooms leading from an airy veranda. It was afternoon, and outside along the wall was a prodigious row of little shoes. The owners were all tucked up in beds asleep, olive-skinned, dark-haired, bonny children, with the usual eminently suitable women in charge. Outside, a large space was set aside for play, provided with swings, see-saws, etc., and near by ran a cool stream shaded with willows.

The Secretary of the Supreme Soviet (Council) of Uzbekistan is a woman, and among our hosts were Halimova, Deputy Prime Minister, Tachenova, Chairman of the Educational and Cultural Institute, and Markoma, Deputy Chairman of Communications, all women and wearing European dress. At the Kyzyl-Uzbekistan Collective Farm another Uzbek woman in native costume presided at one end of the dinner table; in a large cotton mill we saw a predominance of women and girls at work; and in scientific research institutions women equalled the men in laboratories I visited. In this way the Uzbeks have enormously enriched the lives of their womenfolk. All can take part in the administration of their affairs and share in the yearly increase in prosperity.

Higher Education

Higher education in any country depends on the general level of education. In 1918 an order was issued by Lenin for the creation of

a Middle Asian State University of Turkestan, as this area was then called. Later it was divided up ethnographically into the five present-day republics, of which Uzbekistan is the most important, though not the largest. The two universities at Tashkent and Samarkand have played a great part in the development of the republic, and have been concerned with the establishment of thirty-six other institutes of higher education. Seventeen teachers' training establishments, as well as polytechnics, Institutes of Medicine, Agriculture, Law, Economics, Fine Art, and the Academy of Sciences, with its affiliated research institutions, is no mean achievement in so short a time. The standard of the work carried out by these institutes is in no way inferior to that in other parts of the world, as I shall try to show later. The higher educational institutions in 1950 catered for 32,000 students, and all specialists are of local race. In addition there are twenty-one centres for the training of elementary teachers and ninety-five "technicums".

It was against this background of prodigious advance from a state of illiteracy and oppression that we saw Uzbekian industry, agriculture, scientific research, plans for the future, and, what is perhaps most important, the personality of the citizens growing up under this new order of freedom and opportunity.

Cotton

Russia depends on Uzbekistan for 70 per cent of her raw cotton; Uzbekistan in return needs wheat and tractors and machinery of all kinds. The first Uzbek hydro-electric station was built during the war, and a vast increase in cheap power and associated industry will soon be available. Forty per cent of the agricultural effort of Uzbekistan is directed towards the production of cotton, and fruit growing also takes a high place. Research institutes work on varieties of cotton from all parts of the world, creating high cropping and disease and drought-resisting varieties suited to the local requirements.

The Tashkent Cotton Institute employs about forty specialists and two hundred workers in addition, and issues about 90 per cent of the seed used by the farms. Varieties of cotton suited to different types of commercial needs are being made, cottons with a coloured staple ranging from green and brown to yellow and pink which can be woven without dyeing, long and short fibred cottons, fibres approaching the qualities of wool for making into blankets, etc.

The cultivation of grapes, melons and figs is to be expected in a locality enjoying warm summers, but unlike parts of the Mediterranean region, the winter frosts of Uzbekistan, reaching -10°C. , make the cultivation of apples and pears also possible.

A Collective Farm

A telephone message arranged for us to visit the "Kyzyl-Uzbekistan" collective farm in the Orjonikidze district with hardly any warning. A slight cloudiness in the sky set in opportunely to keep back a fraction of the blazing heat, but as we travelled about the farm by car to visit its various sections, and as shady trees line the lanes between the fields of crops, our exposure to the sun was minimised. Stepping over ditches of gurgling water, we entered a bungalow, where we sat round the familiar long table, eating grapes and listening to a short history of the farm from our hosts. It was started in 1930, 295 families pooling their land (1,137 acres), and retaining "family courts", that is their houses and surrounding courtyards, walled gardens and private strips of land. Now the collective embraces 740 families, who provide 1,486 workers against the original 765, and the land extends over 4,535 acres.

Any new family wishing to join the collective is considered by the representatives of the farm; if one of the family has studied at an agricultural college or has some other specialised knowledge, so much the better. If the application is accepted, the family is allocated a private piece of land and given assistance with the provision of building materials, and to a certain extent with labour, but the house is not built for them.

We entered some of the members' dwellings at their invitation. In one, a large walled courtyard stood in front of the house and around it on two sides. A pergola bore vines which provided both fruit and shade for a child's cot. Trees gave further shade, and summer cooking was done outside in a corner of the court on a baked earth range blackened by wood smoke. A few untidy flower-beds provided colour, and in a large cage a tame bird rather bigger than a partridge was pecking over its food.

We stepped inside the two-roomed house, spotlessly clean when we arrived, but I am afraid it must have needed a "spring clean" when we left, as we had not removed our dusty shoes. Gaily coloured carpets, embroideries and cloths of various kinds covered the floor and most of the wall space. A few cupboards, shelves and tables displayed crockery and knick-knacks. I coveted the china, which was far superior to that which is readily obtainable in England at the present time. The stove for winter use now served as a table covered with hangings, a brass bedstead stood in one room and mattresses and cushions lay on the floor. The housewife was not without modern conveniences, for tucked away in a corner we saw an electric iron.

The cotton crop covered 2,700 acres, all of it white. In 1935 the

yield per acre was $9\frac{1}{2}$ to $10\frac{1}{2}$ cwt., but in 1950, owing to the good work done by the Cotton Institute and the improved agricultural methods, the yield had increased to 28 cwt. In 1930 they had small fields of about one acre and no machinery; now the fields are about seven acres and 14 tractors are employed (Fig. 10). Tractors are obtainable at the nearest "tractor station", where the farmers are trained in their use. Payment is made in the form of a percentage of the crop. Most of the cotton is sold to the State at a fixed price for a delivery of up to a certain weight from the collective. If the collective produces more cotton than this the excess is paid for at a much higher rate.

We walked through fields of melons. In the orchards the trees were weighed down with apples of many varieties, a fruit recently grown here on a large scale, many varieties new to the district having been imported. Peaches were ripening, as well as many other kinds of fruit. Irrigation channels supplied all the trees and must be in constant need of attention. Vegetables, maize and sunflower are grown in plenty, and there are cattle, horses, sheep, pigs, poultry and bees.

The increase in the livestock between 1935 and 1950 was as follows: horses 65 to 668, cows 41 to 527, sheep 41 to 3,000, pigs none to 150, poultry none to 3,000, and bee-hives none to 150. And the labour force was only doubled.

The income of the collective in 1930 was 300,000 roubles, but in 1950 it became 19,180,000 roubles. At first the recompense for each working day was 2 roubles 40 kopeks and 200 gm. of grain, but in 1950 the figures had risen to 19 roubles 20 kopeks, $2\frac{1}{2}$ kg. of grain, $\frac{1}{2}$ kg. of apples, $\frac{1}{2}$ kg. of vegetables, $\frac{1}{2}$ kg. of potatoes, 50 gm. of lard and butter, 100 gm. of meat. Each worker can either use his allowance or sell what he does not need. Produce is also sold by the farm to its own market at prices which are fixed by the farm, and the collective runs its own co-operative shop.

Leaving the road, we walked along shady lanes to the tune of rippling water and Uzbek songs emanating from loud-speakers in the trees. A blazing flower garden of considerable size surrounded a two-floored rest house built for the workers, and a pond lay in front. The house was not in use at the time, painters and decorators being in possession. The upper balconies commanded a pleasing view of the garden and farm. Here and there wooden booths provided a shady platform on which the workers took a midday siesta and a meal. Urns were brewing water for tea in sectors of the farm remote from the main cooking facilities.

We directed our steps towards a large dais where a sumptuous meal awaited us. Before ascending we found a wash-basin and mirror

erected beside a water channel under the trees, clean water being poured into an upper tank, and towels being provided alongside. The dais was covered with woven mats, a low wooden balustrade surrounded it, the roof being supported on pillars. The woodwork was gaily painted in six different colours, the overlaps of the matchboarding of the ceiling being picked out in red, and the pillars striped. No Uzbek or Russian neglects the details. A long table was piled with flowers, fruit, wines and dishes. We were far from a road in the middle of the fields, but the singing continued.

Apologies were made for the absence of special preparations in our honour, due to the short notice of our arrival, but from some buildings near by came course after course, keeping us occupied for about two hours. Two of these were local dishes which were being served also to the workers, one consisted of meat folded, cooked and served on skewers, and the other had many components. We sat with our Uzbek hosts and interpreters, enjoying ourselves tremendously. The toasts and vodka flowed freely, and one of our hostesses advised us to take plenty of butter, as she did herself. We were tasting in real life what some of us had thought was only the product of highly coloured films.

Refreshed, we walked farther, and inspected the melons and grapes. The vines were grown over curved frames, the rows of arches forming long tunnels, so different in general appearance from the vineyards of Italy and the Mediterranean. Huge bunches, just ripe, were cut for us to take away. Near a melon field we sat upon crates under a large tree eating slice after slice of melon while our hosts patiently answered our innumerable questions. As many as seven crops of lucerne can be grown in one year on this fertile soil, which is also suitable for southern hemp, figs, walnuts and many other crops.

A Cotton Mill

The outstanding advances in Uzbekistan productivity have not been limited to agriculture. We visited the Stalin Cotton Mill in Tashkent, which we examined in some detail as an example of Uzbek industry. Until recently raw cotton was transported to Moscow and other places and returned again as cloth. Now this modern textile factory in Tashkent receives the raw cotton from the farms, and supplies middle Asia with high quality cotton goods in great variety, at an immense saving in transport.

As usual, we were received into the manager's office, and while we sipped tea and tasted the local grown fruit we listened to the history of the mill. The enterprise was started in 1932 and reached full production

by 1939. Besides the modern factory, which now has little if anything to learn from either Lancashire or the U.S.A., the workers enjoy the products of their own kitchen gardens and of a departmental store; modern apartment houses solve the housing problems; and the domestic needs are met by a nursery, a kindergarten and canteens for meals, in which we saw a varied menu of low-priced dishes being served from hatches on to small tables, under conditions of good ventilation and cleanliness; a polyclinic, two cinemas and a "Palace of Culture" completed the amenities (see Fig. 15).

We walked round part of the factory, set in its own gardens with shady walks and outdoor seats for the use of the workers. Groups of men and women were sitting about talking in their leisure time, playing, or eating in the shade. Large screens near an entrance bore photographs of the best workers, and their features—as in the ball-bearing factory we visited in Moscow—indicated that several races were working together. All the equipment appeared to be of the most modern design. In one section every girl was in charge of two spinning machines, each operating 400 spindles. In one shop, containing approximately 3,500 automatic looms, each girl operated from twenty-four to twenty-eight looms, the average being twenty-seven, and there were many such shops. Cool air spurted out of jets placed above the workers, so that the inside of the factory was cooler than the outside at this time of the year. We passed through shed after shed, in which the processes of bleaching, dyeing and finishing were progressing amid much noise.

In an art studio worked a dozen or more girls painting designs and trying out new patterns. It was a bright room draped with the more recent achievements in printed cotton, each girl working at her own desk, and having a large pile of completed sheets for us to see. One of these was almost exactly like the printed cotton I happened to be wearing. The engraving of the rollers for printing and the rapidity of the printing and dyeing machines interested us greatly. The machinery was Soviet made (see Fig. 12).

Lastly we came to the finished cloths of all kinds being prepared for dispatch, thin and thick, patterned and plain, woven in stripes or coloured, and mercerised cottons finished with the texture of silk. We gladly accepted an invitation to choose a dress length each to take away with us. Many of the designs were typically Asian in form and colour, but others might have been made in the "West", and I brought away a thin material with an all-over pattern on a white ground, a deep border of geese, dogs and flowers being intended for the bottom of a child's dress.

The women of Uzbekistan, no longer confined to harems and subject only to the will of their menfolk as slaves with no rights, play a great part in the productivity of the State. Seventy per cent of the workers in factories of light industry are women, as are 20 per cent of the railway employees. Some women drive trains, 1,700 have mastered various railway techniques, and there are 100 women chairmen of collective farms. In the Stalin cotton factory the chief engineer and the deputy director were women, and many women were Stakhanovite workers, habitually accomplishing more than the accepted norm.

All overfulfilment of basic piecework receives its monetary reward, and, as with the collective farm, high productivity of the whole factory in competition with other factories increases the return to each worker, besides bringing banners of distinction to the whole concern. More money coming into the factory as a result of the combined effort not only increases individual wages but also the cultural amenities which have been developing by leaps and bounds.

It is thus that the prevailing spirit of enthusiasm and determination by the workers to fulfil or overfulfil their own plan has been achieved. The whole organisation, with its committees and transfer of agreements and suggestions from the workers upwards and from the State and managing committees downwards, creates a feeling of unity, of ownership and of pride which is so conducive to efficiency and increasing output.

The Palace of Culture belonging to the textile factory resembled those in other parts of the U.S.S.R. and in essentials was like the one already seen in Stalingrad. Its theatre for amateur dramatics had 800 seats, upholstered and comfortable, and the whole was beautifully lit and decorated. Some forty other rooms ministered to cultural needs. Next to this tall modern building, with its balcony and enormous portrait of Stalin in the middle of the first-floor frontage, lay the contrast of low native buildings within their walls of mud brick, and outside ran the irrigation channels to the stately poplar trees.

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Time did not permit us to visit either Samarkand, 220 miles away, or Bukhara. We were told that we should stay in Tashkent for six months in order to see all that might interest us there.¹ However, what we did see in Tashkent provided clear evidence of the nature of the changes which have taken place in recent years. Tsarist colonisation

¹ A more extensive visit to the Central Asian States by W. P. and Zeldia K. Coates is recorded in *Soviets in Central Asia* (Lawrence & Wishart (1951)).

was established after the capture of Tashkent by Russian forces in 1864, followed by the occupation of Bukhara in 1868, Khiva in 1873 and Merv in 1884. A journey to these parts by Europeans in the eighteenth and nineteenth centuries was a dangerous venture, ending usually in either execution or slavery, and few returned. Less than fifty years ago Russia took steps to recover some of her citizens from Tatar slavery in Bukhara.

CHAPTER VII

THE GREAT CONSTRUCTION PROJECTS

AN indication has been given in the foregoing pages of the building of a new Moscow, the rebuilding of Stalingrad, and of numbers of other devastated towns and villages, where the methods employed aim at beauty and civilised needs rather than limitation in expense. In spite of the destruction of two-thirds of the fruits of the five-year plans by war, and the rebuilding necessary on that account, construction projects are now under way on a scale not hitherto attempted in any part of the world, and which are directed towards a peaceful development of the U.S.S.R.

Desert and steppe cover one million square miles of the Soviet Union, but over much of this area there is good quality soil with 300 sunny days a year, and with the addition of water huge crops can be raised. The rivers of Europe and Siberia are pouring abundant water into the sea. The plans for development of hydro-electric power and irrigation, and for changing the climate over vast areas are familiar to everyone in the Soviet Union, where maps and diagrams of the great projects are displayed in every town (see end-paper map). We saw these on hoardings, in the palaces of culture, on stations and in museums. The plans are the subject of much discussion, and were referred to with pride by all manner of persons with whom we spoke. The lifetime of every Soviet citizen has seen such improvement in economic conditions and in cultural opportunities, that plans for further advancement are entered into with an enthusiasm which has to be seen to be understood.

Throughout my visit I encountered research connected with the great projects, and we received authoritative information concerning the details of the schemes and of their manner of implementation. We flew for hours over country showing the early stages of the great developments, and some of the larger installations were seen in this manner.

The projects will be shortly outlined as a whole, since consideration cannot satisfactorily be given to the many sections of the work which I saw, without reference to the entire plan.

The preliminary research work into ways and means has been in progress for over twenty years, and the large-scale practice of methods which have already been tried out has begun.

In 1948 afforestation was started and in 1950 great constructions were embarked upon with the object of providing new power and irrigating an area equal to one-third of the world's irrigated land within the next five to seven years. The irrigated areas will crop enough food for a hundred million persons: more wheat than Canada and more cotton than Egypt and Pakistan will be produced. The anticipated harvests in millions of tons include: wheat 8, sugar-beet 6, cotton 3, rice $\frac{1}{2}$, together with 2 million head of cattle and 9 million head of sheep. Seventy million acres are to be irrigated, an area nine times that of the irrigated parts of the Nile valley, and equivalent to Britain, Belgium, Holland, Switzerland and Denmark put together. Desiccation by wind and movements of desert sand are being checked.

Five major hydro-electric schemes will produce an aggregate capacity of $4\frac{1}{4}$ million kilowatts, the annual output being 22,000 million kilowatt-hours. This power equals the output of all the power stations of Denmark, Finland, Holland, Belgium and Spain, and is one and a half times as great as the output of all French hydro-electric stations. Two of the new stations will exceed the largest existing station, the Grand Coulee of America, with a capacity in 1950 of 1.6 million kilowatts; the capacities of the Kuibyshev and Stalingrad stations will be 2 and 1.7 million kilowatts respectively. The power will be used for industrial purposes, for agricultural machinery, such as electric tractors, for pumping water on to the land, and in some regions for artificial rain. Eight enormous reservoirs are being built, together with 44,000 water basins, and hundreds of miles of canals will carry water through steppe and desert. These projects are to be finished by 1957, and their speed of construction is dependent upon the present advanced state of industrial development.

