

kind of study; and there are some diseases, such as trichiniasis, which are so protean in their manifestations and simulate so many other diseases that the diagnosis can only be made by the finding of the parasite or by serological methods which depend upon considerable laboratory experience. The veterinarian, of course, is always confronted by this kind of difficulty; his patients may be able to utter cries the quality of which may tell the experienced hearer of the vital things, but they cannot tell the whole story, and the experience necessary to interpret them comes only after years of practice. It comes, moreover, only to those who have the ability to acquire it; and it cannot be communicated to students and others except by a similar long experience based on a similar ability.

In a matter like this, the veterinarian and the medical man must therefore find a wide field of mutual interest. It is a field which deserves energetic co-operation and exploration. If the children's doctor may seem to be most likely to profit from such co-operation, the whole of medicine may learn much from the study of animal illness. Comparative medicine, whether it be practised by the medical man or the veterinarian, must certainly have a direct interest in objective methods of study which can give it reliable information about the conditions of certain organs, or about such cardinal symptoms as the quality, intensity and distribution of pain, about normal and pathological variations in body temperature, about fatigue, the reactions of the autonomic nervous system and so on. Much might be learnt, too, from a comparative study of the reactions to certain cardinal symptoms of disease which are shown by animals so different as the carnivore, the ungulate, the mammal and the bird.

The interpretation of the results of studies such as these will not be easy. They will usually involve behaviour patterns for the study of which the co-operation of a psychologist will be required. Perhaps we could begin with a reconsideration of the whole basis of Pavlov's work, or at least with a critical examination of certain criticisms of it (see *British Medical Journal*, 487, Oct. 16, 1943; *ibid.*, 305, Aug. 14, 1943; and *ibid.*, 573, April 22, 1944), which would seem to merit the serious attention of biologists. At any rate, we should have to begin with carefully thought out basic experiments, planned by a medical man, a veterinarian and a psychologist, which would be designed to provide a basis for further work. Such a plan has, in fact, been formulated by the Institute of Animal Behaviour, a committee of which is designing a programme of work the object of which is to explore the possibility of creating an objective science of clinical study. A similar theme was discussed at a recent meeting of the Section of Comparative Medicine of the Royal Society of Medicine. There exists, of course, a great deal of knowledge based on objective experiment which will help such a project; and both the medical man and the veterinarian can supply a vast store of clinical experience which will, if it can be systematized, be invaluable. Meanwhile the explorers stand upon their peak in Darien. Let us wish success to their campaign on behalf of all those, whether they be human or animal, who suffer but cannot tell their sufferings, or, if they would tell, are prevented by their own constitutions or immaturities from telling the truth or directing attention to the root causes of their troubles.

G. LAPAGE.

THE IMPERIAL CANCER RESEARCH FUND

THE Imperial Cancer Research Fund, which has just issued its forty-first annual report, is still carrying out experimental work and is also improving its financial position. During the past year, more than £20,000 has been added to the capital account, so that the Fund has now almost £430,000 in hand and spends about £15,000 a year in supporting research work in its laboratories at Mill Hill.

With a scientific staff of seven and four visiting workers, the laboratories are working in many fields of cancer research. The visitors include Sir John Ledingham, Dr. L. Dmochowski from Poland and Dr. E. Vasquez-Lopez from Madrid. The report of the director, Dr. W. E. Gye, is divided into sections on carcinogenesis, tissue culture, the mammary tumour inciter, and chemotherapy.

The work on carcinogenesis consists of Mr. H. G. Crabtree's study of the effects on the induction of cancer in mice of substances which inhibit metabolic processes. He has found that organic halogen compounds which react with substances containing sulphur in the body are able to retard the induction of tumours on the skin of mice painted with a carcinogen. The halogen compounds are of two types: those in which the halogen is reactive, as in chloroacetone, and combines directly with sulphhydryl groups, and others, such as bromobenzene, which react with sulphur compounds in the body without loss of halogen. Both types of compound appear to cause a local fall in concentration of glutathione when applied to the skin of mice. A similar effect was looked for with maleic anhydride, as it is known that maleic acid combines with glutathione. Maleic anhydride applied to the skin of mice treated with benzpyrene proved to be a more potent inhibitor of carcinogenesis than is bromobenzene. The work suggests that sulphur compounds are connected with the induction of tumours in some way which is not yet clear.

If connective tissue cells are grown in tissue culture in contact with carcinoma cells, the growth of the former is stimulated. On the other hand, sarcoma cells tend to restrain the growth of connective tissue. Stimulating effects of carcinomata have long been known to operate *in vivo*, as the change of connective tissue cells into malignant cells in the presence of transplanted mammary tumours has often been observed. Dr. R. J. Ludford and Miss H. Barlow have tried to demonstrate such a malignant transformation in connective tissue cells grown *in vitro* in contact with mammary cancer tissue, but so far without success.

The effect of the mammary tumour inciter, discovered in the Roscoe B. Jackson Memorial Laboratory in the United States, which is present in the milk of strains of mice with a high incidence of breast cancer, has now been shown to operate in the high-cancer strain RIII and the low-cancer strain S. It is pointed out that the fact that oestrone treatment induces tumours in male mice of susceptible strains indicates that the factor is present in the tissues as well as in the milk of mice in which mammary cancer occurs. The presence of the inciter in spleen tissue has been confirmed.

