experiments administration of extra chloride resulted in concentrations up to 20 mg per cc. Reference to the figure reveals that the specific gravity reached its maximum somewhat earlier than did the chlorides. This failure of the two peaks to coincide in time was a finding in every experiment. It may possibly be explained by the observation of Stehle that there is a greater increase in potassium than sodium in the urine formed under pituitary.[4] A change in the K:Na ratio would of course modify the specific gravity. Determinations of this ratio were not made. In a few experiments, however, it was found that the changes in urea concentration were not significant, and did not serve to explain the phenomenon.

Summary. In dogs, placed under conditions similar to those employed clinically for revealing the concentration capacity of the kidney, that is, under restriction of food and water, the administration of posterior pituitary extract results in the formation of a more concentrated urine than follows from restriction alone.

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Effect of Rabbit Adenocarcinoma Material on Brown-Pearce Rabbit Epithelioma.

ALBERT E. CASEY.

From the Department of Pathology and Bacteriology, Louisiana State University School of Medicine.

A material[1, 2, 3] which always has been present in primary and metastatic tissue obtained from the Brown-Pearce tumor of the rabbit has been shown to be filtrable through a Berkefeld "V" candle, desiccable, thermolabile (56°C) and different from the Duran-Reynals factor. It has consistently influenced the growth and spread of this particular strain of malignant cells *in vivo,* and when injected intratesticularly or intracutaneously into rabbits, in a dosage com-

[4] Stehle, R. L., *Am. J. Physiol.,* 1927, **79**, 289.

[1] Casey, A. E., PROC. SOC. EXP. BIOL. AND MED., 1932, **29**, 816; 1933, **30**, 674, 1025; 1934, **31**, 663, 666; 1936, **34**, 111; 1939, **40**, 223, 228, 230; *Am. J. Cancer,* 1934, **21**, 760, 776; **22**, 665; 1936, **26**, 276; 1937, **31**, 446; *Arch. Path.,* 1935, **20**, 156; 1936, **22**, 275; 1937, **23**, 741; 1938, **25**, 754; 1939, **27**; *Proc. III Internat. Cancer Congress,* Atlantic City, Sept., 1939.

[2] Casey, A. E., and Moragues, G. V., *Arch. Path.,* 1939, **27**; *Am. J. Cancer,* in press.

[3] Erös, G., *Proc. III Internat. Cancer Congress,* Atlantic City, Sept., 1939.

parable to 0.0001-1.0 g of whole tumor tissue, 2 weeks before transplantation of the Brown-Pearce tumor, there results a greater incidence, volume and number of metastases, an increased mortality and a decreased longevity. Injection of the material into the rabbit evokes no demonstrable local or general reaction, and repeated injections have not rendered animals immune to transplantation of the same tumor.

Injection of the material into mice does not affect the growth and spread of Bashford carcinoma 63 or S180 of the mouse, nor have similarly prepared extracts of mouse tumors or of certain tumors of man, when injected into rabbits, affected the growth and spread of the Brown-Pearce tumor.

During the last few months, through the courtesy of Dr. H. S. N. Greene of the Rockefeller Institute (at Princeton), it has been possible to test the effects of a similarly prepared material from a transplantable uterine adenocarcinoma of the rabbit[4] on the growth and spread of the Brown-Pearce tumor. In this way it has been possible to test within the same species the effect of injection of a material of one carcinomatous origin on the growth and spread of a material of another carcinomatous origin.

Materials and Methods. The animal material consisted of 50 healthy New Zealand white male rabbits, 6 months of age.

Two sets of experiments were performed, in each of which 20 animals were subdivided into an experimental (Groups A and C) and a control (Groups B and D) group. As far as possible, each experimental animal was paired with a control litter mate.

The adenocarcinoma tissue, covered with paraffin and kept in a cold container, was sent by plane to New Orleans, where it was divided into 2 portions and kept in the freezing chamber of the ice box for 14 and 53 days respectively before being used. Ten animals (Group A) were injected with 0.5 cc of an approximately 5:1 dilution in normal saline of the material which had been refrigerated for 14 days, and 10 others (Group C) with the same amount of material which had been refrigerated for 53 days.

Two weeks after Groups A and C had been injected with the adenocarcinomatous material, all 40 animals (Groups A and C, and B and D) were injected intracutaneously over the left scapula with 0.5 cc of saline emulsion of Brown-Pearce tumor tissue.

Results. The primary tumors which had developed were measured in the animals in the first experiment (Groups A and B) 38 days and in the animals in the second experiment (Groups C and D)

[4] Greene, H. S. N., *J. Exp. Med.*, 1938, **67**, 691; 1939, **69**, 447.

