As far as speakers were concerned, we soon found that most of those whom we approached were able and willing to come. This to a large extent answered the first question. It also helped in answering the second. The fact that a large proportion of the speakers were engaged in war work, some very extensively, indicated that they agreed with us as to the importance of maintaining the development of pure science where possible.

I think we are all convinced that pure science research is a matter of very great long-run value to the nation. Granting this, there are two reasons why it is important now to keep it going. In the first place, we do not know how long the war will last; there is enough of a probability that it will last for a long time, so that weight should be given to activities of long-run importance even for their possible value in winning the war. In the second place, weight also should clearly be given to pure science so that the nation's scientific foundations will be strong when peace finally comes.

There are some fields of pure science which are so fortunate as to have had their development greatly accelerated as a direct part of the war program. Here the path is clear. In other fields, however, which are no less important for the progress of science in the long run, the effect is reversed. Although, in general, priority must be given to the fields of direct short-term value, nevertheless I am convinced that workers in the long-term fields should feel that they too are making a valuable contribution to the national effort by carrying on their work as effectively as possible.

Quoting a letter received this spring from a British colleague, "I am so sure that above all we must see that some fundamental research tradition is preserved at our universities. There is a danger here in Britain of it stopping, through sheer pressure of work. I hope that it won't stop with you in America. In the last war we lost about 15 years in our British universities through it; we must not let that happen again."

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SPECIAL ARTICLES

GROWTH OF CANCER TISSUE IN THE YOLK SAC OF THE CHICK EMBRYO

BY the simple process of injecting a suspension of tumor cells directly into the yolk, we have succeeded in growing cancer tissue in the yolk sac of the developing chick embryo. Tumors up to 3.5 grams in size have been produced in this manner with an initial inoculation of .05 gram of tumor tissue.

It has been known for some time that cancer tissue can be grown on the chorio-allantoic membrane of the developing chick embryo.[1] This technique, however, has proved to be somewhat limited in its scope, since it involves removing a piece of the egg shell and the depositing of the tumor tissue directly on the chick membranes. This effects considerable interference with the embryo and the mortality rate among eggs so treated is about 65 per cent., according to Stevenson.[2] Further, the initial inoculation must be small (.003 to .005 grams), and large tumors can not be produced regularly because they are likely to interfere with the growth and development of the chick.

In the present method each egg can be inoculated in a few seconds, the mortality rate is little more than that of untreated eggs, and 100 per cent. takes can be expected.

Mammary carcinoma transplants of the DBA and C_3H strains of mice were used. Moderate size tumors (1 to 2 grams in weight) were dissected out aseptically and squeezed through muslin cloth so as to disperse the cancer tissue. This material was diluted with saline solution to the extent where each ml of suspension contained about .2 gram of tumor tissue. Tumors which had external lesions and were infected could not be used as donors. It is well known that tumor transplants in mice may grow in an apparently normal manner even when some bacterial infection is present. Such tumor material naturally could not be used for injection into the egg yolk. The presence of necrotic tissue in the injected material also resulted in the death of the embryo.

Fertile eggs after incubation for 4 or 5 days at 38° C were used for inoculation. A needle-sized opening was made in the shell area over the air sac and .25 ml of the tumor suspension was injected hypodermatically into the yolk, using a 20-gauge needle 1¼ inches in length. The opening in the shell was then sealed over with cellulose tape. It has been our experience that the egg can accommodate a much heavier inoculation of tumor tissue.

After inoculation, the eggs were incubated at 37° C for 12 or 13 days or until the total incubation time was 17 days. The injected tumor tissue became attached to the inner wall of the yolk sac from which it obtained its blood supply. The bulk of the tumor, which tended to conform in appearance with the mouse-grown variety, grew down into the yolk of the yolk sac cavity. In this position there was plenty of room for growth without mechanical interference with the embryo mem-

[1] J. B. Murphy, *Jour. Am. Med. Asn.*, 59: 874, 1912.
[2] H. N. Stevenson, *Jour. Cancer Research*, 3: 63, 1917.

branes. Tumors grown in this manner grew readily when transplanted back into mice. As long as care was taken to obtain clean tissue free of yolk and other extraneous materials the takes and growths in the mouse appeared unchanged from its original behavior in these respects.

It appeared, however, that cancer cells were also diffused through the yolk substance, since subdermal injection into a mouse of untreated yolk from cancer-inoculated eggs was sufficient to produce a tumor of the same type as the donor tissue for the egg.

Histological sections revealed healthy-appearing cancer cells with numerous mitoses in progress. The supporting stroma was supplied by the yolk sac membrane.