Twenty-two out of the last sixty-four summers have brought drought to the South Ukraine. The $\frac{3}{4}$ million square miles of Central Asian deserts are among the largest in the world, but archaeological evidence shows that parts of the Turkmenian deserts between the Aral and Caspian seas were once under cultivation, although now in part covered by sand. The annual rainfall of these regions is 2 to 15 inches, and desiccation is caused by strong winds sweeping across the Aral and Caspian lowlands to the western parts of the Soviet Union. The origin of the dry winds from the deserts is not fully understood, and is the subject of research being carried out by expeditions and scientific stations. Cultivated land withstands drought better than uncultivated areas. The drought of 1946 was accompanied by good crop yields on the farms where an extensive land surface was under cultivation.

The climate is being changed over much of the steppe of the South Ukraine and Volga regions and part of the Asian deserts by irrigation, by periodic flooding and by the planting of forests. Desiccating winds and temperature extremes will be mitigated, and the atmosphere will become more humid.

Afforestation

It has been found in the U.S.S.R. as well as elsewhere that a proper use of trees can materially improve crops and add humidity to the air and soil. Afforestation was started in 1948 on a fifteen-year plan, and already a fifth is completed. Tree lines are being planted along the watersheds between the Volga and the Ural rivers, west of the Volga, between Stalingrad and the Caucasus and along a belt across the Don and the Donetz, running roughly north and south. Each of these consists of trees planted in 65-yard-wide strips spaced 325 yards apart, and the length of these wind-breaks is 110 to 370 miles. The effect will be to interrupt the streamlined airflow of the lower atmosphere, substituting turbulence, which will diminish the force of the winds and reduce their desiccating power.

Tree lines are also being planted on either side of the Volga, Don, Donetz and Ural rivers for distances up to 670 miles along each. All the smaller drainage systems around which erosion is so conspicuous from the air are being surrounded by tree lines. Gullies, ponds and reservoirs will also be sheltered by trees, and wind-breaks on the hedge principle are being planted between the farms. As we flew over the steppe black stripes of ploughed land 20 to 65 yards wide were seen for hour after hour (Fig. 7). In the Voronezh area lines of small trees were visible on these stripes, even from a considerable altitude, but farther south the young trees were too small to be seen from the air. Snow will be retained by the trees during the winter, the soil will become moister and erosion will be checked. The hedge principle is being adopted on the steppe because better crops have been obtained on tree enclosed fields in difficult country such as Siberia than on exposed fields, and we saw the lines of poplars separating the irrigated crops in Tashkent. It is estimated that the climate over 300 million acres will be bettered by influence of the afforestation. The total area being planted is 14 million acres, or more than the arable area of Britain, and 3,300 miles of major tree belts are being formed.

An abundance of machinery has been devised for the planting of forests. The tree-planting machines, which deal with seedlings raised in nurseries, we saw only in films. A seedling 1 or 2 feet in length is

put in place by hand on the machine, which then does the rest. Oak is the tree mainly employed to initiate the forests because it develops a deep root system in dry country. Some initial experiments in planting mixed forest in the treeless steppe failed. Now "cluster sowing" of acorns is practised on a large scale. About thirty acorns, together with soil from near existing oaks containing the appropriate mycorrhiza, are planted at intervals in rows, and the rows are separated by low-growing crops such as rye and clover. About 270 clusters per acre are planted. Each group of seedlings holds its own against weeds where a single seedling would perish, and harvesting machines of the appropriate width cut the intervening crops. We saw this method of cultivating oaks at the field station at Gorki Leninskiye, near Moscow.

Every encouragement is being given to increase the bird and insect populations of the new tree belts, and popular information is being circulated to the local inhabitants concerning the preparation of nest-boxes, suitable anti-predator devices and methods of providing extra food for birds in winter.

Hydro-electric Stations: Irrigation

The Dnieper hydro-electric station, destroyed during the war, has been completely restored, and in 1950 five regional irrigation and hydro-electric schemes were started which are to be completed within five to seven years.

On the Don a dam and hydro-electric station have been built at Tsimlyanskaya, forming a reservoir 110 miles long and 18 miles wide. The dam, 130 feet high, is composed of about half a mile of steel and concrete spillway, flanked by 8 miles of earth wings. It is twice as big as the Fort Peck Dam on the Missouri, which has been described as the greatest dam in the world. The lower Don was diverted into a new channel at the Tsimlyanskaya dam in September 1951, and passes through several smaller power stations on its way to the sea. Locks are being built at all the dams.

The Volga-Don Canal between Kalach and Stalingrad, 63 miles in length, was started before the war and has just been completed. Water was pumped into it from the Don reservoir in February, and ocean-going ships are to sail through it from June 1952. The canal joins 18,500 miles of navigable waterways of the Volga and beyond with 8,100 miles on the Don, Dnieper, etc., and unites the inland seas with the Black Sea, the Baltic and the White Sea. Internal communications are tremendously enhanced by the canal. Timber from the north, cereals from the Volga and Caucasus regions, oil and fish from the Caspian and Black seas, coal from the Donbas, metal and machines

from the Urals, and fertilisers and minerals from Turkmenia will be transported cheaply. Refrigerator ships will carry fresh fish from the sea of Azov to Moscow. The Volga will take forty times as much freight as can be handled by a large railway.

Water for the maintenance of the canal is being raised 50 feet from the Don by three pumps, the capacity of each being 9,900 gallons per second (half the average flow of the Thames).

A network of canals in the Kuban region and lower Don valley are linked with the main Don irrigation canal, 118 miles in length, which runs off the Tsimlyanskaya reservoir. The daily flow on the main canal will be 4,750 million gallons, nearly four times that of the Thames. A ridge of high land has been tunnelled for the canal by the Moscow Metro builders for a distance of $3\frac{1}{2}$ miles through loose shifting soil. The tunnel is lined with metal, and faced internally with concrete. Subsidiary canals, 350 miles in length, with 140 pumping stations, will be fed by the main canal.

Irrigation in the Volga-Don Canal region will serve $1\frac{1}{2}$ million acres near Rostov and $\frac{1}{2}$ million acres near Stalingrad, and in both regions $2\frac{1}{2}$ million acres of pasturage will be periodically flooded. The spring of 1952 saw water flowing to $\frac{1}{4}$ million acres of new land in this region.

In the South Ukraine a dam near Kakhovka on the lower Dnieper and another on the Molochnaya River will both be fed by the spring flood water of the Dnieper, which will be stored and progressively used during the summer. Both these reservoirs will feed a canal running through the Ukrainian steppe, across the sea, to the North Crimea. The daily flow of 12,100 million gallons, about eight times that of the Thames, will feed 525 miles of canals, and irrigate $\frac{3}{4}$ million acres between Sivash and Kerch. In the irrigated Ukraine and Crimea, cotton and rice are to be grown for the first time, besides winter wheat, castor oil, fruit, plants for essential oils (lavender, rose, sage, geranium, etc.) and vegetables. Increased grazing and hay will double the herds of Karakul and other sheep, and cattle, pigs and poultry will increase.

The river Volga, 2,400 miles in length, flowing from the north of Moscow and eventually emptying into the Caspian Sea, is being converted into a series of lakes, drowning a score of towns. The Volga basin, equal in area to Germany, France and Britain, represents one-third of European Russia and embraces about 50 per cent of Soviet industrial output. Three dams and power stations are already in operation on the upper Volga. Two large ones are being built at Gorky and at Molotov on the Kama tributary.

The Kuibyshev dam and hydro-electric station are to be finished by 1955. The annual output will be 10,000 million kilowatt-hours. The dam, 100 feet high and $3\frac{1}{2}$ miles long, will form a lake, 310 by 25 miles. The magnitude of the task can be realised by comparison with the Dnieper station, which also took five years to build. The Kuibyshev project involves twenty-five times the earthwork and five times the concrete, or twice the earthwork of the Suez Canal. In years of mean rainfall 10 per cent of the Volga water will flow over the dam; in low-water years all the spring water will be held, but in high-water years $15\frac{1}{2}$ million gallons per second will flow over the dam and drop 90 feet. The bed of the river is therefore being reinforced by concrete blocks for 550 yards.

From the lake an area of $2\frac{1}{2}$ million acres, equal to that of Devon and Cornwall, will be irrigated and all farms will then possess 5 to 8 per cent of irrigated land on which crops will be guaranteed.

The Stalingrad station will be completed by 1956 and will have a similar annual output to that of Kuibyshev. The perimeter of the excavation already formed for the station is 6 miles, and 15 million cubic yards of earth must be moved from this site during the next five years. The dam will create a lake 375 miles long by 19 miles wide, the water being raised 80 feet. Over the dam will run a railway and a motor road, so linking up the two banks of the Volga and all that lies beyond. The navigability of the Volga will be enhanced by the dams, and shipping will not be hindered by the building because the locks will be made first. During the first year it is intended to lay about $1\frac{1}{4}$ million cubic yards of concrete for the dam, followed by 3 million cubic yards during the next year. Suction dredgers, with capacities of 400 to 1,000 cubic yards of pulp an hour, are excavating the site of the power station and piling up the earth wings of the dam from the bed of the river. Already railway sidings and roads have been built to the site of the power station, and a permanent workers' settlement on the left bank of the Volga is forming the nucleus of a new town.

The area to be irrigated from the Stalingrad lake is much greater than that from the Kuibyshev lake. Fifteen years ago the Moscow Academy of Sciences sent an expedition to the region between Stalingrad and the Ural River to the east, and the information so gained is now being used in the irrigation plans. A canal 375 miles long will lead water from the Stalingrad reservoir eastwards almost to the Ural River, and branch canals will supply the whole of the semi-desert region between the lower Volga and Ural rivers and the Caspian Sea. This area, 32 million acres (about the size of England), will receive

a daily volume of 15,700 million gallons of water by this canal, a flow exceeding that of the Don and about ten times that of the Thames. The dam and canals in the Stalingrad region involve four times the earthwork of the Kuibyshev project, and more than three times the earthwork of the Panama Canal.

About half of the power from the two great stations at Stalingrad and Kuibyshev will be transmitted to the Moscow and "black earth" belt for industrial purposes at voltages of the order of 400,000. For this, entirely new installations are being devised to operate a grid system covering a very wide area. Riverside industry will be stimulated and power will be used for irrigation and agriculture.

The utilisation of power during the winter for heat and light will be balanced by the agricultural needs of the summer, and in very dry years the thermal power stations will be more fully used than in wet years. The anticipated cost of hydro-electric power is one-tenth of that produced by the thermal stations.

Giant Machines

The execution of such gigantic projects within a few years is being realised by the employment of mechanised navvying on an unprecedented scale. Models of giant machines and special building techniques are displayed in museums.

Two types of large excavators are used. The Stalin engineering plant at Novo-Kramotorsk has designed a caterpillar excavator with a bucket of 19 cubic yards capacity. The Uralmash plant has produced a drag-line excavator with a bucket of 18 cubic yards which can excavate several million cubic yards a year. We were told that a bucket of 32 cubic yards capacity was being planned. Such large buckets are used as a result of research on metal alloys to give sufficient strength. For the construction of the Stalingrad-Ural Canal 300 4-cubic-yard excavators are to be employed.

The drag-line excavator weighs about 1,100 tons, and stands on a basal plate 45 feet in diameter. The component parts of one excavator fill 180 railway wagons. A forward movement of this "walking excavator" is done by pushing out the main bearing skids for a distance of 4 to 6 feet. The machine lifts itself up, pulls itself forward, and lowers itself again with a smooth movement. The 72 yards of main gib allow the machine to cut into the ground for a distance of 50 yards, and 18 cubic yards of soil can be dug and dumped up to 130 yards away every minute. A crew of fifteen engineers on such a machine can do the work of 7,000 or more men (see Figs. 16 and 18).

At least half of the excavation is done underwater by means of suction units. A pontoon carries a suction unit and a drill-like dredge. The drill cuts a trench, either forward in the formation of a canal, or downward to a depth of 70 feet, pushing the earth towards a suction head. The soil is then pumped through a pipe for a distance of up to 2 miles, where the earth may be run into a dam or piled into a waste heap. A crew of ten to twelve can do the work of 10,000 to 15,000 men, the output per man shift being 170 to 200 cubic yards of earth. Over twenty such dredges were completing the piling up of the Tsimlyanskaya dam at the time of our visit (see Figs. 19 and 20).

The mixing of concrete sufficiently rapidly is another problem. The concrete for the Kuibyshev project alone would make a wall 1 yard thick and 3 yards high from Calais to Rome. Temporary automatic factories are used. One, for example, is staffed by seventeen men; it processes two train-loads of materials every hour, delivering 5,000 cubic yards of concrete every 24 hours. Steam heating enables the factory to work in frosty weather, and special ventilation removes the dust.

There are many other types of new machines. A scraper operated by one driver removes 650 cubic yards a shift. Tipping lorries have capacities of 10 to 25 tons, and special road-laying and railway-laying machinery has been devised. These and other machines will enable 4,000 million cubic yards of earth to be moved in five to seven years, about sixteen times that moved for the Panama Canal. Twenty-five million cubic yards of concrete must be mixed, about sixteen times that required for the Dnieper station, and hundreds of thousands of tons of metalwork and equipment are being utilised.

Substrata of the Dams

The construction of large dams is most easily done where there are natural firm foundations, such as rock. The dams in the Volga region and other parts of the Soviet Union must be built on silt and loose foundations. The problem therefore arises of preventing water, under pressure from the reservoir, from seeping under the dams and washing away the foundations. Several methods are being used to prevent this happening. On some sites a series of deep walls are being sunk in the bed of the reservoir near the dam to create a zone of dead water below the structure. Another procedure is to freeze the ground below the dam to a depth of about 60 feet.

In western Turkmenia the proposed desert canal will pass through a region subject to earthquakes. The dams to be built here are designed to ride earth movements and not be destroyed by them.

Fish

The requirements of freshwater fish and of those which spawn in fresh water from the sea are not forgotten, and work is in progress on the exploitation of the increased inland waters. It has been shown in Germany and elsewhere that a proper use of fresh water can produce more food in fish than an equivalent area of grass-land in beef. Care is being taken to flood nothing that may prove harmful to fish. Bypasses for fish are being built round the dams, and special reservoirs are being made in the Volga delta and elsewhere for the maintenance of stocks and for the rearing of fish. Four fish-breeding stations are being established above Kuibyshev and five above Stalingrad. Every year millions of fish eggs and fry are put into rivers, lakes and ponds. The fish farms breed six varieties of salmon, including the white salmon, hump-backed salmon, and those from the Baltic, Caspian and Black seas, and two species of trout. The following fish are also being bred: *Coregonus autumnalis* (herring-like in shape), grayling, sturgeon, carp, tench and *Alburnus chalcoides* (related to the British bleak). Biological stations have been established on land for the study of fish, research fishery vessels are employed, and expeditions of zoologists work on problems connected with fish.

The productivity of the inland seas is also receiving attention. Long ago the Black and Caspian seas may have been united, and they lacked a marine fauna. Later they became separated. Evaporation of river water in the Caspian Sea has gradually increased its salinity, but owing to isolation this inland sea lacks many typical marine animals, such as worms and shrimps. A marine fauna has invaded the Black Sea from the Mediterranean. Some years ago mullet was introduced into the Caspian from the Black Sea. This fish has now multiplied sufficiently to give good catches. More recently some thousands of the marine worm *Nereis* were transported from the Sea of Azov to the Caspian Sea, where they have now spread over 11,500 square miles, so providing staple food for sturgeon and other fishes. In these ways the productivity of both fresh and salt waters is being enhanced.

Minor Power Stations

Besides these major hydro-electric schemes, thousands of small plants are appearing all over the country. We were told that electrical installations can be obtained by a village or district that would like to exploit a local stream. The construction of the dam and the setting up of the station has to be done by local effort, and the district is responsible both for the maintenance of the plant and for decisions as to the

use of the power produced. In one sense these small units are comparatively uneconomic, but we were told that they are most valuable as a general method of education. New skills are introduced to remote regions, and the possibilities dependent upon electric power are brought home to the people, who must nevertheless become educated and skilled in order to obtain the new benefits.

The Turkmenian Canal

Between the high plateaux and mountains of China and Mongolia to the east and the Volga to the west extend the lowlands of Central Asia with their scanty rivers, which either disappear into the sand, or feed the inland Aral and Caspian seas from which their waters evaporate. Two large rivers flow into the Aral Sea. The Syr Darya collects its waters from the western parts of the Tien Shan mountains, and after traversing 1,500 miles, 850 miles of which are navigable, empties into the north-eastern corner of the Aral Sea, its tributaries watering Tashkent *en route*. The Syr Darya has been called the "Nile of Turkestan", and carries 3.5 cubic miles of water annually (about six times the flow of the Thames). The Amu Darya arises from the Pamirs to the south, and flows north-westward to the southern end of the Aral Sea. Its annual flow is 10.5 cubic miles. The Amu Darya is believed to have changed its course three times since A.D. 600. A branch of the Amu Darya, the Uzboi River, at one time separated off south of the Aral Sea, and traversed about 600 miles of the Turkmenian Plain to empty into the Caspian, forming a delta at Krasnovodsk (see end-paper map).

Archaeological evidence shows that in the third to fourth millennium B.C., Turkmenia supported a civilisation resembling that existing in the South Ukraine and North Crimea. Old irrigation channels have been found which formerly ran from this Uzboi River. With the disappearance of the river and the influx of sand, the Kara Kum desert replaced the earlier cultivation, and is now the largest and driest desert in Central Asia.

The average July temperature is 77° to 80°F., rising on some days to 112°. This region, together with parts of India, represent the largest Asian areas of great heat in summer, while the January temperatures are 16° to 32°F. Between the Amu and the Syr Darya rivers the Kyzyl Kum desert also shows the ruins of ancient cities, and here are valleys which were once flooded for rice.