33 days after transplantation of the Brown-Pearce tumor. At this time 14 of the 20 control animals had primary tumors which averaged 12.4 cm in volume ($\Sigma x = 173.8$; $\Sigma x^2 = 4631.32$) and 14 of the 20 experimental animals, also 70%, had primary tumors which averaged 12.8 cm in volume ($\Sigma x = 175.6$; $\Sigma x^2 = 3952.72$). These values for the incidence and volume of the primary tumors were not statistically different.

The experiments were terminated in Groups A and B 50 days after tumor inoculation, and in Groups C and D 55 days after tumor inoculation. At postmortem examination 14 of the 20 control animals (Groups B and D), 70%, were found to have primary tumors which by water displacement averaged 5.8 cc ($\Sigma x = 80.9$; $\Sigma x^2 = 1121.43$), and 15 of the 20 experimental animals (Groups A and B), 75%, were found to have primary tumors which averaged 4.6 cc ($\Sigma x = 68.3$; $\Sigma x^2 = 815.97$). There was no significant difference in the volume or in the incidence of the primary tumors in the two series at necropsy, and the average size of the primary tumors had greatly diminished in both the experimental and the control groups toward the latter part of the period of observation.

Nine animals in the experimental groups, 45%, and 9 in the control groups, 45%, were found at necropsy to have metastatic tumors which averaged 7.6 metastatic foci for each control animal ($\Sigma x = 68$; $\Sigma x^2 = 976$) and 2.8 metastatic foci for each experimental animal ($\Sigma x = 26$; $\Sigma x^2 = 132$). The volume of the metastatic tumors in each control animal averaged by water displacement 19.2 cc ($\Sigma x = 172.8$; $\Sigma x^2 = 9554.62$) and 3.1 cc in each experimental animal ($\Sigma x = 28.1$; $\Sigma x^2 = 180.21$).

There was thus no statistically significant difference in the incidence, volume or number of metastatic foci among the animals in the two series, regardless of whether the analysis was made on the basis of all the animals inoculated, on the basis of animals with primary tumors, or, finally, on the basis of animals with metastases. Since all the animals survived the 50-55 day period of observation, there was no difference in the actual mortality or longevity in the two series.

In earlier experiments it was shown that the injection 2 weeks before transplantation of material obtained from mouse tumors S180 and from Bashford carcinoma 63 promoted the growth of the homologous tumor but had no effect on heterologous tumors in the same species.[1]

Summary. Preliminary treatment with a material derived from a uterine adenocarcinoma of the rabbit failed to render rabbits more

susceptible to the subsequent transplantation of the Brown-Pearce tumor, and likewise failed to enhance its growth and spread. These results are in contrast to the marked enhancement in the incidence, growth and spread which constantly ensues when rabbits are treated with a material from the Brown-Pearce tumor 2 weeks before transplantation of that tumor.

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Respiratory Exchange of the Fresh Water Annelid, Tubifex.

FRED G. BRAZDA. (Introduced by Howard H. Beard.)

From the Department of Biochemistry, Louisiana State University School of Medicine, New Orleans.

During an investigation to determine the availability of Tubifex tubifex as a test-object for certain pharmacological studies it was desired to define the magnitude of its respiratory exchange.

The method of Warburg[1] for measuring oxygen utilization (Q_{O_2}) and that of Dickens and Simer[2] for determining the respiratory quotient (R.Q.) were used. An aqueous medium containing NaCl—0.32%, KCl—0.007%, $CaCl_2$—0.00074%, and $NaHCO_3$—0.005%, possessing a pH range from 7.0 to 7.1, was used in the experiments. An atmosphere of oxygen, since it was found to be as suitable as air, was used for the sake of expediency in calculations. The most suitable temperature for these experiments was found to be 30°C; a few determinations were made at 25°C.

In most experiments preliminary anesthesia with chloretone (0.2%) was used to free the animals from mud and to sort them. Anesthesia lasting no more than 10 minutes was induced well in advance of the experiment. The data obtained from several comparative experiments indicate that such anesthesia induced long before the experiment did not modify appreciably the nature of the respiratory exchange.

The animals were arbitrarily divided into two categories based on length: small—about 2 cm; large—about 7 cm. No attempt to segregate the animals on a basis of sexual phase was made.

Utilization of Oxygen: In 12 determinations the average utilization of oxygen (Q_{O_2}) by small worms at 30°C was 1.49 cmm O_2

1 Warburg, O., *Über den Stoffwechsel der Tumoren*, Berlin, 1926.

2 Dickens, F., and Simer, F., *Biochem. J.*, 1931, **25**, 973.