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Progress against cancer

The prospect of the first "cancer vaccine" is brought nearer by research described at the Eighth International Cancer Congress, held in Moscow at the end of last month. The author, who attended, discusses some of the papers presented, and gives his impressions of the rapidly increasing activity in cancer research within Russia itself

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A QUESTION uppermost in the thoughts of many of the 5,000 doctors and scientists from over 60 countries who converged on Moscow for the Eighth International Cancer Congress was: "What contribution is Russia now making in the field of cancer research?" At previous meetings held outside Russia, the number of Russian delegates had been so small as to create the impression that relatively little effort was being made in this field within the Soviet Union. Many of us, therefore, were astonished that 1,700 Russian names (as compared with 550 American, 140 British, 140 French and barely 100 from any other country) appeared in the lists of participants at the Eighth Congress held at the end of last month. Even if this total represents 50 per cent of Russian cancer workers, it is still much higher than most people would have expected. According to one Russian delegate, the number of scientists working in the field has approximately doubled during the past five years. Ten years ago the Institute of Experimental and Clinical Oncology had a total staff of only 350. Later this year the staff, now exceeding 1,000, are due to move into new buildings which will constitute one of the largest Institutes of its kind in the world, situated 20 km from the centre of Moscow, and having its own station on the Moscow "Underground" (Figure 1). This is just an indication of the rapidity of expansion in Russian cancer research.

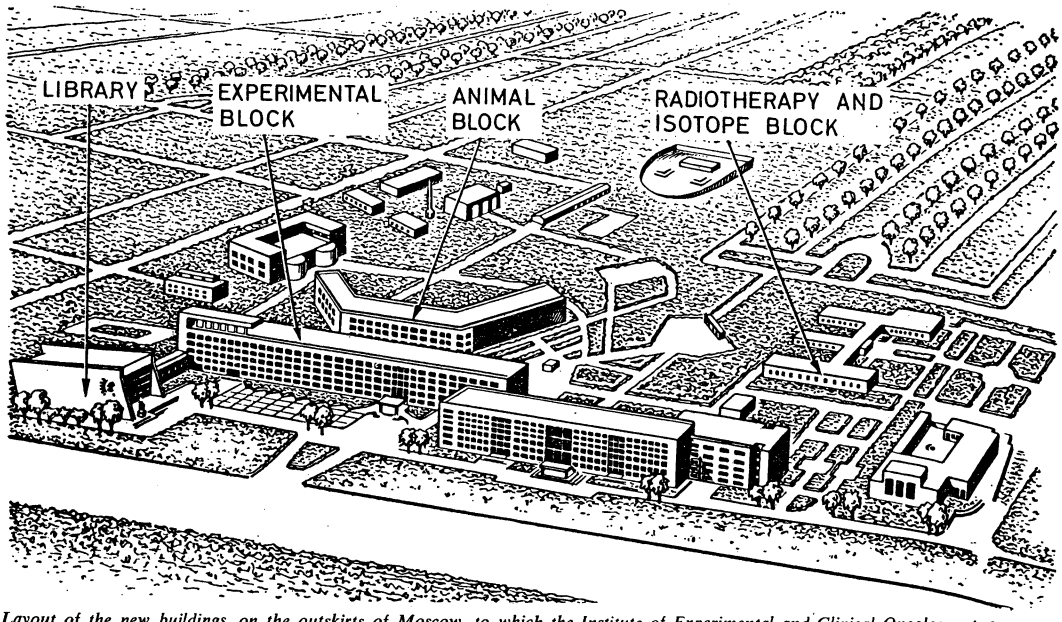
On the other hand, it is truer of cancer research than most other fields of scientific endeavour that success is not proportional to the number of workers seeking it. Therefore one must try to assess the quality rather than the quantity of Russian work as compared with that of scientists from other countries. With over 1,300 papers, and six lecture theatres in use simultaneously, making this assessment at the recent Congress was no easy task.