Already in the eighteenth century the Russians were considering the deflection of the Amu Darya once more towards the Caspian Sea. In the summer of 1950 a decree was issued for the irrigation of Turkmenia, and work is now in progress on the building of the main

Turkmenian Canal which will link the Amu Darya River with the Caspian Sea.

By 1957 a main canal, 683 miles long, will run to Krasnovodsk, its middle section utilising the old bed of the Uzboi River; and 746 miles of branch canals are to be completed, together with three main hydro-electric stations, one near Takhia Tash on the left bank of the Amu Darya and the others along the canal. Their aggregate capacity will be 100,000 kilowatts, and the area to be irrigated is about 20,501,000 acres, an area larger than Scotland. Of this, about 3,500,000 acres of hitherto uncultivated land will be irrigated for crops, and 17,000,000 acres of pasture land will be periodically flooded. The average daily flow of the main canal will be 6,500 million gallons (four times that of the Thames), but the canal at times will take nearly double that flow. All its water will be used for irrigation and none will pass on to the Caspian Sea. About 47½ per cent of the water of the Amu Darya is to be diverted.

The construction of such a canal through desert presents many problems. In the summer of 1951 an experimental scientific base was established in the desert, with its own railway line and feed canal to supply water for 300 scientists, for hydraulic machinery and for the local growing of crops. A large-scale photo-survey has been made from the air, besides ground surveying, to determine the most favourable position for the canal and for the location of natural building material. The middle sector of the main canal will utilise the old bed of the dried-up Uzboi River, and the eastern sector of the canal will by-pass the Sarikamish depression, which would take twenty years to fill with water. The whole of the Kara Kum desert region is being studied intensively by scientists drawn from all over the Soviet Union, from Tashkent and Ashkhabad as well as from Moscow. Much survey work has still to be done, and equipment for drilling and other purposes supplies small expeditions of about fourteen workers. They are determining the subsoil water levels, the salinity of this water and the rates of seepage. Building materials and machines are arriving near Takhia Tash, the new landing place on the Amu Darya, where a town is being founded, and equipment for the other end of the canal is accumulating at the seaport of Krasnovodsk.

A major problem concerns preventing seepage through the bed of the canal. This may lead to excessive water loss, but also to the raising of saline subsoil waters to a level which would interfere with the growth of cotton and other crops to be planted near the canal. The lining of such a canal with concrete or asphalt throughout would be too expensive, and clay is to be used for packing and for introduction with the water, which is anticipated will prevent such seepage.

Not only are there the engineering problems in the construction of such a canal, but there are those of maintenance. The silt content of the canal water will probably reach 20 to 25 million tons, and deposition of silt will need continuous control by electric suction machines and dredgers. The intense rate of evaporation of water means that a very large volume of water must pour into the canal. In Lake Sevan in Armenia it is estimated that only 5 per cent of the water draining into the lake ever leaves it by the river. Such a rate of evaporation may tend to make the canal water saline. Then blown sand must be prevented from choking the canal.

The problem of silt is being tackled on a large scale by the All-Union Scientific Research Institute for Hydro-technique and Amelioration. It has devised a floating installation to keep water clean in irrigation channels. A system of stream directing shields allows only pure water to enter a canal. An installation of this type has been set up in one of the largest of the canals in Uzbekistan, and in one year it retained 560,000 cubic yards of silt. The cost of cleaning out the canal was reduced to one-tenth of its previous figure.

Problems connected with salt affect much of the desert republics of Central Asia, deposits being left as their scanty waters evaporate. In the Uzboi river-bed, for example, the deposits are 5 to 10 feet thick in parts. Scientific work is now in progress with a view to making recommendations for the prevention of the main Turkmenian Canal from becoming salt.

The movement of sand is being attacked in several ways. The planting of the first forest belts along the main canal will start in 1952, and all irrigated land will be similarly sheltered against winds, which at times reach hurricane force. Trees are to be planted over a 1½ million acres, but unlike the steppe forests, they must be irrigated. Oak is of course unsuitable for a hot desert, and in 1951 the Ministry of Forestry started collecting seeds of saksaul for planting. The black saksaul and poplar grow well under these conditions, and white acacia, apricot and mulberry will be extensively used.

The surface of the sand can be immobilised by spraying with a by-product from industry, which does not appear to be harmful to plants and can be readily perforated by their growth and by rain. It is planned to treat large sandy areas in this way, and not only prevent the sand blowing into the canal, but stop reclaimed land being smothered once more by sand. The difficulties raised by sand storms are also the subjects of much scientific research at the moment.

Then arises problems, both in Turkmenia and elsewhere, as how best to use the land which will be watered. This depends on the nature of

the soil and on the manner in which the water can be supplied. Large areas flanking the Uzboi will be flooded for periods of one to three months, and will support Karakul sheep and horses. Workers from the Byelorussian Institute for the Amelioration of Water and Marshes Economy are engaged on these problems, and have established which plants can most suitably be grown on such meadows to provide fodder for livestock. The work of the many biological expeditions in the Kara Kum deserts and elsewhere is considered in the next chapter.

In the neighbourhood of the lower Amu Darya 2 million acres of rich land will be irrigated and another million on the South Caspian flats. It is anticipated that after 1957 two crops of wheat a year will be harvested, and rice, cotton, olives, dates, grapes and other fruit and plants producing rubber and essential oils, will be raised. A decrease in the level of the Aral Sea will follow the diversion of so much water into the Turkmenian Canal. The consequent reduction of subsoil water-level in the delta of the Amu Darya will provide additional areas of rich arable land.

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All the schemes to be completed within the next few years will irrigate some 70 million acres of land against the present figure of 16 million acres. Within twenty years the figure is expected to be 84 million acres. The total amount of irrigated land in the whole world is now about 220 million acres. The yield of cotton, grain and cattle of the U.S.S.R. is expected to be increased four to five times. At the present time the Soviet Union holds second place among the nations in hydro-electric power, but in five years she will hold first place.

The Turkmenian Canal will link the Aral Sea with the open oceans, and Moscow will receive vessels direct from Central Asia as well as from the Baltic, the Arctic, the Black and Caspian seas.

Labour

We made inquiries concerning the labour needed to implement these tremendous constructional schemes. Seventy thousand men started work on the new railway to supply the Turkmenian Canal, and a total of 200,000 workers are needed for the next five years. Enough has been said to indicate how a labour force of that order can carry out such gigantic tasks in a few years when equipped with the type of machinery described. The construction of the Boulder Dam in America has occupied thirty years, although it is smaller than the Stalingrad project, and twenty years have already been expended upon the Grand Coulee scheme, which is not yet completed.

The conditions under which the workers live were inquired into in detail, and all that I was told by authoritative persons was corroborated by others with whom I spoke. On some sites the workers live in permanent flats and houses which have already been built. The workers' health is a prime consideration, and the U.S.S.R. Academy of Medical Sciences has sent parties of experts to all the construction sites, and has organised measures for the protection of the health of the workers on the great projects. Of the first 70,000 persons to start work in Turkmenia, 1,200 were medical workers who organised a regular hospital service. A big sanatorium is being opened for the workers on the Kuibyshev station, and every conceivable measure is being taken to safeguard health; these measures differ greatly according to the climatic conditions in the various regions.

Cultural and educational needs are also met. Entertainments of all kinds, cinema, theatre, acrobats and music are provided as well as lecturers. We had seen how all these things are done amid the ruins in Stalingrad, and I have no reason to doubt the statements made by persons who had been on various construction sites about matters which we all came to realise are typical Soviet ways of doing things, and which are practised everywhere (see Fig. 17).

We were told that no difficulty was experienced in obtaining the necessary labour force by volunteers. Hundreds of persons going to the sites learn new trades and skills. Many young people apply for two years' work on the construction sites before they settle down to more permanent employment. As a scientist who has worked on expeditions in distant parts, I know full well how easy it is to find volunteers for such work; in fact, many more would like to go than can be taken. It is the same in the Soviet Union with their own scientific expeditions, and it is the same with labour. Enormous publicity has been given to their projects, and, as with their industrial and other concerns, the sense of ownership gives an enthusiasm which, as said before, needs to be seen to be appreciated. There is an intense desire to advance their country, and great scope is given by these projects for initiative and skill. Ambitious workers are attracted, persons who enjoy seeing distant parts volunteer, and doubtless others whose housing problems are awaiting solution. The projects progress rapidly, and the workers soon see the fruits of their labours.

Nowhere did we see any evidence of forced labour being employed, a subject which will be referred to again later.

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The great Soviet construction schemes, aspects of which were

continually encountered throughout our visit, are unprecedented in the history of the world, both as regards their speed of execution, the scale on which the projects are planned, and their national importance. The cost in money and materials must be equally spectacular, and this tremendous burden is being carried at the same time as the widespread rebuilding of towns in the manner already described. It was not infrequently pointed out to us that national resources are not infinite, and that expenditure of this order is evidence of peaceful intentions. Further, the new sources of power will be used in great measure for the economic development of the land. The plans and their execution are designed for the peaceful needs of the people, to give the anticipated abundance of everything needful. Vast irrigation systems are clearly plans for peace and not for war, and lands so developed become not only more productive but more vulnerable to hostile intent.

Long-term Projects

The immediate projects which have been described will deflect on to the land a great deal of water which has hitherto flowed into the Aral and Caspian seas, and moisture will be retained in the damper atmosphere over the areas where the climate will be changed. The level of these seas will fall, and by 1970 their salinity will appreciably increase if nothing more is done. Such changes in the salinity are likely to affect the fauna. It has recently been shown by British scientists that differences in sea water too small to be detected by chemists control the occurrence of breeding of many marine animals along our south-western coasts.

Even if the waters of the Amu Darya and Syr Darya rivers were fully utilised, they would be insufficient to irrigate the whole of the Central Asian regions which need water. Near the main Turkmenian Canal alone, 17 million acres are to be watered, but 37 million acres of good land could be irrigated if more water was available.

The volume of river water flowing northward into the Arctic Sea from Siberia is enormously greater than all the rivers of western Russia. The annual flow on the Ob and Yenisei is about 226 cubic miles (that of the Volga and Thames being 64 and 0.6 cubic miles) and the easterly rivers carry more still. If the waters from the Ob and Yenisei were put into railway tanks they would make a train which would extend five times the distance between the earth and the moon.

The long-term projects of the Soviet Union propose to deflect some of the head waters of the Siberian rivers towards the west, cutting them off from the Arctic, and draining them into the inland seas. The Kazalinsk and Ural steppes and deserts as far as the Ural River to the

west could be watered, and dried-up river-beds in Kazakhstan could once more be filled. There would be water in plenty for irrigating Central Asia beyond the Ural mountains, the level of the Aral and Caspian seas could be maintained, and the Aral Sea would eventually be changed from a salt to a fresh sea.

The long- as well as the short-term projects are the subject of widespread discussion in the Soviet Union, and several aspects of the more distant projects were put before me during my visit. No final details have yet been decided upon, there being several alternative plans. One of these would be to build a dam 255 feet high on the River Ob at a point below the entry of the Irtysh. This would flood an area of 96,000 square miles, covering the upper reaches of the Ob, the Irtysh and the Tobol rivers, so forming the largest reservoir in the world. Its size would be greater than the area of Great Britain. This lake would extend to the Turgai plateau to the south-west. A canal 560 miles long could be cut through this high land, and thereafter comparatively little engineering would be required, and old river-beds through Kazakhstan could carry the water to the north-east shores of the Aral Sea. The Siberian waters would travel about 2,500 miles to the deserts, 1,200 miles of the route would pass through lakes, reservoirs and inland seas, 600 miles through channels of ancient rivers, and 780 miles through canals. Then another canal about 56 miles long could put the Yenisei into communication with the Ob reservoir.

The effects of such a plan would be to divert something like 72 cubic miles of water annually, which would make possible the irrigation of some 62 million acres of land for crops and 87 million acres for pasture. The climate of West Siberia and Kazakhstan would be changed, and a landscape such as described earlier for Aktyubinsk need no longer exist. The atmosphere would become more humid and the temperatures less extreme, and the milder winters would allow agriculture to be carried out farther north than is at present possible. Central Asia would grow more cotton, citrus fruit, rubber-bearing plants, rice, sugar-beet, grapes and cereals. Lifeless deserts could become abundantly fertile, and a modern civilisation could inhabit the sites of ancient communities, abandoned when the water supplies disappeared. Inland waterways for navigation could spread far. The Arctic Kara Sea could be put into communication with Moscow via the Ob River, and then by the Aral and Caspian seas, and further developments on the Yenisei could link up Lake Baikal. Hydro-electric power would be all but unlimited. The Central Asian states could support a population of 120 instead of the present 20 millions.

CHAPTER VIII

BIOLOGICAL RESEARCH AND EDUCATION

ASSOCIATED with the construction projects outlined in the previous chapter is a great body of scientific work of many kinds, much of which has been undertaken specifically for these schemes. The All-Union Academy of Sciences has set up a special commission to co-ordinate the work on the hydro-electric projects. Technical suggestions are received from all quarters and the data collected by scientific expeditions to the construction areas are centralised. Technical and popular literature is prepared both for those engaged on the work and for the general public. Maps of many kinds are made. Committees have been set up to deal with various aspects of the work in conjunction with the various academies of sciences in the several Union republics. The scientific work is in fact planned in detail on a large scale.

Particular tasks are delegated to certain places. For example, in Moscow a special Research Institute for hydro-electric power has been set up containing thirteen large laboratories. Latvia is making a study of alloys and the protection of waters from pollution and metals from corrosion. The designing of machines for mechanised navvying is being pursued in Byelorussia, while ceramics and new binding materials are being studied in Estonia.

Among the most important tasks before the scientists is the determination of existing climatic conditions in the construction areas, and to forecast the changes which will result from the irrigation and afforestation work. For this end many expeditions have been collecting data, and meteorological stations have been established at many places in the Caspian lowlands, in the Turkmenian desert and elsewhere. Weather experts are trying to assess the potential changes in climate, and there is much discussion as to exactly what will happen as a result of the next few years construction programme. The problem is a difficult one.

In the Caspian lowlands drought and dry winds are the deterrents to agriculture. Investigations are in progress towards discovering the origin of these winds, and this involves a study of all factors which determine the temperature, humidity and movements of the air near the ground. Detailed study is being made on the gradual heating of

the air circulating over the Caspian region, and of the increase of its drying properties. Then the probable effect of evaporation from the huge new lakes is being calculated with a view to discovering how much humidity it may add to the atmosphere, and to what extent the climate will thereby be softened. A problem of great importance is to forecast the conditions in the great reservoirs and to calculate the future water balance in the Aral and Caspian seas. A reduction in the level of these seas is welcomed up to a point, and the long-term projects concerning the Siberian rivers must be correlated with the effects of the immediate schemes.

The soil is being studied with vigour, both to survey its nature and to study the probable effects of alterations in subsoil water-levels, which will be more extensive than the direct effects of flooding or irrigation. Those engaged on the soil survey are making maps, studying and classifying soils, and experiments are in progress towards establishing techniques for the bettering of soils. Mention has previously been made of a method for consolidation of dry sandy surfaces, and others are being tried out for improving the agricultural usefulness of soils which crack into slabs during the dry season and give rise to impassable swamps in the wet season.

Agricultural problems are many. Some concern fodder crops which can be grown on land to be intermittently flooded for long periods, and agronomists are selecting the most suitable perennial grasses for these meadows. Methods are also being devised for improving the surface of such meadows. Work is always being done on finding or creating the most suitable plants or varieties which will give high yields in particular localities, and sand fixing vegetation suitable to the several climates and conditions where it is required is being studied and tried out.

Sandstorms from time to time cause great damage in deserts, and a modern laboratory has been established to study means of combating them. The work is being conducted by the Turkmenian branch of the Academy of Sciences of the U.S.S.R., and is situated at Ashkhabad in the south-western part of Turkmenia.

In association with the great projects, large numbers of scientists of all kinds, archaeologists and others have been employed on expeditions covering the areas to be affected. Since immense tracts of land are to be flooded, all possible knowledge is being collected before the sites disappear beyond recall. Archaeologists have made surveys from aeroplanes besides on the ground. Palaeontologists are on the look-out for fossils at the sites of excavations.

Desert Bases and Expeditions

Besides the main scientific base set up in the Kara Kalpak desert, to which reference has been made in the last chapter, numerous expeditions composed of zoologists or botanists, or mixed parties of biologists and others have been at work in the field. One of the reasons why I found so few zoologists in Moscow and only a limited number in their laboratories in Tashkent, was that they were participating in the twenty-two expeditions which have been at work in the Kara Kum desert region in the summer of 1951. A party of zoologists from the Turkmenian Academy of Sciences has travelled about 2,500 miles in the southern part of the Turkmenian Canal region in the valleys of the Atrek, Sumbar and Chandir rivers. The biological parties usually number from twelve to twenty persons. I discussed this work with zoologists in Tashkent who had been away on expeditions in the summer of 1951.

The biological work is mobile, but several semi-permanent desert stations have been set up, besides the small laboratories on the Caspian and Aral seas, and photographs of these were shown to me. The compilation of local faunas and floras is going ahead in Central Asia as well as elsewhere in the Soviet Union, and monographs are produced when sections of the work are completed. Efforts are made to obtain all varieties of animals and plants from the wild which may be turned to economic use, and a special study is being made of varieties existing naturally under difficult conditions. Seeds of plants wanted for particular purposes are being collected. The finding in 1930 and 1931 of two plants *Scorzonera tau-saghys* and *Taraxacum kok-saghys*, the latter closely related to our dandelion, in the Tien Shan indicates the usefulness of such surveys. These plants today provide commercial crops of rubber.