For many problems in cancer research this new method of growing cancer tissue should be of value. The tumors so produced are contained in a relatively stable biological system which at the same time is open to some manipulation.[3] Further, since the stroma is furnished by the chick tissue, different types of tumors can be studied against a common background.

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THE EFFECT OF 11-DESOXY-17-HYDROXY-CORTICOSTERONE ON RENAL EXCRETION OF ELECTROLYTES[1]

IN an earlier report[2] data were presented which indicated that adrenal steroid compounds possessing a hydroxyl group on C_{17} in the presence of an oxygen atom on C_{11} stimulated the renal excretion of sodium and chloride in normal dogs in contrast to the well-known "sodium and chloride-retaining" effect of 11-desoxycorticosterone, corticosterone and dehydrocorticosterone. At that time it was not possible to determine the physiological effect of the addition of the hydroxyl group on C_{17} in the absence of an oxygen atom on C_{11} because of inability to obtain crystalline 11-desoxy-17-hydroxycorticosterone (Substance "S", Reichstein). Recently Professor T. Reichstein, of Basel, succeeded in providing us with a sample of this compound which, when tested in a normal dog, indicated that it belonged to the group of compounds possessing "sodium and chloride-retaining" property (Table 1). The addition of a hydroxyl group on C_{17}, however, definitely reduced the "sodium and chloride-retaining" potency of desoxycorticosterone.

TABLE 1

EFFECT OF THE INJECTION OF 25 MG OF 11-DESOXY-17-HYDROXYCORTICOSTERONE. (SUBSTANCE "S," REICHSTEIN)

24-hour period	Urine volume	Sodium	Chloride	Potassium	Inorganic phosphorus	Total nitrogen	Body weight
	cc.	*m.eq.*	*m.eq.*	*m.eq.*	*mg*	*gm*	*kg*
Control .	490	63	54	20	570	10.3	12.8
Treated .	390	34	38	14	480	10.1	12.9
Control .	470	55	50	16	520	11.1	12.9
Control .	420	58	54	18	450	10.6	12.8

It is of interest to note that whereas the addition of a hydroxyl group on C_{17} to a compound which possessed a very striking "sodium and chloride-retain-

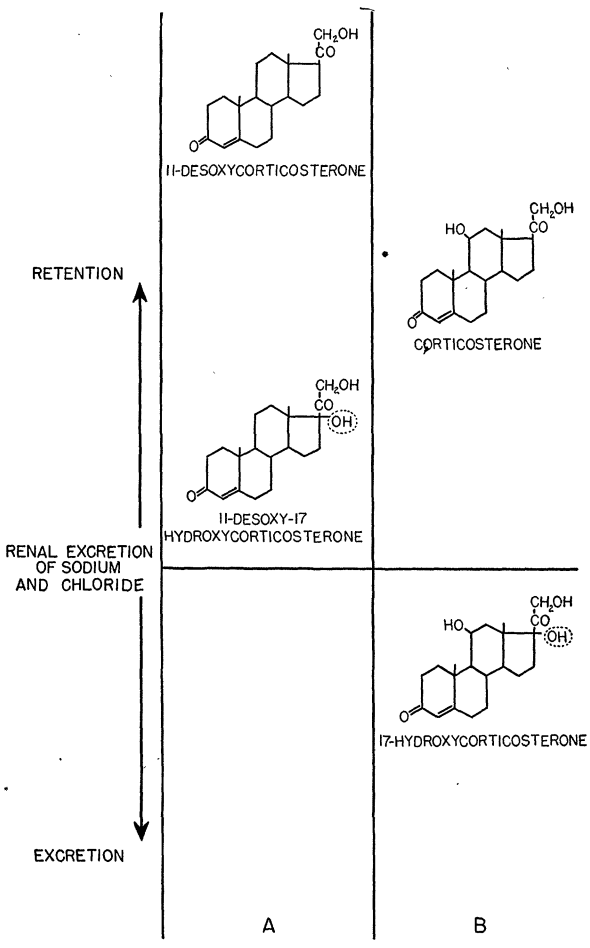

FIG. 1. Adrenal steroids: The relation of changes in chemical structure to the renal excretion of sodium and chloride. Compounds in column "A" do not possess carbohydrate-regulating-activity whereas compounds in column "B" do.

[3] A. Taylor, J. Thacker and D. Pennington, SCIENCE, 94: 542, 1941.

[1] This study was aided by a grant from the Committee on Research in Endocrinology, National Research Council.

[2] G. W. Thorn, L. L. Engel and R. A. Lewis, SCIENCE, 94: 348, 1941.