idly and the appetite promptly returns. The animals remain well after the cessation of treatment. One animal treated on the fifth day of the disease recovered within forty-eight hours and thereafter remained well. Of the two fatal cases one animal died and the other was sacrificed. Both were in an advanced stage of the disease when first treated and had already developed severe secondary pulmonary infection. The amount of drug administered to dogs has been 1 gm twice daily. Eighteen cats suffering from a spontaneous disease commonly known as cat distemper or influenza have also been treated with the drug. Its effect in this condition is in all respects similar to that in canine distemper.

Sodium sulfanilyl sulfanilate therefore appears to be the first chemical agent to have such definite therapeutic action in an infection due to a filtrable virus. The range of its activity in virus diseases remains to be explored.

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THE EFFECT OF LIGATION OF THE LUMBOADRENAL VEINS ON THE COURSE OF EXPERIMENTAL DIABETES IN DOGS AND CATS[1]

HOUSSAY[2] was able to ameliorate the course of pancreatectomy diabetes by hypophysectomy. Subsequently, Long[3] produced a similar effect on depancreatized dogs and cats by complete adrenalectomy and maintenance with cortin. A new method for the alleviation of diabetes and some results obtained with this procedure are presented in this report.

In 20 cats and 4 dogs the lumboadrenal veins were ligated proximally and distally to the adrenal gland and the entire pancreas simultaneously removed. It should be emphasized that these animals at no time received either insulin, cortin or sodium chloride therapy. That the intensity of the diabetes is greatly diminished by the ligation of the lumboadrenal veins is shown by the following:

(1) *Survival.* The survival of completely depancreatized dogs and cats is usually less than 7 days. As a result of adrenal vein ligation, the range of survival has been increased in cats to 11–98 days; the average is about 20 days, excluding the cat living 98 days. The period of survival of dogs to date is 18, 11, 35 and 8 days. The first animal is still alive. The last 3 succumbed. However, the death of the dog on the eighth day was due to a post-operative complication and not diabetes.

(2) *Chemical Studies.* The values for blood sugar, blood fat, glycosuria and ketonuria of these dogs and cats are much lower than those observed in depancreatized animals without ligation of lumboadrenal veins. Occasionally marked hypoglycemia was observed, and in two cats fasting rendered the urine free of sugar.

The D:N ratio was well below the value of 2.8, characteristically associated with pancreatectomy diabetes. Respiratory quotients above 0.70 were obtained in every animal studied. The changes in carbohydrate metabolism are not secondary to alterations in blood total base. In many of the animals, the blood electrolytes were normal in concentration.

Gross and microscopic autopsy findings revealed complete absence of pancreatic tissue. Histological examination of the adrenal and pituitary glands are being made to determine the involvement of these organs.

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THE LIQUEFACTION OF SPONTANEOUS TUMORS OF THE MAMMARY GLAND IN MICE BY HEPTYL ALDEHYDE[1]

RECENT data[2] have shown that certain characteristics of spontaneous tumors of the mammary gland in mice may be influenced by the daily administration of the true oil of gaultheria in the diet of those mice showing such neoplasias. These effects have to do with the clinical course and histological appearance of the tumors. It has been demonstrated that in early cases the connective tissue of the tumor seems to have been materially enhanced by a such a treatment. Similar results could not be produced by the use of redistilled synthetic methyl salicylate.[3] In an attempt to isolate the active agent of the true oil which had the above inhibitory action on spontaneous tumors, the true oil was subjected to fractional distillation. From this work, it was shown that the active inhibitory agent was contained in the low boiling point fraction, that is, in that fraction which distilled over below the boiling point of methyl salicylate.[4] It was demonstrated that the low fraction had a pronounced effect on: (1) the

[1] This research was aided by a grant from the National Research Council.
[2] B. A. Houssay, *Am. Jour. Med. Sci.*, 193: 581, 1937.
[3] C. N. H. Long, *Medicine*, 16: 215, 1937.