Ecological studies are stressed. The conditions under which the organisms live are considered in detail, and ecological surveys of oases and areas of special interest are carried out. Detailed studies of soils are made to determine their natural and biological significance.

A very large field is that of ascertaining the normal pests of trees and shrubs about to be planted in large numbers, particularly in the deserts, so that measures may be taken in time to prevent wholesale destruction by pests which may multiply inordinantly as a result of the altered balance of nature. Both insects and rodents are being worked on from this aspect, and possible damage to pastures as well as to drier places is being studied.

Predators and parasites of domestic or potentially domestic animals

are being investigated, and every opportunity is being taken to follow out the complex life-cycles of flatworm and other parasites which utilise two or more hosts. For this the mollusc fauna becomes of importance, and the determination of species and habits is being accomplished. Then the work associated with insect vectors of diseases of all kinds is as important here as in other warm countries, and employs many persons. Fly problems are numerous.

My impression of this work was that its basis was very broad, that the personnel was competent, and that the scale on which it is being carried out will not only give the immediate information needed for the economic development of Central Asia, but will greatly increase biological knowledge in general. I inquired if camels were used for transport and learned that this animal is becoming comparatively rare, being used only in difficult country.

Research Workers

From what has been said of the scale and speed of the Soviet construction programme, and the magnitude of the scientific investigations, and indeed from the whole planned economy, it is clear that there is a need for enormous numbers of highly skilled workers, engineers, technicians, scientists and educated persons in general. Exceptional ability in any community is only forthcoming in a small proportion of the population; it cannot be created by additional education or training. Very widespread opportunities of education will ensure that all exceptionally able persons will be suitably trained. It is the aim of the Soviet régime to provide equal opportunities to all, and we saw for ourselves the similarity in the facilities now present in Tashkent and in Moscow. There is no question of a master race with a favoured education and prospects. The system developed in backward states is being implemented by the several nationalities themselves, most of the posts concerned with teaching and research being filled by persons belonging to the local race, and not by Russians.

There are now in the Soviet Union 33 universities and 880 other institutes for higher education, catering for 1,200,000 students. Medical, engineering and agricultural institutes rank equally with the universities which cater for science, mathematics, geography and the humanities. The university courses cover from four to five years for students aged eighteen to twenty-three. We were told that in 1951 there were 6,000 professors and 25,000 assistant professors.

The school system is that already described for Uzbekistan, and, as with the university and technical training, the system is rapidly expanding. Ten-year schools for children between the ages of seven

and seventeen are usual in all the larger and older centres, and in many country districts. In some country districts the schools occupy the children only until the age of fourteen, but ten-year schools are due to be opened everywhere when enough teachers are available. Schools for the three- to seven-year-olds are also provided. Education from the age of seven to fourteen is compulsory and free. Success in an examination is necessary to secure the following three years' schooling, and for this fees of the order of 2 to 3 per cent of the cost of education are charged in most cases. The purpose of the introduction of fees was to cause people to take secondary education more seriously, and to secure an improvement in standards of work, and we were told that this had been achieved.

University Students

In September 1951 about 260,000 new students were expected to pass the university entrance examinations from the schools. A prize-winning school record carries with it exemption from the entrance tests. Candidates must pass in three or four school subjects, and Russian and one other language are compulsory. There is competition for entry into certain institutes. The old university in Moscow could only take 2,500 of the 7,000 applicants, but with the new building which will function in 1952 the intake will be 5,000 students a year. Students passing the entrance examination but failing to obtain a place, automatically gain entry into a provincial centre.

All students are paid a grant by the State, the amount they receive depending upon their course of study, their geographical position and the progress of their work. A small fee, amounting to about 10 per cent of the grant, must be paid for university training, a sum which can be easily earned in a vacation. First-year students receive 200 to 350 roubles a month, and without parental help may have to spend with great care. In the second year the grant rises to 300 to 500 roubles a month. Good marks in examinations carry an increase of up to 25 per cent of the grant, and about 10 to 12 per cent of students attain this. Very bad marks result in the cutting off of the grant, and the student is still liable for the fees. The very best students are exempted from all fees, as are war orphans, and those students who have parents working in the same institute pay only half the fees. Income tax at 4 to 6 per cent of the grant must be paid by students. An initial grant of 200 roubles a month is not considered to be full subsistence, but only aid. However, students' requirements cost little; for example, hostel accommodation costs but 15 roubles a month, excluding food, and this can be obtained cheaply at canteens.

In study, as in industry, personal proficiency and effort receive their monetary reward, and the liability to income tax and fees provides a sense of responsibility. Slight failures in examinations mean that the test can be taken again after further work, but if the failure relates to several papers the student is sent down, and may then proceed to a technical college or to a lower grade of occupation.

All students belong to trade unions and to sports and other organisations. Five or six students, freely elected, sit on a university council along with about twenty professors who serve automatically according to status.

Examinations are largely oral, with practical tests in scientific subjects. It is claimed that a more searching, and incidentally a quicker test, can be made by this system. Certainly the labour involved in correcting written examination papers is very great. The two systems must select for somewhat different qualities. The readiness with which children and young people expressed themselves impressed us, but whether they can put their ideas on paper equally well, I had no opportunity of judging. In the final examinations about 1 per cent of the students fail, and about 3 to 5 per cent drop out of the university courses at earlier stages—figures not unlike those existing in universities in which I have worked in this country.

The syllabuses for courses of study and State examinations are controlled by the Ministry of Higher Education, which is divided into departments to deal with the several subjects. Text-books are published by the Ministry, and recommendations are made as to the choice of books to be used, but there is no compulsory use of any books. Text-books are also produced independently, the manuscripts being sent direct to publishing houses. The modern text-books are very varied and up to date. They are either home-produced or translations of authoritative works in other languages. For example, Professor Ernest Baldwin's text-book *Dynamic Aspects of Biochemistry* published in this country in 1947 has already been translated and published in the U.S.S.R., as has Professor Waddington's *Organisers and Genes*, published in 1940.

Posts are guaranteed to all students after graduation, and they choose from what is available. Further, the heads of mining concerns, medical directors and other employers may attend the final examinations and make their offers to particular students. An employer is obliged to find a flat for the worker, hence the large amount of accommodation which has been built by industrial concerns. It is expected that in 1951 300,000 graduates will be placed in posts. Fifty per cent of the students study the humanities or take teachers' training courses.

Scientific Research

Scientific research in the U.S.S.R., as in this country, is carried on in universities and in special research institutes. We were told that 50 per cent of this work takes place in university laboratories, and that the choice of subject there is entirely free. Members of the teaching staff are expected to spend half of their time on research. In the research institutes the work is directed both within the plan for each institute and in co-ordination with national needs, and the planning of research is very highly integrated, as was explained to us by the biological secretary of the Academy of Sciences. Money is not spared where the planned research is considered to be a priority.

About 20,000 post-graduate students, we were told, were now working for the "candidate" degree, corresponding in science to our Ph.D. The period of work is three years, and leave of absence from various posts is given for such work. The higher Doctor of Science degree must be preceded by the candidature, but the research work is of unspecified duration. Post-graduate students work both in university departments and in research institutes.

We inquired if the standards of education were uniform in all schools and universities, knowing full well the difficulties which lie before such an aim. We were told that the standards were as even as was possible, and that uniformity was assisted by the exchange of teachers and examiners.

A system of centrally planned courses to be given in establishments situated in widely different places clearly has its disadvantages, but this is doubtless the quickest way in which to obtain a reasonably uniform standard over a rapidly expanding educational system. A common standard for degrees which are conferred by every university is considered to be of major importance, and where some universities lie in regions with backward or little past education, such a system will eliminate any inferiority appertaining to qualifications gained in centres far distant from the older universities.

That individuality among parallel institutions is welcomed is shown by the several specialised lines which are already being taken up by the many bacteriological institutes in Moscow.

Our visit to Tashkent provided an opportunity of seeing some research laboratories from a remote region which was until recently backward in education, as described in a previous chapter. Unfortunately, all schools and universities were closed for the long vacation both in Moscow and Tashkent at the time of my visit.

Scientific Research in Central Asia

In Tashkent I visited the Uzbek Academy of Sciences, founded in 1943 in integration with the State University of Tashkent. A large gathering of Uzbek scientists greeted us in a spacious building with many large meeting-rooms and offices. The academy integrates the activities of twenty-three research institutes, many of which are housed each in its own building situated in various parts of the town and irrigated suburbs.

The research of each institute is planned in accordance with definite principles and needs. The institutes are co-ordinated into four groups: (1) the humanities; (2) agricultural and biological sciences; (3) physical and chemical sciences and mathematics; (4) geological and mining sciences, technology and power.

Scientific research is planned with the aim of stimulating the development of purely scientific problems, and of encouraging and developing the productive forces of the Uzbek Republic and the general cultural achievements of the community. Scientists have spent many years considering the productive potentiality of certain districts, and the work of many departments has been drawn upon in putting into practice scientific developmental schemes of an economic nature. The research institutes receive questions and problems from ministers of the State, from agricultural enterprises, etc., and are responsible for the research necessary for the solution of these problems.

At present the scientific research work of the Central Asian republics is dominated to a large extent by the needs of the rapidly growing economic projects, the biological problems of which need immediate attention. The scale on which research is being carried out in Central Asia by the Uzbeks themselves surprised me. A visit to the Zoological Institute of the Tashkent Academy of Sciences, for example, disclosed a large modern building of several stories surrounded by luxuriant grounds. In Tashkent alone work sixty trained research zoologists who are not concerned with teaching. Many of them greeted me, some twelve were absent on expeditions, and of those present, half were women. Here, as elsewhere in the Soviet Union, there is complete equality between the sexes, and outstanding scientists and doctors number both men and women in Uzbekistan, in contrast to the earlier traditions of this region.

In the Zoological Institute work specialists of all kinds on problems of entomology, vertebrate physiology, parasitology, soil protozoology, animal breeding, ecology, etc. The laboratory facilities are adequate for the work in progress, and no difficulty is experienced in obtaining

apparatus. The individual research rooms are well laid out, and within the building there is a biochemical laboratory, a darkroom with photo-micrographical apparatus, etc., for those who need them, and plenty of room for the installation of specialist requirements.

Large numbers of cultures of soil micro-organisms were being maintained; analyses of soil brought back by the expeditions was in progress. Platyhelminth parasites were occupying several workers, and numbers of mollusca were being examined for the larval stages of these worms. The gad-fly problem, I was told, had already been satisfactorily solved. At present no work in pure cytology or embryology is in progress, ecological and physiological problems receiving most attention.

The results of the scientific work completed both by expeditions and in the laboratories of the Uzbek people are being published in their own language in scientific journals and monographs.

Research Institutes in Moscow

In and around Moscow we visited laboratories and field stations concerned mainly with biological and botanical work. Except for agronomists, botanists and plant physiologists, most biologists were on holiday or participating in the numerous expeditions. Some zoologists and palaeontologists broke into their holidays especially to meet me, and I was most grateful and appreciative of the efforts that were made to show me as much as possible in the time at my disposal. Nothing was too much trouble: Soviet scientists gave their time freely, described the research work in progress, answered questions, showed us their laboratories and experiments, and discussed at length a number of specialist questions in which we were interested. We were received by the directors and heads of departments and members of the staffs in the Institutes of Genetics, Microbiology, Plant Physiology and Biochemistry and at the field station at Gorki Leninskiye of the Lenin Academy of Agricultural Sciences. The Palaeontological Museum was opened specially for me and four members of the staff greeted me.

Palaeontology

The Palaeontological Museum in Moscow possesses a wealth of fossil material of vertebrate animals, particularly reptiles, which is unique. It is to be regretted that the present restriction of entry into the Soviet Union prevent palaeontologists from other countries visiting this collection for the purpose of study. Very few have been able to do so since the war. Much of the materials forms an indispensable link between fossils collected from several other parts of the world, notably

America and South Africa. The collection of mounted skeletons of the mammal-like reptiles, which are preserved in most life-like attitudes, is unrivalled, and many outstanding palaeontologists who have had access to material in museums in other parts of the world would welcome an opportunity to work here.

I was shown something of the wealth of the material brought back in 1946 by an expedition to the Permian deposits of Mongolia, the working out of which will take the staff of the museum and others many years. Particularly striking was the skeleton of a large bipedal dinosaur *Saurolophus* standing about ten feet high with deep crowned, ridged teeth reminiscent of those of a horse. Several skulls about two feet in length of the huge carnivorous monster *Tyrannosaurus* had just been cleaned from the matrix and were in very good condition. The tail region of *Ankylosauria*, a reptile with a large expansion at the end of the tail, showed ossified tendons alongside the vertebrae, doubtless providing the owner with strength to deliver a mighty swipe with the tail.

Biology

In the Plant Physiological Laboratory in the Academy of Sciences, a laboratory filled to capacity with various types of apparatus, we saw many different lines of work in progress. Factors controlling flowering are being studied from several angles, here and in other laboratories in the Soviet Union, as well as in England, Germany and the U.S.A. Experiments were shown to us concerning the effects of the duration and of the type of illumination on the balance of photo-synthetic products. Other experiments are concerned with problems of manuring and plant nutrition (including bacterial manuring, from which positive results have been obtained with certain crops). The problem of drought-, heat- and frost-resistance is being studied in a fundamental way in relation to the properties of the cell protoplasm. Practical pre-sowing treatments for increasing the resistance of plants to these factors are being tested on field plots. All this work is closely linked with Lysenko's phasic theory of development.

The agricultural requirements of the Soviet Union are a primary need, and biological science is applied to them on a very large scale. Varieties of animals and plants of economic interest are needed which are suited to different soils and climatic conditions, both for improvement in the utilisation of land already under cultivation, and for the new areas to be irrigated by the construction projects outlined in the previous chapter.

Large-scale expenditure of public money in the Soviet Union has been devoted to the promotion of methods which are believed to have

been the most successful over twenty years of trial. Besides the older research institutes, seventy-two State selection stations, each usually possessing 4,000 to 5,000 acres of land, have been established for the production of new varieties, for the study of improved cultural methods, and for the growing of sufficient seed of suitable varieties for use on the farms.

In advancing this type of work, which is basically concerned with the production of new varieties, contact has been made with many fundamental concepts of biology, and facts have been found which appear to conflict with existing theories. New conceptions concerning heredity, variation and the function of fertilisation have been developed on the basis of work carried out over a number of years. The full significance of these views is not at first easy to grasp.

The genetical work in the U.S.S.R. stresses the dynamic relationship which exists between an organism and its environment. The success claimed by Soviet biologists in changing heredity by environmental influences has led to Michurinist theory which has had big effects on the practice of Soviet seed production. Soviet biologists believe that the property of hereditary transmission is not limited to germ cells, but is possessed by all parts of an organism, and is essentially an aspect of metabolism, and further, that heredity is not separable from the environment and its effects. The requirements of an organism at different phases of its life-cycle link development with heredity.

In a talk with Professor Nuzhdin at the Institute of Genetics of the Academy of Sciences, he emphasised four points: (1) Soviet scientists do not deny any established facts discovered by Mendelians, but only the explanation of these facts in terms of genes; (2) they have found new facts which in their opinion the gene theory does not cover, whilst that of Michurinism does; (3) the new facts are not "invented" as some seem to think; if Soviet scientists invented facts they would soon be found out in the practice of collective farming; (4) they do not reject any methods on principle; thus although they think that work on colchicine-induced tetraploidy is unlikely to be fruitful, they are even now testing and putting into production a colchicine-induced tetraploid of kok-saghyss.

A moral may perhaps be drawn from the coral-reef problem of the last century. Four very different theories were put forward to explain the formation of coral reefs as they are seen today. Adherents of one theory automatically disbelieved the others. We now know that coral reefs of closely similar form have arisen in the past by widely different means, and that there is truth in all the conflicting theories, which are

applicable, suitably modified, in whole or in part to particular reefs in different parts of the world. Genetical theories also are not static.

Soviet workers are as yet unable to give any detailed explanation of their new facts, or of the orthodox Mendelian ratios which they, as well as others, obtain, although they endeavour to do so in general terms. Their essentially physiological outlook, once it is grasped, is very far-reaching and stimulating.

The history and political background of the genetics controversy in the U.S.S.R. has been presented by Dr. A. G. Morton in *Soviet Genetics* (1951). The situation cannot be properly understood without this historical background. One may deplore the mixing up of scientific fact and theory with politics and certain types of philosophy, but the close application of science to all branches of the development of resources in the Soviet Union accounts for this trend. It may also account for the manner in which Soviet biologists describe biological theories as "reactionary" and therefore to be avoided, but it does not excuse the way in which sweeping statements are made about matters which are not approved of. The polemical style of Soviet writing is repugnant to the "West", where it will be tolerated in politics but not in science. Soviet scientific literature sometimes gives the impression that there may be too much reliance upon the writings of eminent men long dead, and detailed descriptions of logically executed experiments are sometimes not easy to find.

However, the workers in the institutes which I visited were evidently most sincere in their work and in their assertions as to the facts that they think they have discovered. There is no question of their results being purposely "cooked" with the object to deceive; the work which I saw in progress was being done with the utmost care. The object of their work is usually the production of particular varieties, not the establishment of scientific truths, but the amount of work in progress is so great that although it is predominantly of an economic nature, the actual bulk of pure science is considerable. At the moment they are putting their main efforts into the lines which they think will produce the most rapid practical results, and the fact remains that they are producing the varieties of plants which they need. We discussed with them the widespread integration of the work of the practical farmer with that of the research institutes. New varieties are tried out on large plots on farms and there is a constant exchange of material and information.

