

MEDICINE

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THE normal correctives of sensational reports on medical activities at any particular centre or country are close personal contacts and a free flow of publications. Both these are conspicuously lacking in our relations with Soviet medicine, and it is therefore inevitable that our knowledge of Soviet medicine is at all times inadequate, and at times grossly misinformed. This is unfortunate, for Soviet medicine has a significant organization and substantial achievements.

The organization of Soviet medicine is conditioned no less by the immense territory of the Soviet Union than by the assured place research has in the organization of society. The territorial expanse imposes a considerable amount of decentralization. This is apparent in the structure of the medical services as a whole, and in research in particular. The medical services, though conceived on a central plan, have an endless variety of administrative organs. Each of the autonomous republics controls its own services, which supplement those of the Union. Moreover, the municipalities, different industrial undertakings, collective farms, and many other labour organizations have services of their own, again supplementing those generally available. Soviet medicine is therefore a national medical service in its widest sense rather than a State medical service; its distinctive feature is its stress on preventive treatment.

The organization of research facilities is essentially parallel to those of the health services. Not all research institutes are under the control of the Commissariat of Health of the U.S.S.R. The newly established Academy of Medicine, the successor to the Gorky Institute of Experimental Medicine (Vienn), controls a large number, and there are also institutes controlled by the governments of the autonomous republics. Furthermore, the medical schools and the universities play a significant part in medical research, so that there is no lack of research facilities or of variety of opportunity and service. Though there is intensive specialization, rigid departmentalization does not appear to be prominent; if anything, the opposite applies. This is apparent from such typical institutes in Moscow as those devoted to neurology, neuro-surgery, occupational diseases and ophthalmology. Each of these institutes consists of a large clinical unit balanced by well-equipped clinical and research laboratories. While these institutes employ many full-time laboratory research workers, they also have many others with both clinical and laboratory duties. Planned research, as it is understood in these institutes, consists of the co-ordinated activities of different workers approaching an agreed problem from their own special angle. The close contact that an institute and its planned work makes possible ensures that laboratory workers are fully acquainted with clinical needs, while the clinicians know the possibilities and limitations of the laboratories. Though working in a team, the individual worker does not lose his identity, as is obvious from the publications in the journals, which are not more frequently than elsewhere collective reports. While of necessity the bulk of the research in a clinical specialty is concentrated in the institutes exclusively devoted to it, all clinical institutes are broadly planned and have many special departments. Thus

impressive work in ophthalmology was proceeding at the Institutes of Neurology, Neuro-Surgery and Occupational Diseases, and no doubt in other institutes too, in addition to the Institute of Ophthalmology. Some institutes are devoted exclusively to laboratory work in special fields, but these too do not appear to be narrowly conceived; at the Institute of Microbiology there was considerable work on pharmacology.

The team spirit and the organization of planned research probably ensure that in the Soviet Union more is known to research workers of unpublished work and its progress than is the rule elsewhere, and it is possible that publications as media for the dissemination of knowledge are relatively less important in the Soviet Union than they are in Britain. It is therefore all the more regrettable that there is so little personal contact between British workers and those of the Soviet Union.

Soviet medicine has grown rapidly, and in the course of its development has had to adapt itself to rapidly changing conditions. The training of medical men is as good an example as any of the empirical nature of much Soviet organization. No attempt is made to arrive at an ideal solution at any particular stage. When the need for numbers was urgent the training was not particularly exacting; and how urgent the need was is obvious from the fact that in 1913 there were less than 20,000 medical men in the Czarist Empire, whereas in the Soviet Union to-day there are about 150,000 and the number is still inadequate. As more physicians became available, the standard of training was persistently raised, and now has been fixed at a six years course. This is already operative in Moscow, and will become effective over the whole of the Union in the course of four years. This new level has rendered unnecessary such temporary makeshifts as specialization introduced at an early stage of the student's career. When the need was still pressing there was no general qualification in medicine; final-year students were trained for either public health activities, general practice, or children's diseases. While raising the standard of medical training, the Soviet authorities are still creating 'feldschers', relics of the old barber surgeons. They are given a practical training and are allotted much of the routine work of medicine, generally under supervision. In the course of time the 'feldscher' will no doubt disappear, but for the present his persistence is the price that has to be paid for the more intensive training of physicians.

It is the aim of Soviet educationists to produce 20,000 well-qualified medical men a year. The fifty-two medical schools at present available scarcely seem adequate for such numbers, but there is no shortage of candidates. Students for the medical schools are recruited from the secondary school population, and there are two systems of entrance. Those secondary school students who have a good record gain admission to the medical schools automatically; the remaining places are then filled by competitive examination from among the secondary school students whose record has not been so good. Stipends are paid throughout the student's career and they increase with each year of study. On qualification, students are expected to undertake three years service wherever the need is greatest; but many of those who have done well are expected to specialize immediately as clinicians or research workers. All who have given three years service are encouraged to "improve their qualifications", so that

postgraduate study is a normal feature in the life of the Soviet physician. Soviet medicine has no fear about the standard and qualifications of its personnel.

