Fig. 3.

UP-TAKE OF RADIOACTIVE SODIUM FROM THE SMALL INTESTINES; THE ENTERIC COATING HAD A LEAK. 0.3 GM. Na^{22}Cl IN ENTERIC COATING DISSOLVED IN SMALL INTESTINE AFTER 8 HR.

after it started to dissolve) and then decreases to equilibrium value.

Fig. 3 was obtained with a pill which apparently was leaking, for an activity in the hand can be detected half an hour after intake. The pill itself could be followed for about eight hours, when it finally dissolved in the intestines. At this time the activity in the hand is raised, reaches a maximum in about one hour and falls again to a level higher than the first one, since now the total

activity is distributed throughout the body.

Besides the handcoated pills, commercial coatings have been tested. In this case some 100 or 1,000 pills are coated at the same time, and the few active samples can be easily segregated with the aid of a counter.

The results in Table 1 indicate that the majority of the hand-made pills dissolve in the small intestines.

In connexion with other experiments on the distribution of the sodium, potassium and chlorine ions in the body, we want to direct attention to the fact that the curve for the time-rate of absorption from the stomach is entirely different from the absorption-curve from the small intestines. In the first case the absorption reaches a level which remains constant for hours and decreases only after a large amount of the salt has been excreted.

The absorption from the intestines raises the salt level temporarily and equilibrium is reached through back-diffusion, indicating that a local surplus produced by a sudden release of salt causes a real absorption through the wall of the intestines which is adjusted later by back diffusion and ionic exchange.

A detailed description of these experiments will be given elsewhere,

¹Corley, J. T., and Lee, C. O., *J. Amer. Pharm. Assoc.* (5), 27, 379-384 (1938).

²Hamilton, J. G., *Proc. Nat. Acad. Sci.*, 23, 521 (1937).

WORK OF THE BRITISH EMPIRE CANCER CAMPAIGN

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THE seventeenth annual report of the British Empire Cancer Campaign contains 280 pages as compared with 368 pages of the previous report. The total sum expended in grants in aid of research amounted to more than £40,000, as compared with £53,000 for the previous year.

Interesting advances into the possible origin of cancer have been made by examining human organs for possible carcinogenic agents. Some years ago, the Russian investigator Schabad prepared carcinogenic material from the liver of a woman dying of cancer of the stomach. Dr. des Ligneris has investigated this problem in South Africa, where cancer of the liver is common among Bantus, but not among Europeans. Extracts of livers from normal Europeans were not carcinogenic, but extracts from the livers of both cancerous and non-cancerous Bantus produced cancer in mice. Dr. I. Hieger is working on the problem in London, and has induced tumours in mice by treatment with the unsaponifiable fractions of livers from European cancerous and Bantu non-cancerous subjects. Several tumours in mice were

obtained by treatment with the extract of a liver from a case of lymphosarcoma.

Normal human liver and bile contain deoxycholic acid and, as was reported in these columns (Cook, Kennaway and Kennaway, *NATURE*, 145, 627; 1940), this acid is carcinogenic to mice when injected subcutaneously but not when painted on the skin. The carcinogenic material isolated from human livers is not likely to owe its activity to deoxycholic acid, as it is the unsaponifiable fraction which contains the active material.

Carcinogenic hydrocarbons in very low concentration are able to photosensitize *Paramecia*. Using this as a means of detection, Dr. J. C. Mottram has been able to show that when 3:4-benzpyrene is applied to mice, it accumulates in the liver and lungs. This is of interest, as it helps to explain the fact that some carcinogenic compounds induce tumours in these organs in certain strains of mice. The addition of benzpyrene to a culture of *Paramecium* kept in the dark increases the rate of growth, and after prolonged cultivation in the presence of the hydrocarbon

many abnormal forms are produced (see also NATURE, 145, 184; 1940).

The relationship between carcinogenic action and inhibition of growth with change in chemical structure has been carefully studied and many new compounds have been synthesized. Most carcinogenic compounds inhibit growth, but 9:10-dimethylanthracene, which is a weak carcinogenic agent (and incidentally the simplest known carcinogenic hydrocarbon), does not inhibit growth. Dr. A. Haddow has tested many compounds for growth-inhibitory power, and has found that 1:2'-azonaphthalene inhibits tumour growth without being carcinogenic.

Definite inhibition of tumour growth with three types of compounds has been obtained by Dr. E. Boyland. Of the first group, of aldehydes and their possible metabolism products, citral and malonic acid were the most satisfactory; of the natural bases representing the second group, aminoethylalcohol and cadaverine gave definite results; while of the third group of aromatic diamines, 4:4'-diaminodiphenyl-ether is the most promising. It would be of interest and value to know if some of these substances had any effect on cancer in human beings.

