THE BRITISH EMPIRE CANCER CAMPAIGN

ANNUAL REPORT

THE nineteenth annual report of the British Empire Cancer Campaign, which was recently issued, is much thinner than reports of previous years. It is, however, much condensed, and the usual index and many lists of names have been omitted. All the cancer research centres in Great Britain appear to be still carrying on, so that in the future it should be possible for the work to expand and to make rapid progress.

Virus Research

Pure lines of fowls have been used to advantage in the study of avian tumours at the Middlesex Hospital, London. A strain of Plymouth Rock fowls is very susceptible to the action of carcinogenic agents, while a strain of Brown Leghorn fowls is resistant to such agents and also readily forms antibodies to the Rous sarcoma virus. The variability in susceptibility of Brown Leghorn fowls to the virus is reflected in their ability to produce neutralizing antibodies and agglutinins. The antibodies present, however, may be ineffective in preventing the subsequent growth of tumours. This is probably due to the growth of the tumour cells coupled with increase of virus within the growing cells, in such a way that the virus does not come in contact with the circulating antibodies. Immunity to filterable tumours therefore is less certain than immunity to other virus diseases.

Dr. M. H. Salaman, of St. Bartholomew's Hospital Cancer Research Department, working with Dr. D. E. Lea, has studied the action of X-rays on vaccinia virus elementary bodies. The particles contain only a small amount of radio-sensitive material, but this is dispersed throughout the volume of the elementary bodies. In contrast to this animal virus, the radio-sensitive part of a crystallizable plant virus occupies almost the whole of the volume of the particles. Photomicrographs of vaccinia elementary bodies taken by means of an electron microscope show that they are oval in shape.

Carcinogenic Action

The possible carcinogenic effect of heated fats has been further investigated at the Glasgow Royal Cancer Hospital. When rats were fed on a diet of bread, milk, water and heated fats, non-malignant ulcerated papillomata developed in the stomachs of some animals. Since white bread ceased to be available, the rats have been given National bread and no papillomata have been seen.

Workers at the Royal Cancer Hospital are preparing and testing compounds for carcinogenic action and growth-inhibitory power with the object of finding new substances worthy of therapeutic trial.

Dr. I. Berenblum suggests that injected benzpyrene must remain unchanged in the tissues for some time if it is to produce tumours. If benzpyrene is injected subcutaneously, it remains at the site of injection for some time and tumours are formed. If it is injected into the peritoneum, it disappears rapidly and no tumours result. Less than one per cent of injected benzpyrene is excreted as unchanged material, but a considerable amount is excreted as a monohydroxy derivative. Dr. I. Berenblum and Dr. R. Schoental have now isolated benzpyrenequinone from the fæces of rats which had been injected previously with benzpyrene. This quinone is possibly derived from a dihydroxy compound.

Benzpyrene in true solution has a violet fluorescence, but in the animal body it is converted into *BPX*, which has a blue fluorescence; *BPX*, in the presence of intestinal contents, is changed into a substance with a green fluorescence. Prof. F. Weigert and Dr. I. Doniach at the Mount Vernon Hospital have observed a violet fluorescing wave passing down the alimentary tract of mice which had been given benzpyrene by mouth. The benzpyrene was absorbed so that the violet fluorescence spread to the fatty tissues, and afterwards a blue fluorescence was seen in the kidney and *BPX* appeared in the bile. When the common bile duct was ligated, the blue fluorescing *BPX* was unable to pass into the intestine but accumulated in the plasma and was deposited in the lung, liver and intestinal wall. *BPX* was not absorbed from the gut. These observations amplify results obtained in this field both in Glasgow and Oxford.

Dr. J. C. Mottram reports that carcinogenic hydrocarbons caused some hæmolysis of erythrocytes in isotonic saline, but the same hydrocarbons increased the resistance of the cells to hæmolysis in hypotonic solutions. These effects were much reduced if proteins were present, and it is suggested that the protective action of proteins may account for the failure of carcinogens to induce cancer cells in tissue culture.

Heredity

The experiments of Andervont and of Bittner in America have shown that a factor influencing the incidence of breast cancer in mice is transmitted from mother to offspring through the milk. This factor is present in the milk of mice from strains with a high incidence of breast cancer. Dr. G. M. Bonser has been able to demonstrate the effect of the factor in male mice. Male mice of the *CBA* strain, in which the incidence of breast cancer even in females is low, have developed tumours of the breast following injection of triphenylethylene only when they have been suckled by mice of the *R* III strain. On the other hand, the incidence of breast tumours in mice of the *R* III strain, which is usually high, was reduced if they had been suckled by *CBA* mice.

Successful experiments on cross-fostering have also been carried out at Newcastle-on-Tyne, where Dr. F. C. Pybus and Dr. E. W. Miller increased the incidence of breast tumours in *CBA* female mice from 5 per cent to 60 per cent by allowing them to be suckled by mice of the Simpson strain. Further confirmatory evidence of the existence of this extra-chromosomal factor has also been obtained at the Marie Curie Hospital.