[1] This experiment has been made possible by grants from the International Cancer Research Foundation and the Anna Fuller Fund. Acknowledgment is also due to the Fluid Research Funds of Yale University School of Medicine. Dr. W. Bergmann has very kindly redistilled the commercial C.P. heptyl aldehyde used in this experiment.
[2] L. C. Strong, *Am. Jour. Cancer*, 28, 550, 1936.
[3] *Idem.*, *Am. Jour. Med. Sci.*, 192, 546, 1936.
[4] *Idem.*, (in press) *Am. Jour. Cancer.*

slowing up of the growth rate of tumors, with complete regression in 4 out of 34 animals; (2) an increase in the survival time of the mouse after the onset of cancer, and (3) gross and histological alterations in the tumors themselves. These changes in the tumors themselves were (1) softening and in some cases, (2) complete liquefaction. The action of the low fraction appeared to be more pronounced than the action of the true oil of wintergreen.

Since heptyl aldehyde is an ingredient of the low fraction, it was decided to put mice bearing spontaneous tumors of the mammary gland on a diet containing this chemical. The heptyl aldehyde was purchased from the Eastman Kodak Company and redistilled. Only that part which distilled at 152° C. was used in this experiment. A very pronounced softening and liquefaction of the tumors occurred in the mice receiving heptyl aldehyde in an otherwise normal or standard diet. Liquefaction was so extensive that drainage through a hypodermic needle under sterile conditions was easily accomplished. Six of the first twenty-five mice placed on the heptyl aldehyde treatment completely regressed their tumors. Liquefaction and regression of tumors never occurred in 120 individuals which served as controls. Samples of the drained-off liquid were tested by Dr. C. G. Burn and found to be sterile.

The present investigation is of interest, since it opens up the question that spontaneous tumors, in mice at least, may eventually be controlled by chemotherapy.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

CLEAVING NEMATODE EGGS AS RESEARCH AND CLASSROOM MATERIAL

WHILE any number of marine forms supply living cleavage material during the summer months, it has been difficult to find material which can be used for either research or teaching purposes during the other seasons. One of the most favorable of plant materials is the stamen hairs of Tradescantia, but Tradescantia presents the difficulty of not flowering consistently through the winter months. The work of Rugh[1] on the induction of ovulation in amphibia now offers a source of cleaving eggs during the entire school year and has become an invaluable addition to many embryology courses. But amphibian eggs, because of their dense pigmentation, are not well adapted to the study of many features of the division process. These disadvantages may be overcome by the use of the eggs of small nematodes. American workers have so far neglected the nematodes as material for cytological and embryological research.[2] A search for a suitable material on which to study the effect of heat shock on the division mechanism showed nematode eggs to have many advantages. Since the eggs are about 45 microns in length and relatively transparent many details of pronuclear fusion, spindle formation, aster formation, spindle elongation and cell cleavage may be readily observed with the 4 mm objective. Their potentialities as living material for class use became apparent, and a two-year trial has proved their value.

Any earthworm will serve as a source of nematodes, where they may be found in the body cavity or in the nephridia. A convenient method of starting a culture is to allow bits of the body wall of the earthworm (nephridial region) to decay on 2 per cent. water agar in a Syracuse watch glass. After four days at 18° the nematodes are mature. I maintain subcultures at 18° on 2 per cent. agar, using bits of beef (3 cu mm) as food. The worms are prolific, and great numbers can be cultured with ease. Worms four days old are the best for eggs, since older worms usually have few cleaving eggs (although many older embryos are present) in the uterus. It is best to make subcultures every day so that worms of a proper age will always be available. Temperature control is essential —very few eggs are found if worms are reared at room temperatures of 22° or above.

In order that the cleavage process may be studied by students it is necessary to pick out ten or fifteen mature females from the culture dish, using a binocular and a fine curved needle (a number 12 sewing needle serves admirably). The worms are put in a drop of tap water on a depression slide and torn part with a straight pair of number 12 needles. The eggs are sucked up into a micropipette and are distributed to depression slides containing tap water. They may of course be studied on an ordinary slide, providing the following precautions are taken: (1) that they are not crushed; (2) that they get adequate oxygen; (3) that they do not dry.

The rapidity of development must be considered when class study is contemplated. Fortunately, the entire sequence of events from pronuclear fusion through the second cleavage occurs within a two-hour interval at average temperatures.

Attention is called to the absolute necessity of isolat-

[1] R. Rugh, SCIENCE, 85: 588, 1937.

[2] Beamis and King, *Biol. Bull.*, 73: 99, 1937, are one exception to this generalization for they have recently published the results of ultracentrifugal experiments on Ascaris eggs.