Cancer Research.

IN the twenty-sixth annual report of the Imperial Cancer Research Fund, the Director, Dr. J. A. Murray, reviews certain aspects of the cancer problem with special reference to the contributions made by members of the scientific staff of the Fund. He points out that although cancer is at its inception a local disease, a factor of general susceptibility or resistance also plays a part in the development of, or failure to develop, a tumour. The response to a local irritation, if it occurs, is the appearance of a growth at the site stimulated; early removal will result in complete cure, even though the growth may be of a typically malignant character. Such cure is observed not only in mice painted with tar, but also in human beings, provided the operation is carried out at the earliest stages of the development of the tumour. But tar-painting only produces a neoplasm after different intervals in different mice: some fail to develop one even after a year's painting. If the growths are removed from a number of mice in which they have appeared soon after the commencement of the course of tarpainting, it is found that these animals are distinctly more resistant to a second course of tarring. A similar resistance to a subsequent course of tarring is also observed in mice which have suffered from a spontaneous mammary cancer, after the successful removal of the latter. This last experiment proves that the increased resistance is not due to a change in the cells of the skin alone, but to a general constitutional factor.

The existence of this factor of susceptibility or resistance in man is disclosed by two different sets of observations: first, multiple malignant new growths in a single individual are extremely rare; secondly, the incidence of tumours in males and females in different countries strongly suggests that a certain number of the population are susceptible to the disease, but that the actual site at which it will appear depends on factors of race and environment. In England, Holland, Japan, and Switzerland the incidence of cancer is about the same in men and women, and varies from 1·0 to 1·2 per 1000 living. In the male, however, the majority of the tumours observed are found in some part of the digestive tract: in the female the incidence here is lower, but is very much heavier in the specific sex organs, especially the uterus and breast; 20-40 per cent of all cases of cancer in women occur in these organs. Thus, so to speak, the heavier incidence in the specific female organs is compensated by a lower incidence in the digestive tract. At the same time the incidence in breast and uterus varies in different countries: cancer of the breast is commonest in Englishwomen, rare in Japanese, and only half as common in Dutch women; cancer of the uterus is very prevalent in Japanese, but only half as common in Dutch as in English women. The lower incidence of cancer of the specific organs in Dutch women is, however, accompanied by an increased incidence in the digestive tract, so that the total mortality is about the same as in English women. These observations strongly suggest that the incidence of cancer is determined by general factors of susceptibility, but the actual organ in which it appears by local factors varying according to the environment in its widest sense.

Dr. Murray states that his colleagues have been unable to demonstrate any connexion between malignant growths and dietetic deficiencies. Old rats, or rats kept on diets deficient in vitamins A or B, frequently develop papillomata and warts of the epithelial lining of the fore-stomach, but no malignant tumour has ever been observed. He considers, in fact, that there is no trustworthy evidence, experimental, statistical, or clinical, of a causal correlation between cancer and the absence, or presence, or excess of any particular dietetic constituent, in spite of statements to the contrary frequently made.

During the year Prof. Heidenhain stated that he had been able to transmit cancer from man to animals, by injecting a large number of mice with human cancerous material. After a considerable interval a certain number of these mice developed tumours; however, the incidence of these growths was similar to that of spontaneous neoplasms in the stock of mice maintained by the Imperial Fund, so that Heidenhain's growths must be considered to be spontaneous new developments, and not as originating directly from the human material injected.

The glycolysis produced by cancer cells in the presence of oxygen does not appear to be a specific phenomenon: virus infections resulting in cellular overgrowth also show glycolysis, whilst those in which this overgrowth is absent fail to show this characteristic. It appears, therefore, that an aerobic glycolysis is not restricted to cancer, but occurs also in other types of pathological cellular overgrowth. The majority of normal tissues only show this phenomenon in the absence of oxygen.

Exposure to low oxygen pressures results in delayed growth and extensive necrosis of tumour cells, but even prolonged exposure fails to arrest the growth completely, and regression has never been observed. As a possible treatment of cancer this method is therefore without therapeutic value by itself (although it might be useful as a supplement to other methods of treatment).

Report of the Forestry Commission.

IN their eighth annual report, the Forestry Commissioners give a record of the work accomplished in Britain during the year ending Sept. 30, 1927. The planting programme, which has formed the chief of their activities, was continued. On the subject of finance, the report shows that out of the total of £3½ millions sanctioned in 1919 for a ten years' programme to be paid before Mar. 31, 1929, £3,014,400 had been allotted up to Sept. 30, 1927, leaving £485,600 still to be provided. The Treasury had since intimated that this balance would be made available for the financial year 1928–29, which, with a balance of £136,000 estimated to be in hand on April 1, 1928, gives a sum of £621,600 for the possible expenditure during 1928–29.

The land acquisitions amounted to 36,039 acres during the year, of which 30,755 acres were classified as plantable. The total land acquired between 1920 and 1927 amounted to 391,511 acres, of which 244,838 acres were classified at the time of acquisition as plantable; 155,208 acres of this latter land are leased and 109,630 acres have been purchased. Of the plantable area, 140,756 acres (57 per cent) are situated in England and Wales and 104,082 acres (43 per cent) in Scotland. In spite of the smaller amount of planting land in the latter, the total acreage, leased and purchased, acquired in Scotland amounts to 233,667 acres as against 157,844 acres in England and Wales. It is at least open to doubt whether the Commissioners are acting wisely in thus saddling themselves with so large an area of unplantable land in the early years of their existence.