The difficulties of work on chemotherapy of cancer are discussed. For effective therapy either all the cancer cells must be destroyed, or the stimulus to divide which is present in these cells must be neutral-

ized. Other difficulties are the similarity in properties of normal and cancer cells, and the variation in growth and lethal effects of spontaneous tumours. The advantages of using a tumour which has arisen in a pure line of mice and is transplanted into mice of the same strain are stressed; no reference is made to a tumour of that nature introduced by Dr. E. Boyland some years ago.

RESEARCH WORK FOR 1944 IN THE ACADEMY OF SCIENCES OF U.S.S.R.

By LYDIA BACH

THE Academy of Sciences of the U.S.S.R., as the guiding centre for all scientific activity in the Soviet Union, has planned its work for 1944 in four main divisions. First, the study of scientific problems of various branches of knowledge for the advancement of science in general; secondly, research work in the sphere of improving armaments for the Red Army; thirdly, the mobilization of resources to strengthen the defence of the U.S.S.R.; and, fourthly, scientific problems connected with the rehabilitation of regions liberated from the German invaders and devastated by war, and further development of the national economy as a whole.

Plans for the year's work were drawn up by each institute separately, primarily by laboratories and then for institutes as a whole. A committee from each institute selects from its programme problems which offer the greatest interest for inclusion in the general plan of the Academy. Plans are then approved at a general meeting of members of the Academy, corresponding members, and leading scientific workers of each section of the Academy, which examines the subjects submitted in detail and draws up a plan for each section of the Academy. The Academy has eight sections covering the following branches of knowledge: physics and mathematics, chemistry, geology and geography, biology, technology, history and philosophy, economics and law, language and literature.

The 1944 plan which was approved by the presidium of the Academy on December 21, 1943, shows that the Academy is devoting the greatest amount of attention to big theoretical and practical research tasks, on the assumption that other questions can be better dealt with by institutions which work in special spheres and branches of industry.

In the Section of Physics and Mathematics, cosmic rays and the structure of the atomic nucleus will be studied by Dr. A. Alikhanov and Prof. D. Skobeltsin. Expeditions to the Pamirs and Mount Elbrus are being organized to study cosmic rays at high altitudes. The building of a cyclotron has been planned. Dr. P. Kapitza and his colleagues will continue their investigation on properties of matter at temperatures approaching absolute zero. The problems of the structure of matter are being worked at in the Physico-technical Institute by Joffe, and in the Institute of Crystallography by Prof. A. Shubnikov; at the Institute of Physics, S. Vavilov is working on mechanics, luminosity and the employment of luminescence. At the Institute of Mathematics, I. Vinogradov, S. Sobolev, A. Kolmogorov and S.

Bernstein are working on theoretical mechanics and giving particular attention to methods of employing calculating machines to solve equations arising in mathematical physics.

In chemistry, work will proceed on the development of modern conceptions of chemical bonds in the kinetics and catalysis of chemical reactions (N. Semenov, Prof. S. Roginsky). Frumkin and his school will continue their work on theoretical questions connected with electrode processes and the theory of surface phenomena. Work on the synthesis of carbon compounds of high molecular weight is proceeding. The chemical institute of the Academy of Sciences is devoting considerable attention to scientific and technical assistance to industrial enterprises, employment of new chemical and technical processes and their intensification, and also the rehabilitation economy of devastated regions which have been liberated from enemy occupation.

The programme for geology and geography includes the study of the main questions of stratigraphy and tectonics of the U.S.S.R., the mineralogy and the geochemistry of the formation and distribution of ore deposits. P. Stepanov will continue his work on the theory of coal formations in the world; V. Obruchev and his colleagues will work on the theoretical and practical problems connected with perpetually frozen territories. The work is being extended to the spheres of hydrogeology and the study of lakes and volcanoes. Work on the study of geography in the Soviet Union and foreign countries, and research work on processes taking place in the soil will be continued.

Each biological institute will work on its own special problems, but will handle them from the evolutionary point of view, developing them all as a complex whole in accordance with the basic problem of biology, that of Darwinism. The institute of evolutionary morphology is studying the laws governing that branch of biology. In the institute of palæontology, Borisyak has established a system of practical phylogenesis for the determination of evolutionary processes in fossils. The institute of physiology (Leon Ordeli) is concerned with the evolutionary processes of various systems of the human organism, muscular, neural, etc. Trofim Lysenko, of the Institute of Genetics, is continuing his work on inheritance.

Work on the humanities includes the study of Russian history, peasantry and working class collectivization, Russian culture, patriotic war, study of Slavonic peoples and the history of international relations. Further volumes, "History, Philosophy", will cover Russian philosophy and the philosophical views of Marx, Engels, Lenin and Stalin.

The mobilization of the country's resources for the needs of defence includes the study of problems connected with the industrialization of Kazakhstan. Work on the oil of new oilfields in Bashkiria continues.

In order to help rehabilitation economy in districts that have been devastated by enemy occupation and by war in general, and to help the general development of national economy, the problem of post-war provision of electrical energy is receiving urgent attention and fundamental principles are being laid down. Research is being done on the restoration of the Donets coal basin and its coalmines; industrial enterprises and transport are being greatly extended. The Academy's institute of economics is working on a very comprehensive publication, "Soviet Economy in the War and Post-War Periods".