Production of New Varieties

The biological work which we saw in progress in the Genetics Institute, at the field station of the Lenin Academy of Agricultural

Sciences, and elsewhere is concerned basically with the production of new varieties, but was also of fundamental interest to us. Work in the Institute of Genetics included study of inheritance in vegetative hybrids of tomatoes, in drosophila, in yeasts and other micro-organisms, in domestic animals, and cytological investigations concerning changed wheats, vegetative hybrids, etc. Examples illustrating the main methods which I saw being employed in the U.S.S.R. for obtaining new varieties will now be briefly reviewed, together with the reasons which the Soviet workers gave us for their disbelief in the gene theory of heredity.

Three methods are being used in obtaining new varieties: (1) alterations in the conditions of growth of the young organism up to the adult state; these alterations can at certain critical phases of development lead ultimately to heritable changes; (2) grafting between different varieties, or between different species of plants; graft hybrids, themselves usually unaltered, may in a small proportion of cases give rise to heritable variations; (3) sexual hybridisation. In the course of this work some novel observations have been made, and have led the Soviet workers to new genetical conceptions.

We saw the large scale on which various experiments are conducted, the care with which they are carried out, and the controls. Parallel cytological studies are being made in many cases; chromosomes as well as other morphological characters are considered and investigated. The workers on Michurinist lines are well aware of the details of genetical work published in their own and in other countries. They appear to appreciate fully the effects of accidental cross fertilisation, of impure stocks, and of the dangers of inadequate controls.

Alterations Induced by Cultural Conditions

We saw examples of the conversion of a winter wheat into a spring wheat. If a winter wheat is planted in the spring it will produce a short bushy grass with no ears, but if the grain is soaked and subjected to cold for a certain period before being planted in the spring, it will grow tall and ear properly. No heritable change is caused by this treatment. Each kind of plant needs certain precise conditions in order that vernalisation shall take place; the winter cereals need exposure for a certain minimum duration at a low temperature, while the spring cereals need a higher one. If, however, the seeds of a winter wheat are incompletely vernalised by exposure to cold during a shorter period, the exact time being determined by experiment, the plants will succeed in completing the process of vernalisation at a higher temperature after they are sown in the spring, and will then form ears very late

in the year. Seeds from these late ears when planted in the following spring *without* previous vernalisation treatment give plants which ear later than normal, but earlier than in the previous year, the next year the progeny ear earlier still, and in the third year the plants ear at the normal time after planting. The wheat has become transformed to a hard spring variety; it is stable, up to nine generations having so far been raised, and if planted in the autumn it is killed by winter exposure.

These results are obtained with no selection during the "training" period, and the method has been applied successfully to many kinds of grain. The plant is caused to complete its vernalisation under conditions of the desired type, i.e. spring temperature, its heredity is "shaken" by the metabolic disturbance involved in the process of difficult vernalisation, and a new heredity then supervenes with the continuance of the spring conditions. Conversely, it has been possible to produce varieties with greater resistance to cold of both cereals and cotton, initiated by changes in the environment.

Alterations in cultural conditions are used not only to create new heritable varieties, but to maintain existing ones. We saw the result of growing the heavily cropping Moscow potato in the Odessa region; it degenerates in four years to a plant producing a worthless tuber the size of a marble. If, however, the Moscow variety of potato is planted near Odessa in the summer instead of the spring, so that it forms its tubers later in the year when the temperature is lower, then the good cropping qualities are retained. The problem presented by growing potatoes in warm places was shown to be connected with temperature and sunlight and not with soil or virus disease. The methods now practised are of great economic importance not only to the Ukraine, but to all warm countries in which it is desirable to grow potatoes.

A method of overcoming the effects of inbreeding appears to lie in the same category. We were shown the annual deterioration of a high-cropping cereal when inbred for a number of generations in the same environmental conditions. A small shrunk ear of no commercial value is finally produced. The small seeds from the degenerate ear are sown separately in pots, and cuttings made from the spreading tillers of the young plants, and each cutting then grown in a separate pot. The ears of the separate cuttings are crossed with one another, and in the resulting plants the original cropping qualities are restored.

Grafting

Work on the second method of obtaining new varieties, that of grafting, is being done on a very large scale, and with many kinds of plants. The exact technical details are of great importance: grafts must

be made in particular ways at particular times in order to produce the results described, and different results arise through alterations in the technique. In the majority of grafts the stock and scion do not influence each other, and no hereditary or other variants are produced. Moreover, in the small percentage of cases where an effect is produced, it is not usually visible until the next generation is raised from seeds obtained from the fruits of the grafted plant, or even later.

Examples were shown to us from the work on tomatoes and on cabbages. A red-fruited variety of tomato, Fikaratsi, was grafted as a scion on to a stock of the yellow-fruited Golden Queen. From the stock only yellow fruits were obtained, but when the seeds of these fruits were sown, some yielded not only plants with yellow fruit but plants with red fruit and others with raspberry-coloured or with yellowish-red fruit. Subsequent generations continued to show segregation of all four colours, but the ratios differ in the descendants from each colour. No change of colour appeared in the fruits of hundreds of control plants. When the original two varieties of tomatoes are sexually crossed the red colour of the Fikaratsi fruit is dominant to the yellow of the Golden Queen, and segregation in the F_1 generation gives only plants with red- and yellow-coloured fruit in the ratio of 3 : 1 the raspberry and yellowish-red colours being absent. We saw fields of segregating tomatoes (the seed progeny of graft hybrids) both at the Lenin Academy of Agricultural Sciences' Field Station and at the Genetics Institute.

Another example of what Soviet biologists regard as a heritable change induced by the interaction of vegetative parts was illustrated to us by experiments on cabbage. The ordinary green cabbage and the red variety are each stable. A scion of green cabbage grafted on to a red stock gives a plant of regionally mixed colours. When the plant flowers in its second year a flower from a green shoot is fertilised with pollen from a green plant and the seeds collected and later sown. We saw the resulting seedlings, some of them were green and some showed red stems and dark leaves. It is inferred from this that some metabolic influence of the stock has altered the hereditary properties of the seeds produced by the green scion.

A number of remarkable experiments on the effects of grafting on the time of flowering (with and without vernalisation) were shown to us at Gorki Leninskiye. We saw, for example, a first-year cabbage grafted on to a species of mustard in its first year of growth, and the cabbage then flowers in its first year, presumably as a result of the influence of this stock. The seeds of this cabbage when sown were said to give rise to plants which again flower in the first year and an

annual flowering cabbage had been produced. Graft hybridisation is being used as a general tool to change varieties, and also as a means of making crosses which are difficult to achieve by sexual means.

Sexual Hybridisation

The third method of obtaining new heritable varieties is that of hybridisation. The Soviet workers told us that many of their experiments show the ratios of segregants which are to be expected upon Mendelian principles, but that they do not believe in the usual genetical explanation of these results. With wheat, barley, sunflower and maize, 80 per cent of their intervarietal hybrids when naturally (not artificially) pollinated resemble the maternal plants, in contrast to vegetables which do not behave like this. Examples were shown to us from the experiments on rye, tomatoes and maize.

Two varieties of rye are used. The anthers of one variety are removed, and the plant is left in a field of the other variety for wind pollination to take place. The seeds are collected and planted, and the resulting progeny do not segregate. If, however, the castrated plant is artificially pollinated, then the progeny may segregate. The cytology of fertilisation is said to be normal. This work has been repeated in Austria and confirmed.

Experiments on double and triple pollination appear to show that paternal characters carried by two or three types of pollen under certain circumstances can be passed on to the ovum and inherited. The pollination must be carried out at very restricted times or the results described below are not obtained, and much experimental work has been done to determine the technique.

The Golden Peach variety of tomato was employed as the maternal plant, bearing recessive characters of growth form and fruit colour. Pollen was used from two other varieties, each possessing but one of the corresponding dominant characters. The maternal flowers were castrated and fertilised with both types of pollen, and isolated in parchment bags, and control crosses were made with each parental pollen alone. Fruit from all the control pollinations gave rise to plants possessing one dominant character only, while a few of the offspring from the double pollinations showed a combination of both dominant characters, indicating that both types of pollen had influenced these offspring.

Similar results were shown to us with maize. A variety with a large cob bearing white seeds was used as the maternal plant, and was triple pollinated by pollen from three other varieties, one with a small cob bearing small white seeds, one with yellow, and one with black seeds.

On the resulting cob some of the seeds were black. These black seeds were sown the next year, and their flowers fertilised by pollen from the large white-seeded variety. In a small proportion of the resulting cobs seeds were present which resembled all the parental varieties used in the experiment, and in addition there were seeds of intermediate colours. All these colour varieties of seeds we saw on the same cob.

In these experiments the chromosomes of the resulting plants appear to be normal diploid. Only one paternal nucleus can be concerned in nuclear fusion, yet characters appear to be transmitted by the other types of pollen. Soviet workers concluded from this, and from double pollinations of wheat, that some metabolic influence can be exerted by several types of pollen on a single ovum, an influence which is independent of nuclear fusion. Working further along these lines, they have shown that additional pollen, either of the same or of other varieties, has an effect upon the next generation. Their findings are of direct practical application; for example, extra pollination of sunflower, maize and lucerne tested on 2,000 acres resulted in increased yields of from 25 to 50 per cent. Soviet workers have shown that such increased yields are not due simply to an increase in the number of ova which are fertilised. The extra pollination results in larger seeds and a tendency towards a more vigorous progeny.

In conjunction with such experiments Soviet workers suggest that there must be much more to learn about the function of sperm. A great excess is needed in animals to effect successful fertilisation of eggs, but we know little of the function of the supernumerary sperm. In some animal eggs sperm are absorbed previous to fertilisation, as I have found in *Peripatopsis*. Soviet workers are on the look-out for metabolic influences by sperm upon the egg, and experiments on multiple insemination of fowls are in progress in an attempt to discover whether an animal egg can be influenced by sperm from more than one parent. If these lines of work are extended and confirmed, the recognised functions of sperm and pollen and of fertilisation in animals and plants will need reconsideration.

Hybridisation is employed not only to obtain new varieties but also to maintain existing ones. Intra-varietal crossing is the main method used to prevent self-pollinating plants, such as wheat, barley and peas, from deterioration. This method, elaborated in the Soviet Union, is now being increasingly applied in the U.S.A. An essential feature of the method is free wind pollination, not artificial pollination, and the occurrence of selective fertilisation by plants has been demonstrated.

Rejection of Gene Theory

The type of data to which the Soviet biologists called my attention as being inexplicable on the gene theory are four: (1) the occurrence of segregation in the offspring of vegetative hybrids, and the greater variety of segregants produced in this manner than by sexual hybridisation; (2) the failure of many sexual hybrids to segregate at all; (3) double and triple pollinations resulting in transmission of characters from all "parents"; examples of these types of experiments have been given; and (4) an experiment such as the following which we discussed with Soviet workers. An onion which normally produces its bulb high off the ground may sometimes give a flower, part of which is normal, and part is replaced by bulbils. If the bulbils and the seeds of the flower are both planted, the offspring are found to segregate in a similar manner in both cases, although a sexual process has occurred in the one and a rejuvenation without a sexual process in the other.

Species Transformation

Many facts of general interest have turned up in the course of experimental work. For example, an endeavour has been made to create a variety of wheat with a branched ear, which will therefore carry more grain. We saw a large experimental plot under sparrow netting bearing a wheat with uniformly very large ears, and many ears showed the branched character. Each plant had been grown separately in a pot from a single grain and planted out later. On many of these plants, however, a single shoot bore an ear of rye. Dried specimens and photographs of similar plants were available. The rye grain when sown, I was told, gave rise only to rye plants. The chromosomes were fourteen in number and typical of rye. Previously it had been supposed that rye growing in a wheat field originated from a mixture of the seed, although a farmers' saying in the hills of Armenia refers to wheat turning into rye under the difficult cultural conditions of this region. Wheat was said to bear oats in the same way.

Various conclusions concerning the origin of species are drawn from such findings by the Soviet workers. The transition from one species of cereal into another without passing through any intermediate stages suggests a possible origin of other species by large mutations, in contrast to theories of the origin of species by the cumulative effect of small changes. Soviet workers are attempting to find similar examples among animals.

From the large amount of work that has already been done on the origin of species in organisms, it is clear that speciation has occurred in

a variety of different ways in different types of animals and plants. Whether the views of Soviet workers on the origin of species prove to be more generally applicable or not, the fact remains that they have shown how wheat can give rise to rye. This sudden transmutation cannot be caused at will on any one plant, but it has turned up in the manner described.

Soviet workers have also shown how the hard wheat *Triticum durum* can give rise to *T. vulgare*. If *T. durum* is planted in the autumn, and the exposure to frost mitigated, the progeny, grown under these difficult conditions, in three years become very varied in type. In one such experiment, 150 plants out of 800 had the appearance of the soft *T. vulgare* and possessed the forty-two chromosomes characteristic of this species, while the majority of the plants still showed the twenty-eight chromosomes characteristic of *T. durum*. There were also single grains of *T. vulgare* to be found on the ears otherwise looking like *T. durum*; and one plant out of the 800 showed twenty-eight chromosomes in one part of the plant and forty-two chromosomes in the other part. Under the adverse conditions of winter sowing the Soviet workers suggest that a metabolic disturbance has taken place in *T. durum* which has caused a sudden change in some individuals of this species to become *T. vulgare*.

Animal Breeding

Little was seen of the work on animal breeding. A fine herd of Kostroma cattle originating in the Volga area was shown to us with pride. In appearance the animals were rather like Guernsey cattle, but larger. The best cow was yielding 35,560 lb. of milk per year, containing 4 per cent of fat, but the average for the herd was 12,100 lb. per year. The bull weighed 2,365 lb. At the School of Agriculture in Cambridge in 1950 the best milk record was 31,499 lb. and the best average herd record was 18,960 lb. in 305 days. Considerable attention is being given also to problems of artificial insemination, to transplantation of ova in mammals and to the breeding of poultry.

Cytology

A topic of general interest in the U.S.S.R. was the work of the Lepeschinskaya school concerning the claimed observation of the origin of cells from non-cellular organic material, but owing to the months of my visit it was not possible for me to see this work. Recently the claim had been demonstrated to a gathering of about 150 Soviet biologists and the matter now appears to be generally accepted as proven. The taking of a democratic vote seems to be a somewhat

unsuitable method of attempting to establish a scientific truth. Only a very few biologists who have actually made appropriate studies are in a position to be critical and appreciative of the difficulties and pitfalls.

Many of those who accepted this work had not considered the researches of Professor P. D. F. Murray, who long before the war made a detailed study of the origin of embryonic blood-cells, and his findings are incompatible with those claimed by Lepeschinskaya. From my own studies of invertebrate yolk in the embryos of Arthropoda, other possible interpretations of some of the observations occur to me. However, a problem of such importance should be subject to photographic proof which carries conviction in the published papers. Such proof is lacking. It may be forthcoming in the future, but in any case, whether the work is finally confirmed or not, it will have stimulated investigations into a large field of studies linking biology with biochemistry and biophysics.

The workers on plant material already think that they may find a similar genesis of cells from "living fluids", but they had no convincing proofs to offer.

The subjects of biological research which have been mentioned here are not exhaustive; they represent some of the work which I saw and discussed during my visit, and lines of work which I did not encounter have not been mentioned. Enough has been said to indicate the variety and the scale on which biological research is being pursued in the Soviet Union today. The vigour of this work, the newness in its outlook, and the originality in many of the lines of investigation, bear promise of the opening up of most stimulating and productive avenues of research. This service towards the advancement of science will remain, no matter if certain claims suffer future amendment.¹

¹ A popular account of many lines of Soviet biological investigations will be found in the English translation of *Land in Bloom* by V. Safanov, Foreign Languages Publishing House, Moscow, 1951.

CHAPTER IX

GENERAL SURVEY

THE preceding pages have been largely devoted to observations upon what exists or will shortly exist in the Soviet Union, associated for the most part with special localities or particular services. Important matters still remain. What freedoms exist for religion, speech and action? What can be said of personal security and liberty? How much direction or coercion is there from above? How do the people think? What is the outlook towards peace and war, both of the general population, and of the government? These questions were answered only in part by direct observations and conversations.

Religion

In Moscow we attended a weekday morning service in the Bogoyavlensky (Epiphany) Cathedral, where we had a conversation with the Dean while the service was in progress. The large congregation consisted mainly of middle-aged women, but persons of all ages and both sexes were present. The Dean thanked us for visiting his church, and expressed the earnest hope that our visit would promote understanding between the peoples of our country and of the U.S.S.R. and world peace. The delegation of Quakers who visited the U.S.S.R. at the same time as we did unexpectedly took part in an evening service in the Baptist Church in Moscow on a weekday, where they found a congregation of some 1,800 persons.

We had a most friendly audience with Metropolitan Nikolai, the Deputy Patriarch of the Russian Orthodox Church, in Moscow. He explained to us that now a happy relationship exists between Church and State, and again in Tashkent we noted the present freedom enjoyed by the Islamic religion. The earlier periods of strife and friction between Church and State concerning matters such as the establishment of schools is at an end.

Religion is not actively encouraged by the State, but religious observances are not hindered, and there is no social or other distinction of any kind between those who believe and those who do not. In the words of Metropolitan Nikolai to representatives of the Soviet Press, "The right of the Soviet citizen to follow any religion, or not to profess any, is ensured by the basic law of our country. The State does

not interfere in the internal affairs of the Church and grants every religious society the opportunity to exist without interference. In order best to ensure fulfilment of the law on the separation of the Church from the State, the Soviet government has set up, under the Council of Ministers of the U.S.S.R., the Council for the affairs of the Russian Orthodox Church and the Council for the affairs of Religious Cults."