Neither I, nor anyone I spoke to in Moscow, was aware of any discovery of really "headline" importance made in the Soviet Union. On the other hand, few of us doubt that, as from now, Russian workers stand an almost equal chance with their counterparts in the West of making important contributions to the store of fundamental knowledge. Even as late as four years ago, at the last International Cancer Congress in London, the apparent ignorance of some of the Russians of work done in other countries, coupled with what seemed to be a genuine belief that their work represented a valuable gift from "organized Communism" to a "disorganized world", made one wonder whether this particular foetus would ever emerge safely from the womb. By way of contrast the present Congress could be likened to the christening of a new infant, an infant full of life, vigour and promise. It is as if a new generation of Russian scientists and doctors had suddenly appeared. Many of them can speak English and other languages, and most of them are far more familiar with the scientific publications of the West than western scientists are familiar with Russian papers. Unless some radical change occurs in the extent to which Russian scientific journals are translated into English, it is certain that ignorance of Russian work by Western countries will soon be a serious handicap to progress at the international level.

Until recent years, interest in Western countries has centred mainly on the techniques of cancer treatment. Even now surgical, radiotherapeutic, and chemotherapeutic studies make up a high proportion of the total research effort. Soviet workers, on the other hand, perhaps because of their naturally more practical and realistic approach, are from the start allowing themselves to be guided by the principle that prevention is better than cure. Thus they are specially interested in such subjects as the prevention of pollution of the air, and the elimination of cancer inducing chemical agents from food. Similarly, Russia was one of the first countries actively to discourage smoking. Research on viruses, including those which induce cancer in various animal species, has also attracted a large number of Russian scientists; in this field, and in the technology of tissue culture, upon which so much virus research depends, they are now beginning to make an important contribution.

In more theoretical branches of cancer research, such as the study of the biochemical mechanisms by which cancer-inducing agents transform cells and tissues from the normal to the cancerous state, somewhat less effort is in evidence. However, there is one branch of basic research, namely the study of immune mechanisms in relation to cancer, in which the Russians really shine. The name of Professor L. A. Zilber has for many years been world-famous in this sphere. A team of workers under his direction have developed new methods for detecting and preparing tissue-specific and organ-specific antigens. This work has importance both because it may throw light on the mechanisms of cancer induction and because it may eventually lead to entirely new methods of cancer treatment. There was a time when immunology could be defined as the study of the response of the body to the introduction of foreign proteins or or protein derivatives. In recent years, however, it has become clear that in certain disease states (known as auto-immune diseases) the body reacts against proteins present in some of its own tissue cells with the result that the latter are destroyed. If the body could be made to regard the special proteins of cancerous tissue as "foreign", the resulting response could lead to the selective destruction of that tissue. The techniques developed by Zilber and his colleagues, and by others, bring this possibility several stages nearer.

One of the most interesting and important papers presented at the Congress was that of Drs J. J. Trentin, Y. Yabe and G. Taylor of Baylor University in Houston, Texas. During the past few years it has become increasingly certain that viruses are involved



Layout of the new buildings, on the outskirts of Moscow, to which the Institute of Experimental and Clinical Oncology of the USSR Academy of Medical Sciences will move later this year.

in the causation of some forms of cancer in Man, and the time is now ripe for the discovery of the first human cancer virus. Only technological difficulties have been standing in the way. Like many other workers, Trentin and his two colleagues introduced material derived from human patients with cancer into animals, either directly, or after cultivation in tissue culture. In most instances, nothing dramatic happened in the inoculated animals. However, when a particular virus, adenovirus type 12, isolated from the alimentary canal of a patient with cancer, was injected into the lungs of newly-born hamsters, a high proportion of the latter developed cancer at the injection site, and some developed cancer at distant sites also. Another American worker, Dr R. J. Huebner, stated that he had repeated the experiment of Trentin and his colleagues, and had obtained the same result. Evidence presented by Trentin makes it virtually certain that the tumours which arose in the hamsters were due to adenovirus 12; but there is not sufficient evidence yet to be sure that the adenovirus 12 causes cancer in Man. From now on, many research centres may be expected to undertake projects with this and related viruses, and the prospect of the first "cancer vaccine" seems to be getting very close.