Dr. T. Lumsden, at the London Hospital, has tested the effect of adding normal tissue fragments on the growth of a mouse carcinoma in tissue culture. While pituitary tissue increased the rate of growth, liver fragments inhibited the growth. This latter result is in agreement with the results recently published by Brues, Subbarow and Aub in the United States, who found that the inhibitory effect of liver was in part due to aminoethylalcohol.

Prof. E. C. Dodds has continued his investigations into synthetic oestrogens, and with Dr. S. W. Stroud has studied the metabolism of these compounds in rabbits. Synthetic oestrogens appear to be more stable in the body than the naturally occurring oestrone. It was found that the oestrogenic hydrocarbon stilbene is converted into 4:4'-dihydroxy stilbene, which is much more active oestrogenically than stilbene. Several other related aromatic compounds are also converted into oestrogenic phenols in the body by an analogous change.

Dr. K. J. Bonser and Dr. J. M. Robson have examined the response of male mice of three inbred strains to synthetic oestrogens. In the *R III* strain, 60 per cent of the male mice developed mammary cancer while in two other strains (*C.B.A.* and *Strong A*) no such tumours appeared. In the *Strong A* strain the treatment caused hyperplasia of interstitial cells in the testis and the development of nodules, some of which had the histological characteristics of malignant growths. Dr. P. A. Gorer describes the post-mortem findings in three pure lines of mice. In the *C.B.A.* strain, cancer is found more frequently in males than females, owing to the high incidence of liver tumours in male mice of this line. In the *Strong A* strain, the incidence of mammary tumours is high in breeding females, particularly in animals which have frequent pregnancies but which fail to nurse their young. Mice of the *C 57* black line are resistant to mammary cancer, but frequently develop lesions in the lymph glands, and leukoses. These differences in the types of cancer which occur in strains are possibly analogous to the differences in the occurrence of cancer in different human races.

Viruses which transmit tumours in fowls continue to be investigated in many laboratories. Dr. P. R. Peacock has compared the properties of filterable and non-filterable tumours. Tumours which can be

transmitted from one animal to another by cell-free filtrates are much more resistant to the action of X-rays than tumours which cannot be transmitted in this way. Filterable tumours also remain infective after thorough mechanical disintegration which renders non-filterable tumours non-infective. These results suggest that it is unlikely that the non-filterable tumours contain a virus.

Methods for the purification of the Rous sarcoma virus have been developed by Prof. J. McIntosh at the Middlesex Hospital. By means of a modified Sharples centrifuge, considerable concentration of the virus particles was obtained. Dr. A. Pollard has analysed particles isolated in this way from the Rous sarcoma and other tumours, and also similar preparations of vaccinia virus and bacteriophage. The isolated particles from vaccinia, from the Rous sarcoma and from two non-filterable tumours are all similar in lipid, protein and phosphorus content. Such tumour concentrates act as antigens when injected into rabbits, but in this reaction it is so far impossible to separate fowl and virus components. In other experiments it was impossible to immunize fowls against fowl tumours.

Dr. L. Hoyle, at Leeds, has examined a number of mouse tumours and extracted a lipid antigen which does not appear to be present in normal mouse tissues. The same antigen appears to occur in several strains of tumours, but it is not present in all mouse tumours.

In the University of Sheffield Field Laboratory it has been shown that the immunization of rats to a transplantable dibenzanthracene rat sarcoma did not influence the induction of tumours by 1:2:5:6-dibenzanthracene. From this and other experiments it is concluded that no immunity to cancer can be expected using techniques based on the principles of bacterial immunity.

Dr. F. Dickens and Dr. H. Weil Malherbe have found that the metabolism of intestinal mucosa resembles that of tumour tissue. Reference is made to a discussion in NATURE (145, 512, 778; 1940) on the carbohydrate metabolism of tumours. It is now generally agreed that anaerobic glycolysis and low respiratory quotient are not specific for cancer tissue.

Dr. C. E. Dukes has made a careful analysis of 1,000 cases of cancer of the rectum, a form of cancer known to be much more common in men than women. Lymphatic metastases from rectal carcinomata occur more frequently in men than in women, and these, along with the most malignant tumours, occur more often in young than elderly patients. On the other hand, the mean age of occurrence was earlier in women than in men.

The Clinical Cancer Research Committee has tabulated data from 7,872 case sheets which were received for the year 1938. Registration of new cases was suspended at the outbreak of war, but the data already available are being examined. It is very unfortunate that on some of the points there is a high percentage of "Not Stated" returns, which makes it impossible to draw definite conclusions from the figures. The suspension of registration of new cases should give opportunity to consider the results so far obtained and possibly to improve the methods of registration that will be used when the War comes to an end.

Although research in certain branches has been much reduced as a result of the War, when one considers the present situation it is gratifying to see that so much progress has been made during the year.