The Church receives much from the State. All buildings of historic interest are restored and kept in order by public funds, and the preservation of church property has been as thorough as that of any other. But for the recent and timely restorations in Central Asia, many historic and religious buildings would have fallen into complete decay. Colleges for the training of priests and premises for religious institutions are provided by the State, as well as a publishing house, and all that is needful for the publication of ecclesiastical literature, a sample of which was given to us at our request. Speeches, appeals and articles made during the last three years by the leaders of the Orthodox Church in the fight for peace have been published and translated into English. The Church must pay its own salaries and collect and administer its finances.

The religious freedom of the approved Russian churches has been obtained at the cost of any interference by the Church in the political aims of the Soviet Union. The past extensive powers of the Church in internal affairs are clearly curtailed, but the era of antagonism appears to be at an end, and an amicable and mutually appreciative relationship now exists between Church and State. In the words of Metropolitan Nicholai, "the Russian Orthodox Church has in our day achieved a genuine religious flourishing", and "whole delegations of religious leaders of foreign countries visit Moscow, Kiev and other religious centres". There were many religious delegates staying in the Hotel National in Moscow when we were there.

Museums

The displays in museums and art galleries in all towns which we visited showed both an aim at public education and an appreciation of the value of preserving works of art and evidence of past history. The Lenin Museum in Moscow illustrated very fully most aspects of the history of the revolution, besides the life and work of Lenin, while that of the War Museum in Stalingrad dramatically displays the part played first by Tsaritzyn in the 1918 resistance, and later by Stalingrad in providing the turning-point of the last war. On both occasions this town was a key position, and the appalling odds against which the

recent defenders repulsed armoured attacks, and the details of the enduring and successful resistance put up at one time by less than a score of men is here commemorated for all time. In both museums contemporary painting and sculpture are applied to the general themes. The large numbers of people of all ages visiting these museums and being conducted round them by enthusiastic guides indicated the measure of public interest in historical matters.

Lenin's mausoleum in the Red Square, open to the public on only some afternoons in the week, appeared to provide no mean pilgrimage for Soviet visitors to Moscow. A queue started to form hours before the time of opening, and extended four deep for a distance of some three to four hundred yards, a remarkable tribute to be paid to any man nearly thirty years after his death.

The Kremlin

The Kremlin is not freely open to the public, although on the occasion of our visit a number of parties of children and adults were being conducted round the palaces, museums and churches. The richness of the Kremlin collections of artistic and historical objects is unrivalled anywhere in Europe. Some of the palaces, converted into museums, contain unique treasures; for example their collection of English Tudor silver is the finest in the world, and they have an Elizabethan royal coach in good preservation, among many other types of coach. These museums bring home to the visitor the tremendous contrast that existed not so long ago between the Tsar and his associates and the poverty-stricken sections of the community.

Another palace has been reconstructed to provide the present meeting-room for the Supreme Soviet, and a more comfortable hall could hardly have been devised. Two thousand seats with adjustable desks, and separated by many alleys, are situated on a sloping floor, so that everyone obtains an uninterrupted view of the rostrum. Two galleries house the press and visitors, and all is lit by reflected light off the curved white ceiling, there being no visible light-point anywhere. The decoration is limited, a certain austerity being appropriate for work, they told us. With the meeting-room are associated large halls and galleries for relaxation and conversation.

Outside the Kremlin costly palaces were taken over intact in 1917 without destruction, and are now used for other purposes. One example is the sumptuously decorated house once occupied by a rich merchant which is now used by VOKS, and where we were frequently entertained.

Stalin's Birthday Presents

Several hours were spent one day looking through seventeen halls in one museum. They contained presents sent to Stalin on the occasion of his seventieth birthday. A museum which we did not see contained ten more halls filled in a similar manner, and we were told that half of the presents were in store! The gifts came from all parts of the Soviet Union and from both socialist and capitalist countries in all parts of the world. The number of gifts from different places varied greatly. Where many had been received only one hall full or a selection was displayed, but where few had been sent, all were set out. Great Britain and the U.S.A. were represented by very little. The exhibits provide a wide sample of contemporary craftsmanship from many countries. Every conceivable handmade object is represented, and many are the results of years of labour. A great overlap in the choice of gifts occurs, but similar objects are executed according to the prevailing styles of the countries of their origin.

Many things show ingenuity rather than permanent value, such as the innumerable portraits of Stalin executed in dried leaves, pressed flowers, seeds, feathers, mosaic, printed words in different sized type giving a half-tone effect, embroidery, inlaid wood, carving on coal, and so on. On the other hand, the art and beauty displayed by many of the gifts are of a strikingly high order. This immense personal tribute to one man from outside the Soviet Union is not such as could have been created from within. The presents are not all useful or artistic, there were hundreds of large bound volumes of signatures from millions of people outside the U.S.S.R., some could not sign but gave a thumb- or finger-print instead.

As might be expected, the contributions of the sixteen Soviet States are great, and they illustrate very fully Asian and European art of today. Large objects, such as carpets depicting many scenes and patterns, had been specially made by hundreds of workers. Of particular interest were some scale models made by engineering firms showing the recent development in mechanised navvying.

The regard by the peoples of the U.S.S.R. for their leaders amounts almost to a hero worship which is readily understood in the light of the Union's progressive achievements. A foreigner may not like the general appearance of so many portraits, often of such large size, but the Russian people do not feel this antipathy.

Labour

We had seen and heard much of the great construction schemes which are progressing simultaneously with the rebuilding not only of

the homes of 25 million persons left homeless by the war, but with all the other extensive building operations. Where does the labour come from and under what conditions does it work? was a question that was constantly in our minds. Is there any forced labour or foreign labour? We were told that the labour force required for the great construction schemes consisted of volunteers.

In January 1949 *Tass* stated that the majority of German prisoners of war had been repatriated from the Soviet Union towards the end of 1948, and that by May 1950 the last group of 17,538 prisoners had left, making a total of 1,939,063 repatriated prisoners. There remained 9,717 convicted of grave war crimes, and 3,815 persons whose crimes were then in course of investigation. The *Manchester Guardian* at the time showed that the outcry set up concerning the supposed retention of large numbers of prisoners was based on no tangible evidence, and that "indifference to truth" probably lay nearer home than Moscow.

Our main routes were decided by us, and it was we who decided what we would like to see in each place which we visited, and everywhere we dispersed and wandered about freely. Building operations are in progress day and night in Moscow and Stalingrad, and in none of them did we see any evidence of forced labour being employed. A few years ago Hewlett Johnson¹ saw German prisoners under guards working on the rebuilding of Stalingrad. At the new university in Moscow, which was being put up with prodigious speed, and with every attention to detail and decoration, the freely employed labour force which we saw was being augmented by Red Army engineers, and the chief architect said that he would have liked more workmen had they been available.

On one occasion we came across men working on a country road under armed guard, and near by was a camp surrounded by barbed wire. We were told that the men were civil delinquents, and that such people are put on to useful work. This was the only occasion on which we saw forced labour of any kind. We did not ask to see further examples of the treatment of civil transgressors, but the delegation of British women who visited the U.S.S.R. in August 1951 did, and they have reported upon the conditions which they found in a large prison for women. In replying to Mr. Morrison on August 1, 1951, *Pravda* gave a list of the types of persons for whom prisons and labour camps are provided. It was clearly not permissible for us to be given statistics concerning employment and distribution of persons in the U.S.S.R. However, the scale on which forced labour may

¹ *Soviet Success* (Hutchinson 1947). The Very Reverend Hewlett Johnson.

be employed was not such as to be in evidence anywhere else on our route.

The nature of the incentives for obtaining the labour for building and for the great construction schemes has already been considered, and the enthusiasm with which Soviet citizens seek to develop their country is astonishing. Equally conspicuous is the exploitation of power-driven mechanical aids. For example, 22,000 h.p. is in use on the Moscow university site; the giant dredgers, excavators and suction units have already been described; a concrete mixing combine manned by eight men has an output of 6,000 cubic yards per 24 hours, and the mass-produced smaller excavators and trucks are also of large capacity. The Stalingrad Tractor Works utilises a type of machine which completely processes tractor cylinder heads. In the past this work was done by 200 men, and now it is carried through by only eight. On the farm in Tashkent where four times the original land is being tilled by only twice the original number of workers we asked what they did when they had insufficient labour. The instantaneous reply was "employ more machines".

Freedom and Security

Those of us who wished to read *The Times* and the *Manchester Guardian* at breakfast in Moscow could do so. These papers, we were also told, were available in libraries, although they were not on sale with Soviet papers. We were offered broadcasting facilities by the Moscow Radio for transmission to our country as well as to the Soviet Union, and no script was inspected beforehand; we said what we liked, and we were paid at trade-union rates.

It is difficult to assess the freedom of speech enjoyed by Soviet citizens. It was prohibited to talk about atomic physics with us for obvious reasons. Certain lines of scientific work are discouraged in research institutes, where individuals must work on problems decided upon by the institute, as in other countries. Greater freedom exists in the universities, where there is a free choice of research.

We were impressed by the way ordinary people are drawn into discussions of many kinds, the way in which factory workers make suggestions for improvements and criticise freely, the way in which junior workers in medical establishments join in anything that appears to be interesting, and in our meetings with students and workers of several kinds the full freedom of discussion was apparent. Our suggestion that it could be otherwise was ridiculed. The story already quoted (p. 36) concerning tobacco, shows that criticism is freely given, even when based on no evidence whatsoever. The provision of abundant

meeting-rooms in the palaces of culture, in holiday centres and parks cannot fail to promote discussion.

In a country of full employment where the poorest are able to afford the necessities of life, where within the lifetime of the middle-aged such tremendous strides have been experienced in medical and educational services, and in a whole economy which has already improved the conditions and prospects of many millions of persons, it is not surprising to find a sense of personal security. There is indeed no fear of unemployment or of poverty. The personal rights of Soviet citizens legally give freedom of speech, of the Press and of assembly, including processions and demonstrations, and no one may be arrested except by decision of a court or with the sanction of a procurator. The privacy of correspondence and the inviolability of homes are safeguarded. In conversations with people of various kinds whom we met casually we could discover no case in which these freedoms had been violated.

The trade unions, whose meetings I had no time to attend, wield great power. Legislation about conditions of employment cannot be undertaken without their co-operation, and they can take enterprises to court on matters such as wrongful dismissal of workers. In Moscow Mr. Morrison's letter published in *Pravda* was read by Russians in our presence. Some of them just laughed at the suggested lack of freedoms and fear of a knock on the door. Others in Moscow and elsewhere asked us if Mr. Morrison really believed what he had written, and what was the explanation of the statements made. Everyone I spoke to seemed perfectly satisfied with *Pravda's* reply.

It is true that many personal freedoms have to be sacrificed in favour of greater freedoms. You cannot continue to live in a wooden bungalow in the middle of a town when the town planning scheme reaches your doorstep. You must move, either into a new flat with increased amenities, or into another small house situated farther out. Your sentimental or other attachments to your house are overridden. No narrow streets remain until the lease of all property expires. If you earn a large salary you cannot necessarily live in a large house or flat situated conveniently for you in the middle of a town just at present. The rebuilding of whole devastated towns and built-up areas is rapid, partly because all land is taken just as and when it is needed for the general good. You may not make money by exploiting the labour of others, nor can you engage in capitalist propaganda.

The increasing speed of realisation of the planned economy could not have been achieved in association with political administrations with fluctuating aims.

We had to accept some of the small limitations imposed on Soviet

citizens, such as prohibition of the use of cameras in many built-up areas and from aeroplanes over some routes, and we rebelled against them probably more than did the Soviet citizens, although the security reasons for such limitations are obvious. On the other hand, greater freedoms over years of people's lives, the security of employment, the absence of economic crises, the increasing abundance of purchaseable objects, and the opportunities for education and cultural activities, the readily available entertainments, and regular indulgence in healthy and happy holidays has had a very great effect, as was brought out by many conversations, and results in full and happy lives.

The freedom of former colonial peoples, such as the Uzbeks, was striking. The Russian population of Uzbekistan has increased, but Russians do not fill the major posts of authority. Every effort has been made here as elsewhere to advance formerly backward peoples with all speed to the same level as prevails elsewhere in the Soviet Union. I had not expected to find in the desert oasis of Tashkent first-rate productions of Shakespeare and opera, or the presence of modern industries, palaces of culture, polyclinics and research institutes such as are here described.

Planned Economy

The unity of purpose in the carefully planned economy everywhere is clearly in evidence, and the scale of the peaceful constructive effort is outstanding. In the creation of new towns and in the rebuilding of old ones since the war the figures given to us for the new living space represent approximately three million new houses and flats, but this excludes private building by people who build for their own personal use, which may bring the total up to four million. Thus many families are still sharing their living space, but a substantial beginning has been made.

At the same time, the provisions for education, culture and medicine are carried through on no mean scale, and there are the great construction projects concerning irrigation and water power. These are noteworthy not only because they are peaceful developments on a gigantic scale, but also because they must absorb vast sums of money. That a nation can carry through so much after a devastating war deserves to be appreciated, especially in view of the supposed vast expenditure by the U.S.S.R. on military matters which has been claimed outside the Soviet Union. The rebuilt towns such as Stalingrad, and the new Moscow university costing £70,000,000, are not designed for war but for peace. The university is the most conspicuous landmark of the city, surmounting a high ridge.

The widespread application of science to all manner of problems in

the planned economy, and the popular interest displayed in scientific matters, are both conspicuous. Science is being harnessed for the good of mankind and for the maximum productivity on the largest possible scale. There is never any fear that to adopt a certain labour-saving machine will put men out of work. The closest co-operation exists between the large collective farms and the research institutes; for example, in 1948 about eighteen million acres were planted with seeds prepared by Lysenko's methods, and this area serves as a huge experimental station. Research is planned on a large scale to deal with immediate practical problems of all kinds. And a scientific training is also considered desirable for those occupying posts of administrative authority.

The rapid recovery from devastations of war, and the simultaneous increase during recent years in the basic level of provisions for all persons of all races are clear, and indicate the measure of the result obtained from public ownership of all resources, which itself took time to build up. Expansion and development now, in spite of the war, are taking place much faster than they did in the early stages of the régime. At present, people are paid in accordance with the work they do. However, the great construction projects which are now being implemented will create an abundance which it is planned will be distributed ultimately according to needs rather than according to the work which is performed.

Isolation

We looked for enlightenment on the subject of the strained relations concerning peace and war existing on either side of the "iron curtain". Isolation and curtailment of contacts have led to ignorance and misconceptions of many kinds, and a continuance of the restriction of entry and exchange can only aggravate matters. The Soviet Press has published erroneous statements and many flagrant distortions of conditions reported to exist in "Western" countries and of the actions of "Western" governments. All this we deplore, but such faults lie on both sides, and were it not so, visitors unversed in matters relating to the Soviet Union would be less surprised in what they find there. It should also be appreciated that some erroneous statements made about this country by Soviet publications have been made in error and not with any malicious intent to mislead or falsify. Some members of our delegation pointed out such inaccuracies. Their criticisms were welcomed and discussed, and corrections have since been published.

It is profitless to consider from outside, the measure of need for the recent isolation. Obviously great schemes of reconstruction can proceed most smoothly in the absence of all interference, either by contending

factions within or by outside promotion, and the forces without that might stimulate discord are not inconsiderable. On the other hand, barriers create suspicion, whether there are other grounds for it or not, as also does the absence of information. Very accurate information about "Western" matters, scientific and otherwise, is possessed by some persons, but ignorance and distortion are also prevalent.

It is probable that an appreciation of the disadvantages of isolation is growing, and that this is reflected in the production of magazines for foreign consumption and in the entertainment of visitors. The illustrated monthly *Soviet Union*, for example, is published in six languages, including Russian, and shows photographs of life and events in the Soviet Union without stressing any ideology. The number of foreign visitors who have recently been allowed to travel where they wished is considerable, and they have visited most of the major towns west of the Urals, some of the dams, hydro-electric stations and construction sites, the Caucasian republics and Siberia. The material burden of visitors must also be remembered in a country which before the war was grossly lacking in living space, and where during the war the homes of 25 million persons had been destroyed. In Moscow a new multi-storied building is being constructed which they say will be the largest hotel in the world, and presumably the hotel accommodation will increase elsewhere. The lack of traffic even between the U.S.S.R. and her neighbour states of comparable constitution was clear; only one plane every other day left Prague for Moscow. Only an increase in travelling facilities and in circulation of information will dispel suspicions and worse created by what appears to us to be unnecessary isolation. It is to be hoped that the time is not far distant when a sufficiency of accommodation and other necessary arrangements will be available to foreign visitors who would like to visit the Soviet Union.

The ease with which Soviet citizens can travel long distances within the Union presents a marked contrast to their scope for foreign travel. Very large numbers of persons habitually cover thousands of miles for purposes of holidays, and large rallies of sport and other organisations bring the youth of their many nationalities together. Conferences and discussions of scientific and other matters are attended by people from all over the Union.

Peace

One of the strongest impressions with which I left the Soviet Union concerns their attitude towards peace. There was no sign of any government-inspired encouragement to war, quite the reverse, and the newspapers lack a daily sensation concerning either war or personal

domestic details. The whole Union is plastered with notices, banners and slogans calling on the people for peaceful economic effort and peaceful co-operation. These are to be seen among the factory banners, alongside the safety precautions and other notices in the workshops, in restaurants, across the streets in Stalingrad, in the palaces of culture, on railway stations, on sidings and railway cuttings written in stones or in flowers. The friendly welcome given to us everywhere by all types of persons could not have been staged, and is further evidence that aggressiveness is not being fostered. Germans have been entertained in Stalingrad. Nobody speaks of war except as a disaster to humanity. The songs which we overheard so often contain a refrain which says, "peace is the most powerful force on earth". Many of us could not help remembering it.

