cipal laboratories were at Cambridge, Aberdeen (for fish), and at East Malling in southeast England (for fruit). Examples of practical achievement have been the refrigerated gas storage of fruit and meat. A pest infestation laboratory was established in 1939, at a time when the government was much concerned over the wartime conservation of the nation's food stocks, chiefly grain. Since it is now a world, as well as a national, problem to obtain the best use from available food resources, it is probable that work on these lines will continue permanently.

The Forest Products Research Laboratory at Princes Risborough, near London, is used by interests in Britain, although it works closely, too, with the forestry departments of overseas territories on the suitability of particular timbers for various uses. It is concerned with the seasoning and preservation of timbers, as well as with their properties, and its work has been considerably increased by the wide use recently of substitute timbers.

The Building Research Station at Watford, near London, has played a large part in British postwar housing plans by working out standards of construction and methods of testing. It is a "user" laboratory, in the sense that neither individual local authorities nor small builders could be expected to carry out the necessary research if left to themselves, and it is directly in the interests of the householder that this research should be carried out.

Fuel and Radio Research

A third category of research is that directed to the best use of any national asset too important to be left to take its chance. The outstanding example in Britain is that of coal—and this brings in the Geological Survey, in the finding of coal and the collection of samples for examination; the Fuel Research Station at Greenwich, London, on the properties of different coals and their efficient use; and the Building Research Station, on domestic heating.

Other laboratories, which have not been mentioned, deal with road research and river pollution. Radio, and particularly radio propagation, is an old interest in the department which has already paid dividends in the development of radar and the use of radio methods in weather forecasting. Radio research, generally, is at present divided between the National Physical Laboratory and a small subsidiary station near Slough, outside London. A site is being sought for a new station at which the department's radio work can be centralized. A second new station, for work on mechanical engineering, is already being built at East Kilbride, near Glasgow, and a third for work on river and harbor models will be built when a suitable site is found.

All these activities are designed to close gaps which, it is felt, can be best closed by government action. And the search for such gaps continues. At the present time a committee is considering needs for research in chemical engineering. Finally, it may again be emphasized that all these institutions are centers of information as well as of research. They are collections of experts as well as of machines and equipment. And they are at the service of other government departments, cooperative research associations, and individual private firms which may have problems to present, with the intelligence division of headquarters as a general signposting unit.

TECHNICAL PAPERS

Qualitative Differences of Malignant Tissue

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Recently, Carruthers and Suntzeff (*2*, *3*) have published two important papers. Based on polarographic investigations, they conclude that, in opposition to the current view, certain tumor lipids show qualitative[1] differences from those in normal tissues. These lipids seem to arise at the moment of carcinogenesis, for in the preparative stages no differences are observed. They are soluble in alcohol-ether mixtures; probably they are bound to proteins.

We would like to draw attention to the fact that, long ago, several immunologists (the field of cancer immunology seems to be somewhat neglected in recent years) showed that there exists a true tumor antigen of lipid character, which is able to incite the formation of specific antibodies in the rabbit, though only in a few animals (Hirzfeld and his school—1931 *et seq.*).

We will also refer to the early paper by Waterman and de Kromme (*6*) (1929) wherein it was shown that iso-

[1] In a nature-philosophical sense there exist, of course, no qualitative differences, since all matter is built up from the same element in varied distribution.

lated suspended tumor cells are agglutinated by the sera of animals, not belonging to the Forssman group on account of their containing a specific antigen, but probably related to the heterogenetic Forssman antigen. De Kromme (*4*) has prepared specific antisera by injecting rabbits with carefully washed tumor cells; these antisera react with a precipitation reaction with the lipid tumor antigen excreted with the urine. This observation has been made the base of a diagnostic reaction in the first specific ethers of cholesterol.

As to the chemical nature of the antigen, Kolodziejska and Halber (*5*) and Breinl and Chrobok (*1*) have investigated this by means of complement-fixating tests with the sera of immunized rabbits. Kolodziejska and Halber assume that fatty substances are the specific substance, or that in any case the specific substance is carried with the fatty acids. Breinl and Chrobok locate the antigen in specific ethers of cholesterol.