Also within the virus field, an important paper was presented by Dr Audrey Fjelde from the Institute of Genetics of the University of Lund, in Sweden. Since when cancer cells divide they pass on heritable differences to their progeny, it is an obvious possibility that a mechanism of action of cancer inducing agents may be through an effect on those components of the cell responsible for their inheritance—the chromosomes and genes. It has been known for some time that cancer producing chemicals induce often quite characteristic changes in chromosomes; now Dr Fjelde's work has shown that viruses, both cancer inducing and non-cancer inducing, may have the same effect. For this work she used three strains of human cancer cells grown continuously in tissue cultures for over ten years. At the end of that period each of these lines of cells had an absolutely stable chromosome pattern. When, however, any one of three different viruses was introduced into the tissue cultures, discrete and characteristic changes were seen in the chromosomes.

The third piece of work which I have chosen to mention came from a Russian worker, Dr R. P. Martynova, working in Moscow. In 1936 the late Dr Bittner of Minneapolis, USA, discovered a virus which caused mammary cancer in mice. The virus is normally transmitted from a mother to her progeny in the milk, the female sucklings which receive this infected milk have a high risk of developing mammary cancer later in life. The disease can be prevented by foster-nursing, from the moment of birth, by a mother not infected with the virus. For many years scientists have wondered whether a similar virus might play a part in the causation of breast cancer in humans. Several relevant investigations with this in mind have been made, but that by Dr Martynova is one of the most extensive and most competent. Detailed and carefully controlled investigation of breast-fed female relatives of women who developed breast cancer led Dr Martynova to conclude: "These results provide a basis for the conclusion that in Man no factor has been revealed similar to the milk factor in mice."

Cigarette smoke is certainly the most important single factor in the causation of lung cancer, though other important factors are known. For instance, before special precautions were taken, nickel and chrome workers had a high risk of developing the disease. During the past few years it has seemed increasingly likely that the effect of exposure to two lung cancer hazards may

be more than simply additive. In this connection two papers of interest were presented at the Congress. The first came from Dr J. G. Dean of South Africa. In his studies he found that male immigrants from Britain to South Africa have a greater risk of developing lung cancer than white men of British descent born in South Africa, despite the fact that the smoking habits of the two are similar. He suggested that exposure to air pollutants during the early life of the immigrant group was responsible for the difference, but presented no real evidence for this not unlikely hypothesis. Dr Paul Kotin of the United States, well-known for his view that atmospheric pollution is more important than smoking as a cause of lung cancer, reproduced the disease in mice by exposing them first to influenza virus and then to an aerosole of cancer-producing chemical agents of the type found in polluted air. It was clear from several other papers on the same subject that the search for cancer-inducing substances both in the atmosphere and in cigarette smoke must be continued if true understanding of the causation of lung cancer is to be achieved. On the other hand, there was no dissention from the view that in the present state of our knowledge the best way of preventing the disease is "not to smoke".

It has often been said that important discoveries come to light between Congresses rather than at them. There are several good reasons why this should be so. Titles of papers read at last month's Congress had to be sent in by November, 1961, and the actual text to be submitted by March this year. Thus most of the data presented were at least six months old by the time of the Congress. However, it is by no means the only, nor the most important, function of meetings such as this to present entirely new material. Reviews of particular aspects of cancer research, by acknowledged experts, and Panel Discussions on special topics, play an important part. But most important of all, perhaps, is the cross-fertilization of ideas which results from the chance or planned meeting of people in the lobbies, over meals, and during social events. From this point of view, many delegates feel that the size and scope of the Eighth Congress exceeded the useful limit. Amid the swarms of people it was difficult to find those one particularly wished to meet, and the chances of doing so accidentally were small. One solution of the difficulty which has been suggested would be to hold alternate congresses in the clinical and purely experimental fields; but this would be a retrograde step, for there is a constant need to maintain and even widen the bridges between the clinical and non-clinical workers, and so to prevent either from wandering off at a tangent to the central problem. Other ways of limiting the scope of the congress must therefore be sought.

The congresses are convened by the International Union against Cancer, of which, at the close of the proceedings in Moscow, Professor Alexander Haddow of the Chester Beatty Research Institute, London, became President; he will hold office until 1966, when the next congress is due to assemble in Tokyo. The friendliness and helpfulness of the Russian hosts at the Eighth Congress greatly impressed their visitors, and there was a general feeling that—as Professor Haddow pointed out in his very fine speech at the closing ceremony—the occasion had made a not insignificant contribution towards world peace.