both of these animals have been maintained on the same diet since September 1, 1931, when dog 1 was depancreatized. Dog 5, normal, and dog 2, diabetic, are also litter mates, both of these animals having received the same diets since July 27, 1932, the day on which the latter was depancreatized. The third dog, 1-N-1, was kept on the diet for approximately one month before blood samples were taken.

Typical results are shown in Table I. There is a marked reduction of the ester cholesterol of the fasting blood of depancreatized dogs. Esterified cholesterol was completely absent from the blood of diabetic dog 2. Further investigations to determine the time of onset of these lipid changes following pancreatectomy are in progress.

7034

Accumulation of Ions. Further Proof of Non-Equilibrium Condition in Valonia.*

S. C. BROOKS.

From the Department of Zoology, University of California.

In a previous paper[1] I reported that when living cells of *Valonia macrophysa* were immersed for periods of 2-3 days in sea water to which had been added isotonic NaCl solution (10-50% by volume) there occurred an increase in the concentration of potassium and a decrease in that of sodium relative to that of chloride. Since these changes were in the direction opposite to those made in the composition of the external medium, it was concluded that this experiment furnished *crucial* proof that the normal condition in *Valonia* was not an equilibrium state. The validity of the data has been doubted by Cole on statistical grounds,[2] and by Jacques and Osterhout on

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[1] Brooks, S. C., *Protoplasma*, 1929, **8**, 389.

[2] Cole, K. C., *Collecting Net*, 1930, **5**, 32.

experimental grounds.[3] I have therefore repeated my experiments in the endeavor to meet these criticisms.

Experiments were done on *Valonia macrophysa* at Naples, which tended to confirm my earlier results, but they were unsatisfactory statistically. Recently similar experiments were done on specimens of *Valonia ventricosa* at Tahiti. These specimens were extraordinary in the perfection of their selective permeability to ions: normal sap was found to consist of a KCl solution about 0.61 M and over 99% pure; Ca, Mg, and Na were present in concentrations of about 2, 1, and 1 mM/1, respectively.

Analyses were made by the methods previously described[4] except that K was determined by the cobaltinitrite method of Hibbard and Stout,[5] which was found by appropriate tests to be as accurate as the chloroplatinate method and much quicker. Na, being determined as the difference between total K + Na sulfates and K, is so small as to lie almost within experimental error. The negative values for Na might be due to this alone, or they might be due to a systematic error of less than 1% in one of the 2 directly determined values. The samples are not adequate for direct Na determination.†

TABLE I.

The ratios of K/Cl and Na/Cl in terms of molar concentration as found in the sap of *Valonia ventricosa* after immersion in K-poor sea water for various periods.

Solution contains		K/Cl after immersion for			Na/Cl after immersion for		
Sea water	Isotonic NaCl	3 days	6 days	11 days	3 days	6 days	11 days
10 parts	None	0.981	0.940		0.0017	0.0033	
9 "	1 part	1.005	0.940	0.942	—0.0083	0.0017	0.0017
3 "	1 "	0.949	0.940	0.938	0.0017	0.0083	0.0017
1 "	1 "	0.972	0.905	0.898	—0.0050	0.0050	0.0033

Table I shows that when a relatively slight change was made in the sea water, as in the 9:1 mixture whose K concentration was 0.010 M, and cells were exposed to this solution for only 3 days, the expected increase in the ratio of K/Cl occurred. The decrease in Na/Cl is worth noting, even though the uncertainty as to the figures for Na would make it, if taken alone, unreliable. In experiments lasting 3 days where a greater change was made in the sea water ($K<0.010$ M), which thus correspond to the shortest experiment of Jacques and Osterhout, the result is like theirs in showing decrease in K/Cl. Experiments of duration shorter

[3] Jacques, A. G., and Osterhout, W. J. V., *J. Gen. Physiol.*, 1932, **15**, 537.

[4] Brooks, S. C., *Science*, 1933, **77**, 221.

[5] Hibbard, P. L., and Stout, P. R., *J. Assn. Official Agr. Chem.*, 1933, **16**, 137.

† The analyses were performed by Mr. B. Weidenbaum.

than 3 days had to be omitted because of lack of material, while those of longer duration again show a decrease in K/Cl. Since Jacques and Osterhout made all their determinations on cells exposed for 3 or more days to a solution containing 0.006 GM/l of K it will be seen that in those of our experiments which were substantially similar we both find a decrease in K/Cl. Unfortunately, they have not reported experiments comparable to those of mine in which I have found the ratio of K/Cl to have increased.‡

The data show an increase in the ratio of K/Cl when the reduction in the K content of sea water is slight and the experiment short, and a fall in that ratio with increase in either factor. The changes shown in Table I are not large, but they are consistent with all my previous findings, and suggest why other experimenters failed to observe the fact that decrease in the K content of sea water does under the right conditions lead to an increase in the proportion of K in the sap.

7035 P

Effects of Dinitrophenol on an Experimental Sarcoma of the White Rat.*

L. A. EMGE, L. M. R. WULFF AND M. L. TAINTER.

From the Departments of Obstetrics and Gynecology and of Pharmacology, Stanford University School of Medicine.

Recent studies of the effect of dinitrophenol on metabolism[1] have prompted us to study its effect upon tumor growth. Since it is known that the metabolism of the cell of malignant neoplasms is more active than that of the normal cell, we were curious to learn whether or not dinitrophenol administered either by injection or mixed with the food would demonstrably affect the activity of the neoplastic cell. The tumor material utilized in this study is a fibrosarcoma which kills white rats in from 30 to 60 days. It was de-

‡ Jacques and Osterhout find practically no change in K/Cl at the time of their first observation (3 days), but the smoothing of the curves in their figures obscures this fact.

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1 Tainter, M. L., and Cutting, W. C., *J. Pharm. Exp. Therap.*, 1933, **48**, 410. (See for citation of literature.)