$I = i + \frac{ik}{} a'$ (3), which means that the relation between the cross-sectional area of the tube less the cross-sectional area of the organism, and the intensity of the current passing through the tube—a part of which will kill the paramaecium—must be a linear one.

Analysis of the results leads then to the following conclusions:

1. The experimental curve is in good agreement with the above assumption on the distribution of the current through the organism and its surrounding medium, although it does not exclude some other interpretation.

2. If a' is made equal to zero the formula (3) reads $I = i$, which means that the intersection of the ordinate and the curve gives the intensity of the current passing through the paramaecium and killing it. That intensity, which may extend from 1 to 10 microamperes in the above curve, was found to be near 1 microampere in some later experiments.

3. If i is known and if r' can be determined, the formula (2) will give the resistance r of the paramaecium. The resistance r' of the medium was measured with the Leeds and Northrup conductivity measuring equipment. The resistance of the paramaecium was then found to be about 700,000 ohms and its resistivity 600 ohms. (The resistivity of the hay tea was 1896 ohms, the length of the organism has been estimated at 0.23 mm. and its mean cross-sectional area at 0.002 mm^2.)

I mention the present procedure as a means of measuring the resistance of organisms of the type paramaecium.

6742

Toxicity Study of Potassium Perrhenate.

L. C. HURD, J. K. COLEHOUR AND P. P. COHEN.
(Introduced by H. C. Bradley.)

From the Departments of Analytical and Physiological Chemistry, University of Wisconsin.

Rhenium, the third homologue of the manganese family, has been known to a few scientists for relatively few years. Although discovered in 1925, it was not obtainable until 1930. The relationship of rhenium to manganese and its chemical similarity to osmium made it appear worthwhile to investigate the physiological effects of the element. The investigation was necessarily limited to a few

direct experiments since the material was expensive and available in but small quantities. The rhenium salt used was potassium perrhenate.

In the analysis of the tissues for presence of the element, a quartz prism spectrograph was employed. The rhenium lines were compared with a standard and a rough approximation was possible as to the presence of a trace or a considerable amount.

I. *Toxicity studies.* A group of 9 mice weighing 15-30 gm. were given intraperitoneal injections of potassium perrhenate in doses corresponding to 0.05-3 mg. of rhenium. All the animals but one recovered within 12 hours. The one fatality occurred immediately following injection and was in all probability due to an accident in injection. The immediate effect of injection was that of water intoxication, since the relative insolubility of the salt demanded the injection of relatively large amounts of solution. This effect was experimentally controlled.

A group of 6 rats were then given intraperitoneal injections in doses equivalent to 2.5-50 mg. of rhenium. No unusual effects were observed in the week following. At the end of the week the rats were each given an injection containing 5 mg. of rhenium, followed by 9 daily injections containing 2.5 mg. of rhenium per injection. One rat weighing 245 gm. received in one injection an equivalent of 50 mg. of rhenium, corresponding to 200 mg. per kilo body weight. The minimum lethal dose of manganese calculated as metal is given as 5-6 mg. per kilo body weight for the rabbit.[1] In the several weeks following no unusual effects were observed in any of the rats.

II. *Fate of potassium perrhenate.* In an attempt to determine the fate of the salt, 2 rabbits were given intravenous injections of the salt in physiological saline. Rabbit No. 1 received 2 injections containing 25 and 45 mg. of rhenium in a half hour interval. Rabbit No. 2 received 2 injections containing 100 mg. of rhenium each at one half hour intervals. They were killed about an hour and a half after the first injection and the following organs removed, desiccated, and examined spectrographically for the presence of rhenium.

	No. 1	No. 2		No. 1	No. 2
Brain	—	—	Kidney	+	+
Testes	+	++	Liver	+	+
Urine	+++	+++	Spleen	+	+
Heart	+	+	Adrenals	+	—

[1] Hanzlik and Sollman, Introduction to Experimental Pharm., 1928.

III. *Physiological effects.* In an attempt to measure any physiological effects, a 20 kg. dog was anesthetized with ether and the blood pressure and heart rate measured. An intestinal plethysmograph was also employed. A solution containing 250 mg. of rhenium was injected into the femoral vein. The changes observed indicated a very slight splanchnic dilatation. However, this effect was not subject to adequate experimental control to warrant interpreting this effect as being due to the injected salt.

Continuation of the toxicity study is being held up pending the development of a satisfactory quantitative method for the determination of rhenium in the presence of organic matter. The work will be resumed at an early date.

6743

Effect of Hypophysectomy on Growth of the Walker Rat Tumor.

C. S. MCEUEN. (Introduced by J. B. Collip.)

From the Department of Biochemistry, McGill University, Montreal, Canada.

Since hypophysectomy is known to lead to cessation of body growth, it seemed interesting to investigate its effect upon the growth of a tumor such as the Walker rat tumor. Twelve out of 25 young albino rats bearing tumor transplants 8 to 12 days old were therefore hypophysectomized (by Doctor Hans Selye), the remainder being kept as controls. The area of the largest cross-section of the tumors was measured by sketching them upon squared paper with the aid of calliper measurements; the total weight of the rats was also followed. The results are summarized in Table I.

TABLE I.

Days after operation	Hypophysectomized (Average of 12 rats) Tumor area, cm.²	Total wt.	Control (Average of 13 rats) Tumor area, cm.²	Total wt.
0	3.8	176	3.3	188
12	8.2	170	10.9	203
18	10.7	171	15.4	216
24	13.1		19.3	

Hypophysectomy evidently retards but does not prevent the growth of the tumors; but the total weight of the rats and their tumors remained stationary (as in hypophysectomized rats without