In the last few years we have renewed our attempts at isolation of this antigen. An example of our recent procedure is offered here. We must confess, however, that so far we have not been able to isolate a substance with a well defined melting point, although we have arrived at a fraction, of which 0.1 μg reacts promptly with precipitation in the form of a ring test when brought in contact with the immune serum.

Perhaps the communication of our procedure may help other investigators to define the nature of the lipid. If so, we believe that an important piece of work will have been performed. In any case, the agreement of polarographic investigations with serological results would be very gratifying.

Case II. Over a period of a week 1100 g of metastatic liver tumor (carcinoma mammae) is extracted with 11 l alcohol, 96% acidified with 10 cc HCl 7 N at 37° C, under frequent stirring.

After filtration, the alcohol is distilled off and the watery residue (*plm.* 1 l) is extracted during 48 hr with a 50% mixture of ether and petrol-ether. The ethereal extract is evaporated to 150 cc and brought to 1 l with acetone. The precipitated phospholipids are filtered off, and the yellow filtrate is evaporated *in vacuo*. The resulting brown oily residue is stirred with 1 l 1% natrium carbonate (pH 9.5). This yellow soap is extracted during 48 hr with ether. The watery solution is brought to pH 3 with 30 cc HCl 25% and the acid solution is extracted again with ether. This ethereal extract is brown.

After evaporating off the ether in nitrogen atmosphere, there remains 8.5 g of a dark brown oil. This is solved in 800 cc alcohol 96% at 70° C. To this solution a boiling clear solution of 5 g lead acetate in alcohol is added; the lead salts of the higher saturated fatty acids are precipitated. After 12 hr standing, these are filtered off on a Büchner funnel. A stream of H_2S is conducted into the clear yellow filtrate containing the soluble lead salts, and the lead sulfide is removed. After evaporation of the yellow filtrate in nitrogen atmosphere the resulting red-brown oil is suspended in 800 cc 12½% ammonia under heating to 80° C. After standing overnight, the ammonia is removed by a stream of nitrogen.

After adding 8 g of barium chloride an orange precipitate is formed, which is washed with water. The precipitate is solved in 80 cc 10% HCl and extracted again with ether. After evaporation (residue: 4½ g) the extract is solved in petrol ether (40–60° C) in order to remove any hydroxy-acids that may be present, and filtered. The solution is agitated with water, dried again, and dissolved in 50 cc dry acetone. The insoluble fraction is filtered off and washed with cold acetone. The brown acetonic solution is cooled for ½ hr at −20° C and the precipitate is rapidly centrifuged in cooled tubes. The precipitate (130 mg) proves highly active in the immunological test (ring reaction with cancer immune serum).

The same treatment is repeated. The rose-colored precipitate is solid at room temperature (26 mg). It is soluble in warm, dry, alcohol-free ethyl acetate: by cooling at 6° C and centrifuging a white precipitate is formed; the ethyl acetate is yellow.

This treatment is repeated four times; now the filtrate is colorless. The precipitate is dried *in vacuo* and becomes slightly brownish thereby. Melting point 100–130° C.

The treatment with barium chloride is repeated, followed by the ethyl acetate procedure described. The resulting precipitate is highly active. One-tenth μg is active in a concentration of 1: 1,500,000.

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A One- and Two-dimensional Paper-Partition Chromatographic Apparatus

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The ascending force of capillary action for chromatographic separation, reported earlier by Williams and Kirby (*1*), has been used in the apparatus to be described here. The apparatus (Fig. 1) consists of a 1-liter graduated cylinder, a No. 13 rubber stopper, some adhesive cellophane tape, and a stainless steel paper holder constructed from two flat and open coils, 60 mm in diameter, and two rods or tubes, 340 and 400 mm in length. Each of the two coils is made from a piece of stainless steel wire or tubing 432 mm in length and 2 mm in diameter. Both ends of the piece of wire or tubing are flattened and fashioned into loops. The longer rod is passed through