The army is conspicuous by its absence as one travels about the Soviet Union. In Moscow a few members of the blue-capped security troops, corresponding to police, were seen in the Kremlin and about the streets, but nowhere else. A widespread understanding exists that war, or even large-scale preparations for war, would be an enormous handicap to the reconstruction with which the Soviet people are pressing ahead with all speed. The scale of the construction projects, and their nature, will make large areas of land vulnerable or uninhabitable once more in case of destruction of key points by war.

It is obvious that the Soviet Union will shortly be able to produce everything material which she can possibly require, and more besides, from within her own borders. In addition she needs peaceful neighbours and the right to live in peace. The measure of possible co-operation between nations is shown by the relationship we saw to exist between the Central Asian races and the Russians. These races are treated as brothers, not as subjected peoples. The children in all Soviet states are being brought up on principles of friendship and co-operation.

In an address given on May 1, 1949, Alexis, the Patriarch of Moscow and all Russia, said, "The thirst for peace is inherent in every man who loves his country and who wishes it to prosper in a life of peace; particularly is it inherent in the Russian man, who is peaceable by nature and is prepared to champion peace by every means possible"; and the statement made by Stalin in March 1939—"We stand for peaceful, close and friendly relations with all neighbouring countries . . . We stand for the support of all nations which are the victims of aggression"—has been repeated in substance many times in the intervening years.

The common people of all lands want peace, and peace is the

declared wish of the leaders of the Soviet people. It is to be regretted that relationships with the "West" have so deteriorated as to result in the loss of goodwill towards the Soviet Union, and in the development of widespread misconceptions of what that country is like.

* * * * *

The second general impression with which I left was the scope offered for initiative at all ages and by all levels of persons. With this goes the complete equality of status of the women, the fullness of their lives, and the part they play in the national effort. Dictation and integration from above can do much, but it cannot do all. The rebuilding of Stalingrad is but one example of the result which can be achieved in peace-time by the same determination and initiative which was shown by the defenders of that city.

The Soviet people are very proud of their achievements, and no one can miss their determination to advance their country and to develop it as quickly as possible for the good of its citizens. They lag behind in many details: the plumbing is not as good everywhere as in the Kremlin; the accepted norms for some industries are lower than in the "West", although this means that large numbers of workers achieve an extra bonus; the uniformity of the university courses, which are centrally planned, must be very limiting in some respects—but how else is an efficient system of higher education to expand rapidly so that standards remain approximately uniform? Time will doubtless modify many things. Many mistakes have been made in the past and are doubtless still being made, but it would be well for the solid achievements which have been accomplished by the Soviet Union to be appreciated everywhere.

* * * * *

Our departure from the Soviet Union was marked by a large reception given on our last evening, at which we met a gathering ranging from distinguished professional and intellectual persons to students of various kinds. We had been lavishly entertained throughout our visit on a scale possible only to an organisation of the order of a government department with an appropriate budget, and this last evening showed a standard in entertainments reminiscent of the construction projects. Refreshments circulated in the marble hall of the former Tsarist merchant, and were followed by the arrival of chairs and music. Between sixteen and twenty top-rank artists were assembled; a fraction of this talent would have been adequate for the purpose, but as we had not attended a concert as such, we were given one of the best

on this occasion. Later we withdrew to a dining-room loaded with everything to eat and to drink that could be imagined for such a party, and by the time that we were refreshed the chairs had been cleared and a dance band was in operation. There were plenty of interpreters and many persons could speak English. The party was in full swing at midnight, but as our plane left in the early hours of the morning we said good-bye to our hosts and were shortly on our way home.

INDEX

- Accidents, 40
- Afforestation, 82, 83, 92
- Beds, 32
- Birthday presents, Stalin's, 120
- Building, 51; of Leningrad, 52; of Moscow, 14, 19, 22; of Stalingrad, 53
- Cabbage, 111
- Canals—Don-Kuban, 85; Moscow, 13; South Ukraine, 85; Stalingrad, 86; Turkmenian, 91; Volga-Don, 84
- Cancer, 36
- Cars, 18
- Children, 30, 32, 35, 49
- Children's allowances, 46, 48, 50
- Children's railway—in Stalingrad, 54; in Tashkent, 66
- Church, 117
- Circus, 59
- Clothing, 18, 71
- Concrete factory, 88, 122
- Construction projects—immediate, 81, 124; Siberian, 95
- Cotton, 74
- Cow, 115
- Crèche, 58
- Crops—over new irrigation areas, 82, 98; South Ukraine, 85, Turkmenia, 93
- Cultural facilities, 30, 56, 79, 94 (*see also* Theatres)
- Cytology, 115
- Dams, 86; on Amu Darya, 91; at Gorky, 85; at Kuibyshev, 86; at Molotov, 85; at Stalingrad, 86; at Tsimlyanskaya, 84; in Turkmenia, 88, 91
- Deserts, 62, 81, 82, 91, 96
- Divorce, 46
- Doctors, 33, 39
- Domestic animals, 29, 75, 115
- Drought, 82
- Education, 23, 72, 94, 100
- Examinations, 50, 102
- Excavators, 87
- Expeditions—concerned with fish, 89; in deserts, 91, 99
- Factories—in Moscow, 30; in Stalingrad, 55; in Tashkent, 77
- Farm, collective in Tashkent, 75
- Fertilisation, 113
- Films—in Moscow, 39, 43; in Tashkent, 70
- Fish and fisheries, 89
- Food, 14, 59, 77
- Football, 28
- Fossils, 106
- Freedom, 117, 122
- Gene theory, 107, 114
- Genetics, 107
- Grafting, 109, 110
- Health centres (Polyclinics), 39, 58
- Heredity, 110
- Holiday centres, 30, 37, 49
- Holidays, 49
- Hospitals, 41
- House, Tashkent, 75
- Hybridisation, 109, 112
- Hydro-electric schemes, 82, 84, 87, 93, 96
- Inbreeding, 110
- Income tax, 16
- Irrigation, 82, 84, 93
- Isolation, 125
- Kindergartens, 30, 47, 58, 73
- Labour, 25, 56, 93, 120
- Machines for navvying, 86, 87
- Maize, 112
- Marriage, 45
- Maternity home, Stalingrad, 34
- Medical education, 33
- Medical examinations, 33, 35
- Medicine, 32, 124
- Metro, of Moscow, 20
- Morrison, letter of, 121, 123
- Museums, 118; of Moscow, 119; of Stalingrad, 54; of Tashkent, 70
- Navy display, 27
- Nurses, 41
- Opera House, Tashkent, 68
- Orphanage, 50
- Palace of the Soviets, 26
- Palaces of culture, 30, 56, 79
- Parks—of Moscow, 27; of Stalingrad, 53; of Tashkent, 65
- Peace, 25, 49, 59, 124, 126
- Penicillin, 37
- Plant breeding, 105, 108

- Pollination, double and triple, 112; extra, 113
 Polyclinics, 39, 58
 Potato, 110
 Prices—of commodities, 16; of theatre seats, 28, 67
 Religion, 117
 Rent, 16
 Research, 74, 97, 103, 125
 Rest homes, 37
 Rouble, exchange rate and purchasing power, 17
 Schools, 72, 100
 Scientific base in Kara Kum, 91
 Shakespeare, 68
 Shops, 14
 Silt, 92
 Soil, 98
 Species transformation, 114
 Stalingrad, 52
 Standards of living, 18, 75, 123
 Steppe, 52, 62, 81, 85
 Students, 23, 38, 74, 100
 Subsoil water, 91
 Suction dredger, 88
 Tashkent, 61
 Text-books, 102
 Theatres—in Moscow, 28; in Stalingrad, 53; in Tashkent, 66, 68
 Tomato, 111, 112
 Town planning—of Moscow, 13; of Stalingrad, 54
 Tuberculosis, 36
 Tractors, 56, 76, 82
 Turkmenia, 82, 90
 Turkmenian Canal, 91
 Universities, 100, 101; of Moscow, 22; of Uzbekistan, 74
 Uzbekistan, 61, 71, 124, 127
 Vernalisation, 109
 Volga-Don canal, 84
 Wages and earnings, 16, 25, 31, 76, 79
 Wheat, 109, 115
 Women, 45, 72, 79, 128



FIG. 1.—Vestibule of the Moscow underground, Botanichesky Sad, Station. The platforms lie on either side of the vestibule, and the escalator at one end.

FIG. 2.—In the bakery department of a Moscow shop.



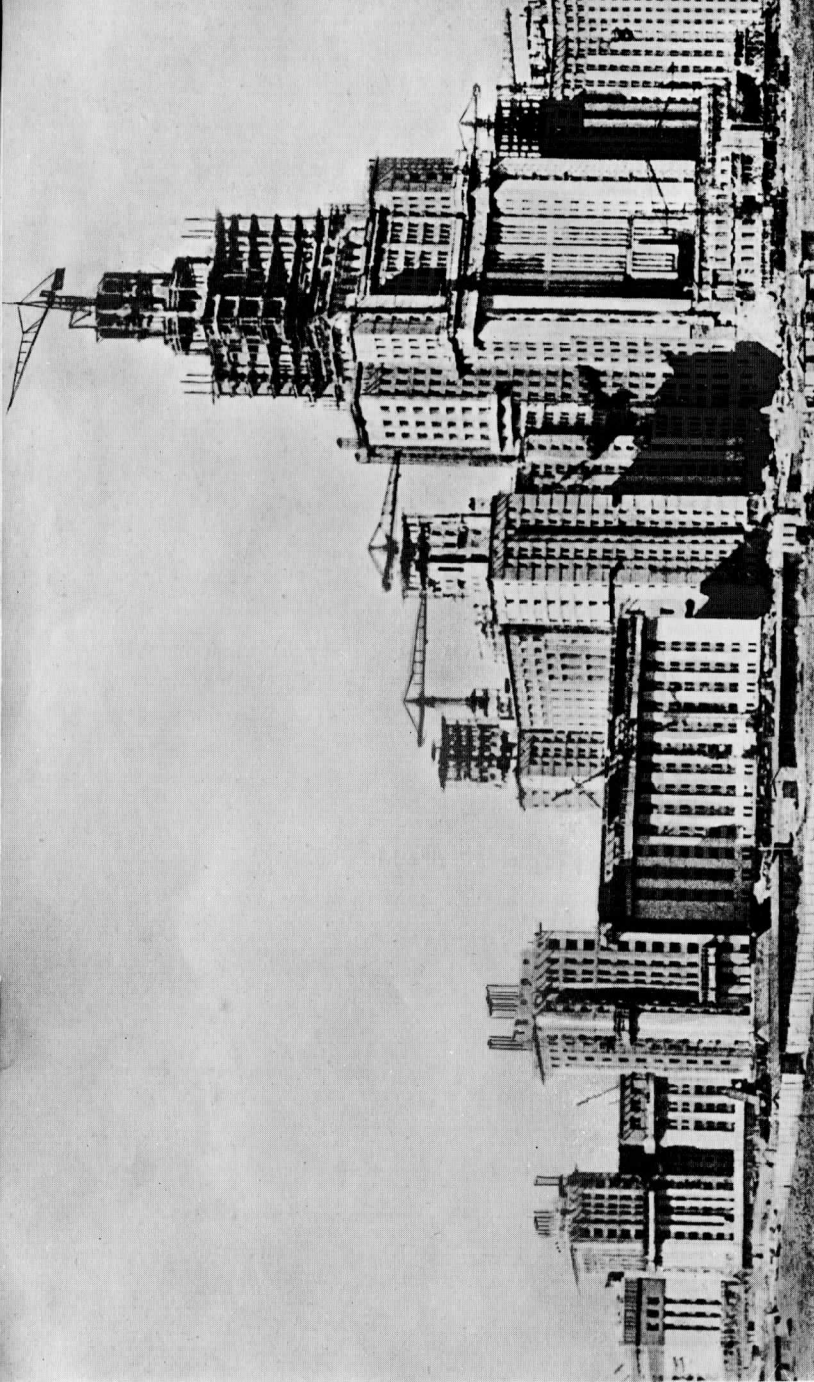


FIG. 3.—Part of the main block of the new University, Moscow, in 1951 after one-and-a-half years' building time. Cranes top the four 18-story wings containing flats for the staff and part of the students' hostel. Ceramic facing is completed over the lower part of the brickwork, and is being applied from cradles hanging from the roofs. An outer gallery above the 26th floor surrounds the 37-story part of the university.



FIG. 4.—Kindergarten of an Agricultural Machinery works where the children keep tame guinea pigs, rabbits, hedgehogs, parrots and fish.



FIG. 5.—A student's room in the new University building, Moscow.



FIG. 6.—Mechanisation of building in a residential district of Moscow. A minimum of scaffolding is made possible by the use of giant cranes, which characterise Soviet building everywhere.



FIG. 7.—A watershed tree line seen from the air in 1951. This future forest belt crosses the steppe for hundreds of miles. The three black stripes are each 65 yards wide, and carry rows of seedling trees separated by low-growing crops. The stripes are 325 yards apart.

FIG. 8.—Members of the British delegation, centre Dr. H. Joules with the author on his left, visiting the children's section of a holiday centre for the employees of the Moscow Energetics Institute named after V. M. Molotov.



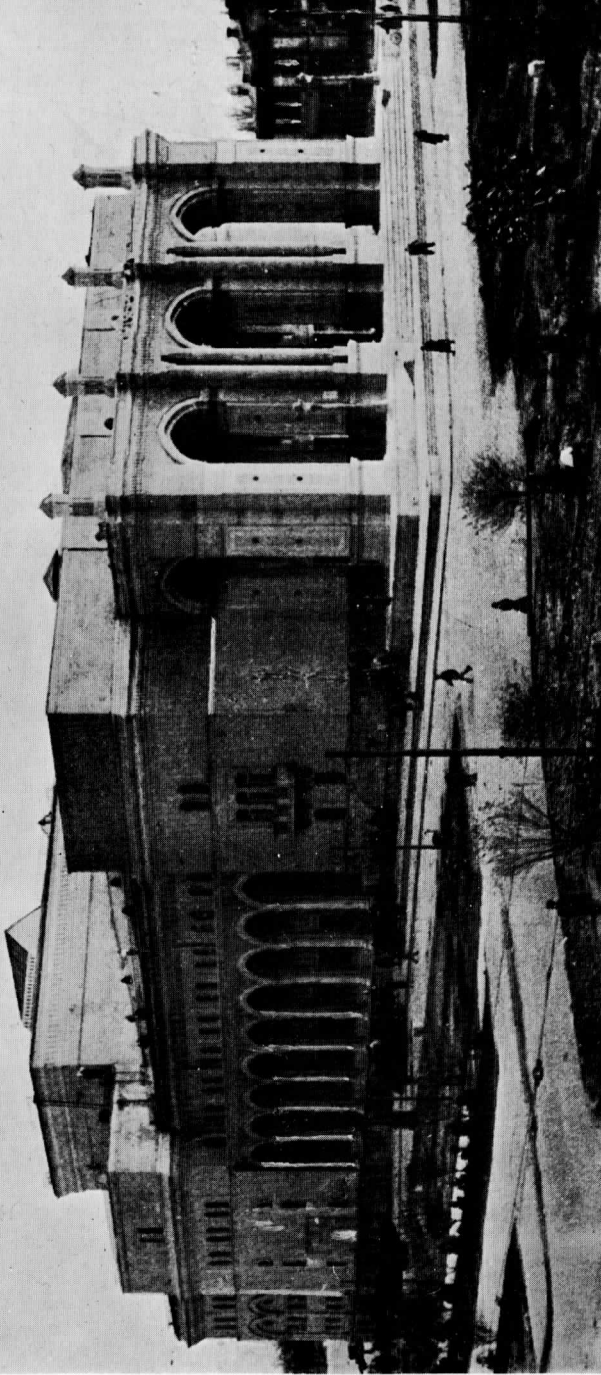


FIG. 9.—The Opera House, Tashkent, opened in 1947. The auditorium is situated at the back of the building, and the side windows light three of the six long lateral halls.

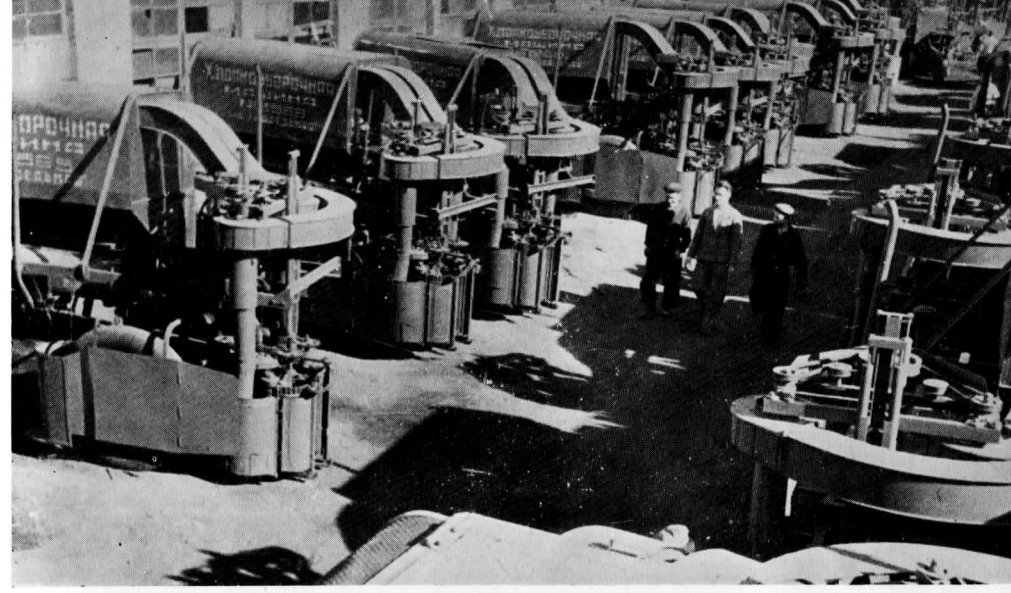


FIG. 10.—Tashkent Agricultural machine-building plant producing cotton-picking machines, here ready to leave the factory. Each machine gathers up to 15 acres of cotton per day, replacing the labour of 50 to 60 people.