An examination of the incidence of cancer in the mothers and sisters of patients suffering from breast cancer, made by Miss L. M. Wainman in Leeds, shows the incidence to be no higher among the relatives of the patients than in the general population. This result is of interest, particularly as it is different from the findings of Wassink in Holland. As most infants are suckled, the present observations indicate that, in the section of the population examined, there is not likely to be a factor influencing the incidence of breast cancer transmitted through human milk.

Radiations

Mouse tumours have been irradiated with neutrons in order to determine the amount of radiation which is necessary to produce tumour regression. This work, carried out at the Mount Vernon Hospital, shows that the neutron dose is only one-twentieth to one-thirtieth of the X-ray dose which would be required to produce the same response.

Dr. J. S. Mitchell has photographed tissues, before and after irradiation with X-rays, using ultra-violet light of wave-length 2537 A. The absorption of light of this wave-length by the cytoplasm increases on irradiation, and this has been shown to be due to accumulation of nucleotides. There is no comparable increase in nucleic acid content of the nuclei, and it is suggested that X-rays inhibit the reduction of nucleotides to desoxynucleotides and so prevent the formation of nucleic acid.

Growth Factors

Extracts of bacteria and of some fowl tumours contain a growth-stimulating factor which reduces the delay in the growth of *Staphylococcus aureus*. Prof. H. N. Green and Dr. F. Bielschowski have been able to concentrate the factor and show that it has the properties of a weak acid. The same workers have examined some derivatives of the carcinogenic insecticide, 2-acetylaminofluorene. The growth of rats and of bacteria was inhibited by 2-aminofluorene. These results indicate that the factors which govern the growth of bacteria and of tumours may be similar.

Clinical Research

An analysis has been made of the histological findings from specimens obtained from mastectomies carried out at the Middlesex Hospital over a sixteen-year period. Nineteen cases of malignant disease in the male breast were found. Only three cases of extensive non-malignant epithelial overgrowth in males were seen, and of these two were from men who had worked with stilbœstrol.

The Clinical Cancer Research Committee has now analysed the data from four hundred and seventy-three cases of carcinoma of the œsophagus. The prognosis for this form of cancer is bad; only thirty-four of the patients were known to have survived for more than a year after the original diagnosis had been made.

The British Empire Cancer Campaign would be doing useful work if it were merely able to keep the various cancer research institutions just 'ticking over'. It is, however, doing much more than this, as the present report amply shows. E. BOYLAND.

CONTROL OF RAW MATERIALS

THE report on the work of the Combined Raw Materials Board to January 26, 1943, which has recently been issued over the signatures of the two members of the Board, Mr. W. L. Batt, vice-chairman of the War Production Board, United States, and Sir Clive Baillieu, head of the British Raw Materials Mission in the United States, outlines the measures taken since the Board was set up on January 26, 1942. The report demonstrates that international co-operation on a large scale and on a day-to-day level can be markedly successful in getting the resources of each country used to the best common advantage. Without combined machinery, the settlement of each joint problem as it arose through contacts which would not continue after their purpose had been achieved, and which would not provide experience and knowledge to be applied to other problems, would inevitably have been surrounded with difficulties and obstacles involving delay, uncertainty and dissatisfaction. As it is, very real progress has been possible towards a planned and expeditious utilization of the combined raw material resources in the prosecution of the War.

The Board's primary duty was to bring under authoritative review the combined supply and requirements position for those materials which are in such limited or precarious supply as to endanger any part of the total war effort. The materials selected for review were those for which there was *prima facie* evidence for concern. Initially, they were materials of which the supply had been affected or threatened by enemy action in the Far East, such as rubber, silk, tungsten, tin and manila hemp and sisal. In other cases, for example, the principal non-ferrous metals, it was important to take all necessary precautions in view of the unprecedented demands which the combined military programmes were imposing upon normal sources of supply. In a third class were materials which gave rise to operating or purchasing problems where both the United States and Great Britain, together with others of the United Nations, might be in active competition in the various markets for limited supplies.

The common factor in all the Board's materials reports is that it has provided for the first time, through combined machinery not previously in existence, an official assessment of the total position. The reports draw together in one document a combined statistical survey of requirements and supply for one or two years ahead; a review of possible interruptions to future supply, and of measures in progress or desirable to increase output; and a consideration of the problems of conservation and substitution. The Board exercises its authority through recommendations to the departments and agencies of the American and the British Governments already responsible for the supply and distribution of raw materials within their fields, and based on its reports these recommendations have been directed towards balancing supply and demand through allocations, maintenance or increase of supply, conservation and economy in use, co-ordination of the purchasing and development activities of the two countries in the various markets and shipping adjustments.

For most materials the maintenance and stimulation of output is a matter of fundamental concern, and for such materials as rubber, copper, tin, nickel, cobalt, tungsten, mica, zinc, balsa and sisal, the Board has gone considerably beyond general indications and has made specific recommendations as to the places at which development should be undertaken and the methods or organization which should be used. In regard to conservation, the principal direct contribution of the Board has been to secure and co-ordinate exchanges of technical information and experience. This action has brought in so far as possible the other United Nations, and such exchanges