

### 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 Å. 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 stilbæstrol.

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 Bailieu, 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

have been of particular importance where the more liberal use of a scarce material in one country than in another is due, at least in part, to undeveloped technical processes and equipment. Recommendations made on this point in connexion with tungsten, tin, cobalt, mica, copper, zinc, graphite and asbestos have in some instances been reinforced by an advisory interchange of technicians. A special liaison has been set up to centralize the activities of the Board in a field covering a wide variety of commodities, and particularly to provide a defined channel for the exchange of information on matters of conservation.

Liaison has throughout been maintained with the parallel Combined Boards, and a Joint Advisory Committee has been set up with the Combined Food Board for questions relating to fertilizers. The Combined Production and Resources Board has been provided with a statement of the estimated supply to the end of 1943 for steel ingots and the key materials aluminium, rubber and copper, as well as with combined supply requirements summaries for some twenty-four materials actually or potentially in such short supply as to endanger any part of the production programme.

In regard to collaboration with others of the United Nations, through machinery already developed by the State Department and the Board of Economic Warfare in Washington and by the British Commonwealth Supply Council in London, as well as by direct discussions and negotiations, the resources of Central and South America, the Belgian and French overseas territories, the British Commonwealth and friendly neutrals have been and are being mobilized. For the U.S.S.R. requirements are covered in the Protocol Agreements in amounts which are adopted by the Board in any general allocations. Discussions have taken place between representatives of the U.S.S.R. and Britain and the United States with regard to the supply of certain materials from Russia.

With the passing of a greater range of materials into the category of "short or critical supply", it became necessary for the two countries closely to co-ordinate the planning of their export programmes involving such materials. A Combined Export Markets Committee was therefore set up under the auspices of the Board to watch over the export programmes of both countries for certain scarce materials, to ensure that the requirements of the importing countries are, so far as possible, met, but on a carefully controlled assessment of essential needs comparable to that obtaining in the United States and Great Britain. On this basis the Committee agrees upon joint export programmes in the light of the other factors involved—shipping, labour, political and financial considerations, maintenance of normal channels of trade, etc.

The report thus shows that the Board has been able to exercise its function of planning the raw materials side of the combined war effort in three principal ways. First, agreement has been secured, through the Board, between the two Governments concerned, to common action in regulating supply, distribution and use of the major strategical materials, with the object of ensuring that each country is put in a position to make its maximum contribution to the war effort on the production side. Secondly, by bringing the authorities of the two countries together in co-operative arrangements for purchasing and supply, a scramble has been prevented for those 'secondary' materials which are, in their place,

essential to the production programmes. Thirdly, the Board and its machinery have formed a centre for the discussion of day-to-day problems affecting either country, and for the compilation of information and evidence on which alone an effective solution for those problems can be based. The extent to which those facilities have been freely and fully used by the Governments concerned, and the fact that although the Board has no executive authority its recommendations have never been disregarded, offer the strongest justification for the hope that this machinery of joint control over world-wide resources will be continued and given wider scope to prevent a wild scramble for the diminished supplies after the War, frustrating our hopes for the most fruitful use of the world's resources in recovery.

## AIR-BLAST CIRCUIT-BREAKERS

A PAPER read in London on March 4 before the Institution of Electrical Engineers by A. R. Blandford discusses notable improvements in circuit-breaker design with reference to the reduction in oil quantities and to its elimination.

The trend in the design of modern high-power circuit-breakers has always been in the direction of reducing the quantity of oil necessary for arc interruption. A decided step in this direction was the introduction of the arc-control device which confined the arc within an arcing chamber surrounding the contacts during arc interruption. The application of such devices, which usually take the form of a small container of liquid with restricted venting enclosed in the main containers of liquid, made possible a considerable reduction in oil quantity, particularly at the higher voltages. More recently, there has developed a strong demand for oil-less circuit-breakers.

Other forms of circuit-breakers using various extinguishing media have been developed, but only the two forms, oil and air-blast, have found general favour, and of these the growing popularity of the latter is accounted for by a proper appreciation of its superiority in principle of operation and behaviour. The inherent advantages in their order of merit are freedom from explosion, elimination of oil-fire hazard, mechanical simplicity, suitability for duties requiring frequent operation, cleanliness of maintenance and operation, reduced maintenance, and facility for power closing.

The principle of the axial blast can be applied readily to voltages from 6.6 kV. upwards at standard ratings. The question of susceptibility to rates of rise of recovery voltage can be overcome with ease by the incorporation of parallel resistors, which also limit harmful over-voltages. Air-blast breakers provide freedom from the dangers of explosion and they eliminate fire hazard completely. They are positive in operation and result in minimum arcing times at all values of current. They sustain a minimum deterioration of contacts, resulting in long life for repetitive operation. 'Making' contacts are exposed for ease of inspection. Clean and speedy inspection of arcing contacts is possible, only about three minutes being required to dismantle and inspect one interrupting chamber. Large-capacity batteries with their problems of regulation for closing purposes are eliminated.