FIG. 11.—Uzbek wood-carver at work on the doors of a new theatre, Tashkent. Similar carving in wood, plaster and stone lines the Opera House.



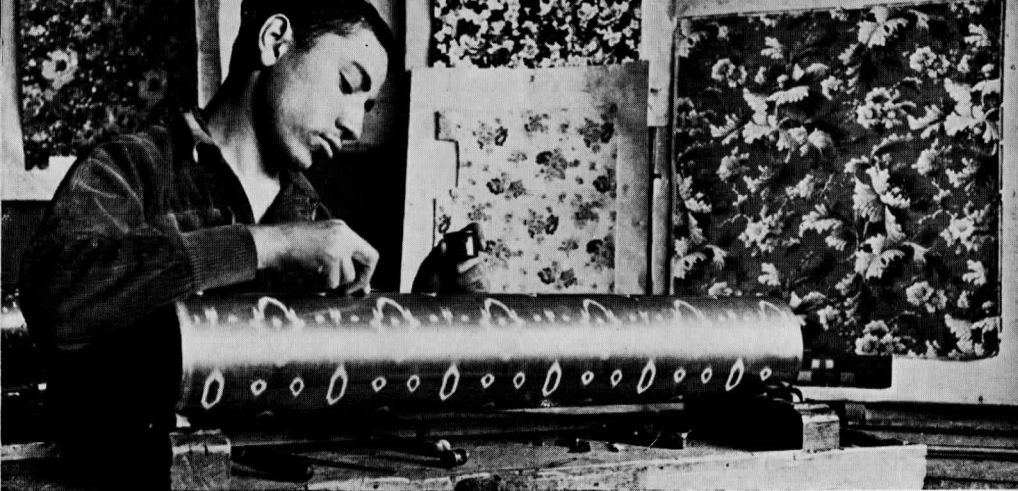


FIG. 12.—Stalin Textile Mills, Tashkent. Putting the finishing touches to the roller, used for printing the pattern on to the woven material, after the design has been transferred to the roller by a photochemical process.

FIG. 13.—Kindergarten of the Stalin Textile Mills, Tashkent. The children are predominantly Asian.



FIG. 14.—The “Polyclinic” of the Stalin Textile Mills, Tashkent, the place where the workers, their relations and neighbours consult their “family” doctors.

FIG. 15.—The “Palace of Culture” or club of the Stalin Textile Mills, Tashkent, with members of the British delegation returning to the cars.

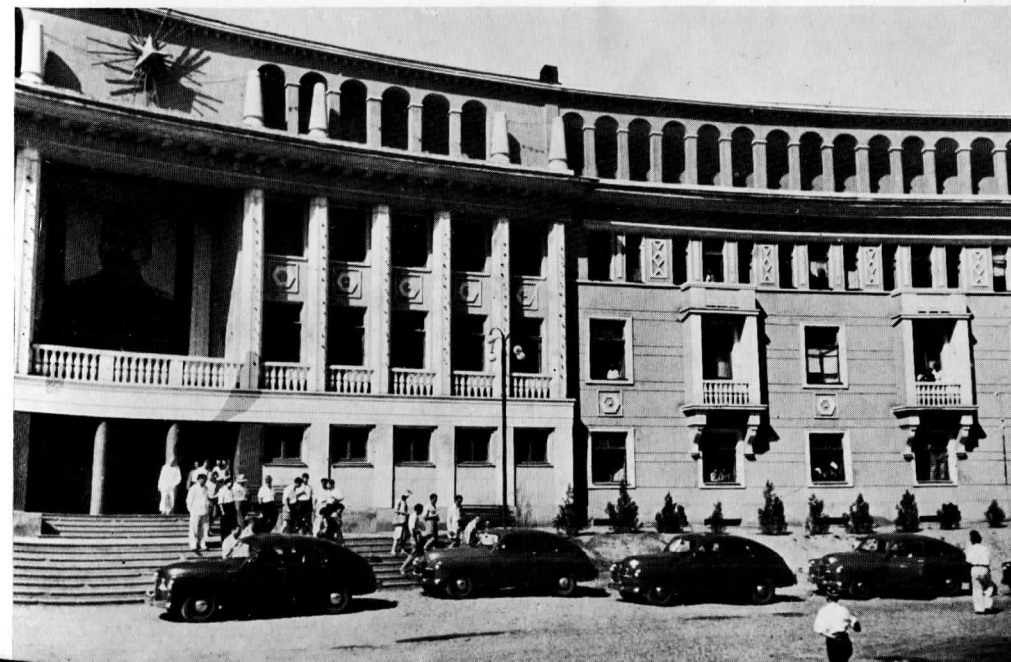


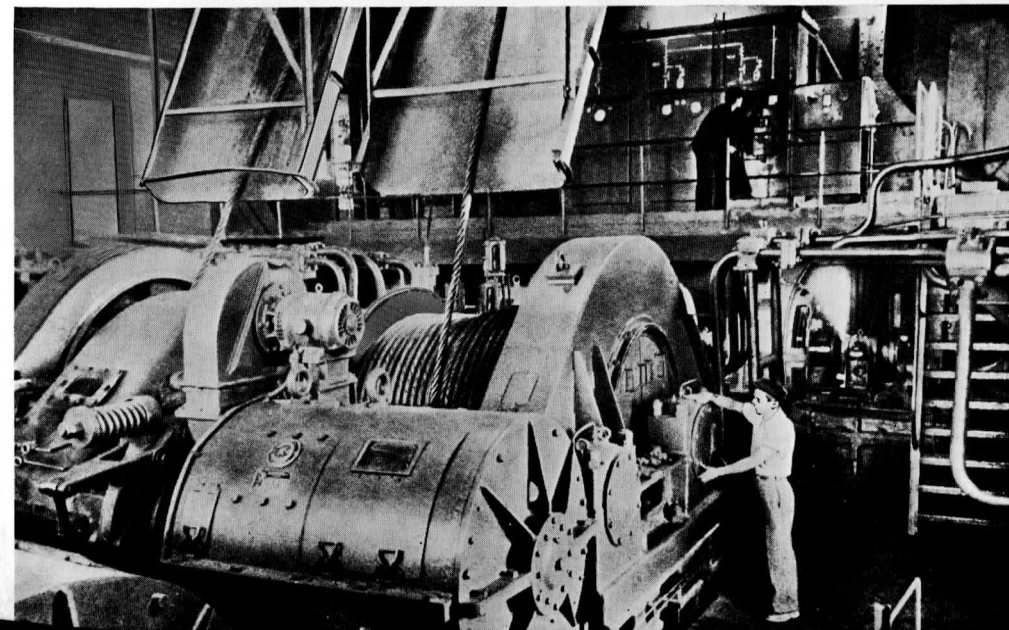


FIG. 16.—The “Walking” or “Drag-line” excavator in use in large numbers on the Great Construction Projects. The bucket can scoop and dump 18 cubic yards of soil a minute. The interior of the cabin is shown in Fig. 18. The component parts of the excavator fill 180 railway wagons.



FIG. 17.—Some 200 workers on the Kuibyshev hydro-electric station attend evening classes at the Industrial Institute on the site.

FIG. 18.—Cabin of the “Walking” excavator shown in Fig. 16. A crew of 17 engineers on this machine can do the work of 7–10,000 navvies.



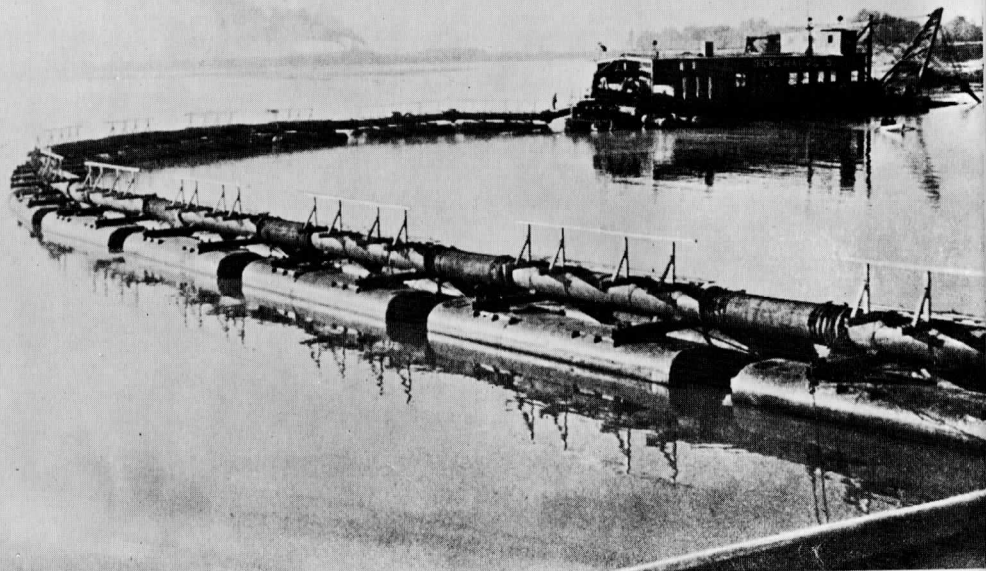
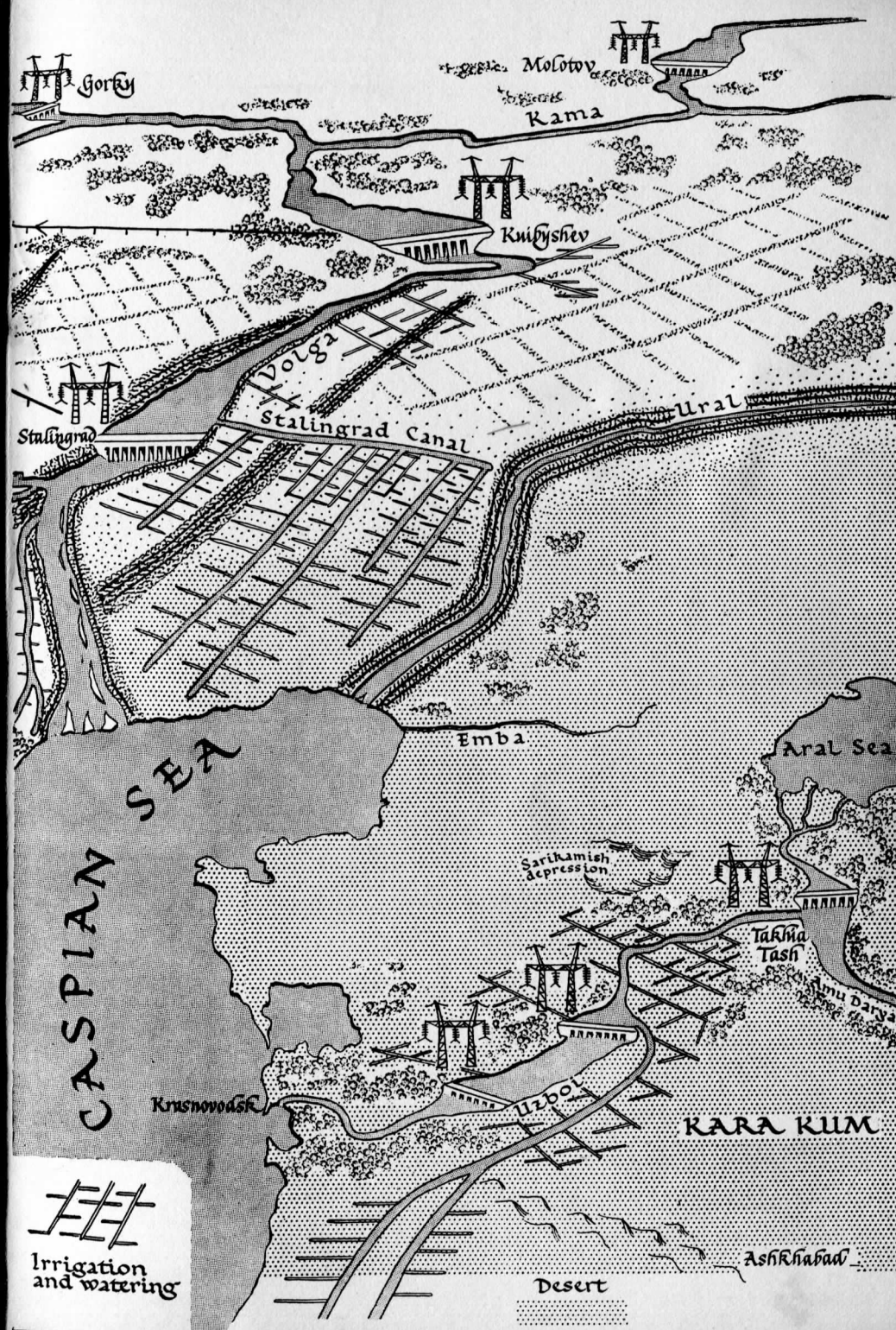
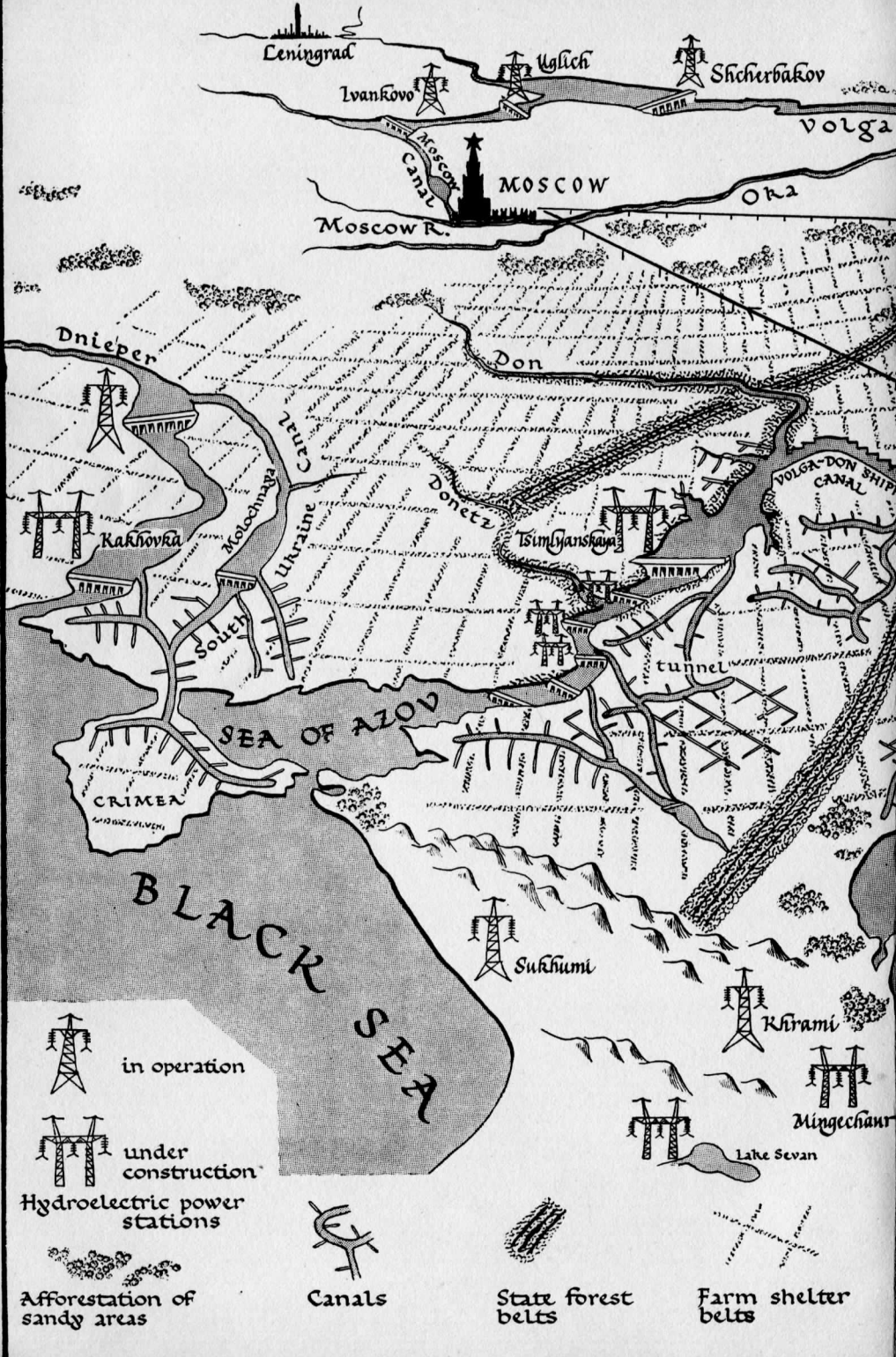


FIG. 19.—One of the suction dredges which are moving half of the earthwork necessary for the Great Construction Projects. The soil is driven towards a suction head by the drill shown in Fig. 20, and is sucked up and conveyed away by pipe for a distance of up to 2 miles.

FIG. 20.—Drill used below water in conjunction with the suction unit and pipe shown in Fig. 19.





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by
W. P. & Z. K. Coates

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