A glance at Russian medical journals, and, still more, visits to hospitals and research institutes, show clearly that Soviet medicine is not 'practical' in the crude sense of the word. Though there is an ever-present need for personnel, and attention to the immense public health problems of the Soviet Union requires many routine workers, much of the work in the laboratories is of a highly abstract character. None the less, practical results are constantly sought. The immense flora and variety of soil conditions of the Soviet Union have been pressed into service. Systematic exploration of the pharmacological properties of the higher plants and soil bacteria is proceeding, while such institutes as that of balneology with its great variety of laboratories illustrates the use that Soviet physicians are making of the curative properties of springs and muds.

Although Russian workers have much to contribute to the rest of the world, they are borrowing freely from abroad, and, in some instances at any rate, have extensively developed work that was begun elsewhere and not carried to any conclusion. The production of lysozyme on a massive scale from a large variety of biological substances is an example. This achievement has been rather overshadowed by the coming of penicillin, but the Russian preparation of penicillin from *Penicillium crustosum* and their intensive exploration of the possibilities of producing synthetic penicillin illustrate once more that they not only borrow but also develop and improve on work from abroad. In the comity of civilized nations, Soviet medicine holds its place as an equal.

AGROCHEMISTRY

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RUSSIAN translations into English of the names of institutes and journals produce many uncouth phrases, such as "Chemisation of Socialist Agriculture" and others mentioned below, but occasionally they produce a word which we might well take over. Thus 'agrochemistry' describes fairly satisfactorily one of the halves into which our old science of agricultural chemistry is splitting up under the influence of increasing specialization. The subject covers crop nutrition and those branches of soil science concerned with soil fertility rather than soil formation and classification. The grand old man of Russian agrochemistry is D. N. Prianischnikow who, with a few other members of the Academy of Sciences, had received the highest Soviet award, Hero of Socialist Labour, a few days before our arrival. We were delighted to find him fitter and more lively in his eightieth year than when he last visited England in 1935 for the Third International Soil Congress at Oxford.

An outstanding feature of Russian agricultural science is the elaborate organization of team-work in a large number of institutes responsible to independent authorities. Considerable overlapping in programmes is not only allowed but also clearly encouraged. The necessary co-ordination is secured and a high standard of work maintained by requiring many research workers to divide their time between

two or more institutes or colleges, and by giving a few overworked authorities responsibility for a broad group of problems in several institutes. Thus we saw one of Prianischnikow's teams at Dolgoprudnoye in the Gedroiz Institute of Fertilizers, Soil Management and Soil Science under the Lenin Academy of Agricultural Sciences, and another in the Department of Agrochemistry in the huge Timiriazev Academy of Agriculture, which has some sixty professors and 3,000 students. We also came across his pot-culture work in collaboration with the radioactivity section of the Institute for Geochemical Problems. Another example is afforded by the work of Prof. I. W. Tiurin on soil organic matter in the soil science departments of the University and the Forest Technical Academy at Leningrad and the Biochemistry Department of the Dokuchaiev Soil Institute at Moscow. Even Prof. Joffe, with all his other commitments in pure and applied physics, manages to find time to direct an admirable Institute of Physical Agronomy in Leningrad under the Lenin Academy of Agricultural Science. By means of his improved thermocouples, it was found that during August the night temperatures of potato leaves in the northern regions are often as much as 7° below those of the soil surface. This led to a new method of planting potatoes in wide high ridges across the direction of the prevailing wind, to transfer as much heat as possible from the soil to the leaves and so avoid late frost damage.

Prianischnikow has been checking his early work on nitrogen metabolism in plants and has confirmed that plants of all ages take up ammonium ions more rapidly than nitrate from dilute solutions of ammonium nitrate, though from unduly concentrated solutions nitrate may be taken up and ammonium excreted. In view of the acute shortage of nitrogenous fertilizers, which was manifest in all the crops we saw, Prianischnikow has great hopes of the benefits likely to accrue in the north from the rapid extension as a green manure crop of a frost-resistant Canadian strain of the blue garden lupin, *Lupinus polyphyllus*.

During the War, fertilizers could be spared only for a few industrial crops, such as cotton and irrigated sugar beet, but research on both the production and efficient use of fertilizers is well advanced. At Salikamsk there are larger reserves of potash than in Germany, and it is claimed that the U.S.S.R. now has larger reserves of phosphate than any other country. Until recently the only known deposits were low-grade rock phosphates and crystalline apatites, both unsuitable for making superphosphate. Brilliant work by Kazakov in the Institute for Fertilizers and Insecto-fungicides under the Commissariat for Heavy Industry has led to the discovery of vast deposits of high-grade rock phosphate in the Kara Tau region of Kazakstan. This discovery is also of considerable geological interest, for it was the outcome of a new theory of the formation of rock phosphate by precipitation from cold deep waters upwelling against a continental shelf.

Preparations are well advanced for using fertilizers on a vast scale. Thousands of field experiments have been conducted over a variety of crops, soils and regions, and individual collective farms are being mapped to show the best amounts and forms to use. Fertilizer consumption and crop yields should increase rapidly, especially in the leached soils of the centre and north, as soon as new factories and railways can be built.

The need for lime is still acute. About half the isolated limestone deposits are dolomitic, but recent