As is well known, the main idea governing the Commissioners' work so far has been the acquisition of land and the formation thereon of coniferous plantations, the original programme being to plant 150,000 acres in the ten-year period. For reasons detailed in previous reports, there was a check in the work. The area planted during the year under review amounted to 21,963 acres of conifers. It is estimated that 135,000 acres will have been afforested with conifers by the end of the ten years, of which 90,156 acres had been planted by the end of the eighth year, with, in addition, 4130 acres of broad-leaved species (hard woods); or a total of 94,289 acres. The report adds that a total area of approximately 117,300 acres had been completed by May 1928. It was proposed in the original programme that assistance should be given, by way of grants, to local authorities and private owners to afforest areas under their control, an area of 110,000 acres being prescribed for the ten years. About 62,000 acres have been more or less dealt with, and it is hoped to achieve a total acreage of 75,000 by the end of the ten years. The work on the provision of forest worker's holdings has proceeded. The systematic formation of these holdings was commenced in the summer of 1924. Up to September 1927, 357 holdings had been completed (171 in the year under review), and 219 were in process of formation.

The cost of planting still remains very high. The report says that the outlay per acre on labour and material on the area planted between 1919 and 1927 was as follows: England and Wales, £8 : 9 : 9; Scotland, £9 : 10 : 3; Great Britain, £8 : 16 : 4. These figures include the cost of preparation of the ground, drainage, fencing, plants, planting, replacement of failures, and weeding. It is noticeable that during 1927 the expenditure on replacing failures (beating up) was something over 25 per cent of the cost of original planting, a decrease on 1926, when it was nearly 50 per cent; the figure is, however, excessive, and few private owners could undertake afforestation if they had to face so high a proportion of failures.

The Commissioners have scarcely faced the question of undertaking a part of their work by direct sowing, of which few adequate experiments have yet been made; and yet it would appear that it is in this direction that the true solution of the afforestation question is to be sought. With high planting charges and nurseries costing as much as half the total expenditure entailed on the cultural operations (£351,046 as compared with £675,889 for the eight years), it is difficult to foresee how an adequate area of forests will be obtainable with the amount of money which the tax payer is likely to be able to devote to this forestry work, necessary as it is to the future welfare of Great Britain.

Moray Firth Fisheries.

THE Fishery Board for Scotland has recently issued two important papers dealing with commercial fishing in the Moray Firth. The first is a review of the cod-net fishing,[1] and the second is an account of the Danish seine-net fishery.[2] Prepared by so able an authority as Dr. Alexander Bowman, these two papers contain much interesting and valuable practical information. Read together, they demonstrate very clearly the great extent to which the prosecution of both cod-net fishing and Danish seine-netting has been influenced by the prevailing economic conditions of the great Scottish herring fisheries.

Between herring seasons, other work must be found for the steamers and motor craft, which need to be kept in almost constant commission to meet expenses; they cannot be laid up with the same facility as the older sail boats. Thus cod-net fishing, begun in the Moray Firth in the year 1906, attracted little attention until two or three years later, when the fact had become more generally realised that remunerative results were being obtained at a time of year when there is a general lull in herring fishing. Even then, one disastrous season in 1911 so weakened the confidence of the crews of the steamers that, in the following year, fewer steamers were fitted out for the fishery, although cod entered the area in considerable numbers. Moreover, the fact that their subsequent return to the fishery has been slow, seems to suggest that, as yet, confidence in the method has not been fully regained.

The method of fishing by means of the Danish seine was first introduced into Scottish waters in the autumn of 1921. In that year, during the coal strike, a large number of Danish motor boats using the seine landed good catches at English ports, and even after bunkers again became available to trawlers, these small vessels proved able to compete successfully in the market. The Danish net was therefore rapidly adopted, at first by English vessels and almost immediately thereafter by a number of Scottish steam-drifters and motor boats. The vessels normally employed in the Scottish drift-net fishery being especially suitable for the use of the light Danish seine and easily convertible at comparatively small expense, both steam and motor drifters from Moray Firth were rapidly equipped with the new gear, and fishing was soon being carried on energetically in local waters. The adoption of the method was accelerated by the acute depression prevailing in the herring-fishing industry at the time. The intensity of fishing which characterised the early operations was, however, not maintained, and, in 1923, the total number of landings fell short of that of the previous year, but in the following years there was no sign of further decline. With the large number of power vessels adopting the Danish seine, it became a question of some interest whether or not the new method would supplant the older one of cod-net fishing. The innovation is of too recent a date, however, to permit a definite answer to be given at present.

[1] "Review of the Cod-net Fishing in the Moray Firth." *Fisheries, Scotland, Sci. Invest.*, No. 1; 1928.
[2] "Danish Seine-net Fishing in the Moray Firth." *Fisheries, Scotland, Sci. Invest.*, II.; 1928.

Liverpool Observatory and Tidal Institute.

AN agreement has just been made between the Mersey Docks and Harbour Board and the University of Liverpool for the administration as a single institution of the Board's Observatory at Bidston and the Tidal Institute of the University. The combined institution is to bear the name of "The Liverpool Observatory and Tidal Institute" and will be governed by a joint committee of the Dock Board and the University.

The Liverpool Observatory was founded in 1845, and since 1867 it has been situated on Bidston Hill, near Birkenhead. The work carried on has always been intimately associated with the activities of the port, much attention being given to time-measurement