search Institute is not directly affiliated with any university, it is desirable that a recipient of a fellowship work under the department from which he applies. Only the thesis or dissertation requirements or parts thereof can be fulfilled at the Biological Research Institute. Preference will be given to advanced graduate students or those already having the degree of doctor of philosophy. Applications should be addressed to Dr. Charles R. Schroeder, Biological Research Institute, Balboa Park, San Diego, California, before May 15, 1941.

THE greater part of the Agricultural Engineering Building at Iowa State College was destroyed by fire on March 31. Much equipment was lost, but most of the records were saved. The Iowa General Assembly has appropriated $125,000 for the replacement of the building.

ALPHA EPSILON DELTA, the national honorary premedical fraternity, installed its thirty-second chapter at the University of Detroit on March 8, when the Iota chapter of the Omega Beta Pi fraternity became the Michigan Alpha chapter with the induction of twenty students and two faculty members. Honorary members of the charter group are Professor Leo E. Buss, department of biology, and Dr. Robert C. Page, assistant medical director of the Standard Oil Company of New Jersey, who was formerly the national secretary of Omega Beta Pi. The installation dinner was held at the Webster Hall Hotel, with Dr. Maurice L. Moore, of the Medical Research Division of Sharp and Dohme, who is national secretary of the fraternity, as the installing officer. Following the dinner, Father John F. Quinn, dean of the College of Arts and Sciences of the University of Detroit, welcomed Alpha Epsilon Delta to the university and spoke on the problems of pre-medical education.

AT the request of the editors of *Nutrition Abstracts and Reviews,* the American Institute of Nutrition has agreed to assume responsible leadership in the direction of continuing unbroken the service rendered by the journal. This involves the abstracting of pertinent material in European and other scientific journals which are not available in Great Britain at the present time. The list includes more than two hundred technological and scientific periodicals. Dr. Arthur H. Smith, of the College of Medicine of Wayne University, will act as the American editor and members of the American Institute of Nutrition, as well as others who are interested, will be asked to assist in preparing the abstracts.

THE centenary of the Royal Botanic Gardens, Kew, as a government institution occurred on April 1. The first director, Sir William Hooker, took office on April 1, 1841. The gardens had previously been the private property of the royal family. To mark the centenary the present director, Sir Arthur Hill, read a paper before the Linnean Society on April 3, giving an account of the work of the gardens during the last century.

ACCORDING to *Nature,* the Advisory Research Council of the British Chemical Society, in collaboration with the Association of British Chemical Manufacturers, is putting into operation a scheme for organizing the preparation of fine chemicals in Great Britain by part-time volunteer workers in the laboratories of universities, technical colleges and other institutions. Compounds so prepared must be required for work of national importance and be not available commercially, and the manufacturers of fine chemicals are themselves unable, or do not find it convenient, to meet the demands. It is intended that preparations should be carried out on a cost-price basis, which would include charges for materials, gas, electricity, etc., but not for the workers' services. No profits of any kind will be permitted.

DISCUSSION

THE RATE OF PERFORMANCE OF OSMOTIC WORK ON THE CHLORIDE ION DURING ACTIVE INTESTINAL ABSORPTION

THE rate of performance of osmotic work on the chloride ion during active intestinal absorption of chloride is given approximately by the equation,

$$dW/dt = (dn/dt)RT\ln(C_p/C), \quad (1)$$

where dW/dt is the rate of osmotic work, dn/dt the number of mols of chloride transferred from the intestinal lumen to the blood in unit time, R the gas constant, T the absolute temperature, C_p the plasma chloride concentration in M./l., and C the concentration of chloride in the intestinal lumen in M./l. If V is the volume of fluid in the intestine, $dn/dt = -d(CV)/dt$ and

$$dW/dt = -[d(CV)/dt]RT\ln(C_p/C). \quad (2)$$

Using the equations of Peters and Visscher[1] empirically to describe the course of active absorption under their conditions, we have

$$CV = C_o V_o (V/V_o)^{R_o/D}, \quad (3)$$

$$\text{and } V = V_o - Dt, \quad (4)$$

where C_o and V_o are original values for concentration and volume, t time, and R_o and D constants. From equations (3) and (4),

$$d(CV)/dt = -CR_o. \quad (5)$$

[1] H. C. Peters and M. B. Visscher, *Jour. Cell. and Comp. Physiol.,* 13: 51, 1939.

Substituting in equation (2),

$$dW/dt = CR_oRT\ln(C_p/C). \quad (6)$$

Applying equations (3), (4) and (6) to experiment 2 of Ingraham, Peters and Visscher,[2] we obtain Fig. 1, which illustrates in a general way the osmotic work

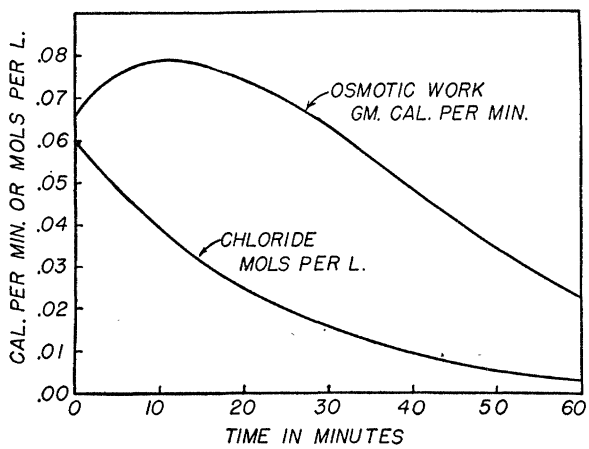

FIG. 1. Rate of performance of osmotic work on the chloride ion and chloride concentration during active absorption.

and concentration curves obtained in this type of experiment.

Differentiating equation (6) with respect to C and equating to 0, we find that dW/dt reaches a maximum when $C = 0.367\ C_p$. Since, in the dog, C_p is generally close to 0.100, we can substitute $C_p = 0.100$ and $C = 0.0367$ in equation (6) and obtain as an approximate equation for the maximum rate of osmotic work during an experiment,

$$(dW/dt)_{max.} = .023R_o, \quad (7)$$

where R_o is in cc per min. and $(dW/dt)_{max.}$ in cal. per min.

Values of $(dW/dt)_{max.}$, calculated from the available data and expressed as cal. per min. per cm of intestine, are given in Table I. Since $(dW/dt)_{max.}$ is the maximum value of the minimum power requirement, its calculation may be of value in finding the mechanism of active chloride absorption. Any proposed mechanism must furnish, at a suitable time during the course of an average experiment of the type considered here, at least 0.0013 gram cal. per min. per cm of intestine before it can reasonably be regarded as a possible sole source of the necessary energy.

TABLE I

MAXIMUM RATE OF OSMOTIC WORK ON THE CHLORIDE ION DURING ACTIVE ABSORPTION

Experimental data	Type of exp.	$(dW/dt)_{max.}$ cal. per min. per cm
Ingraham et al.[2] 3 exps., 3 dogs	Acute	0.0009, 0.0013,* 0.0016 Average, 0.0013
Peters and Visscher[1] 9 exps., 9 dogs	Acute	0.0007, 0.0010, 0.0011, 0.0012, 0.0012, 0.0015, 0.0018, 0.0019, 0.0020 Average, 0.0014
Dennis and Visscher[3] 6 exps., 2 dogs	Chronic loop	0.0013, from average curve, Figs. 1a and 1b

* Exp. 2, described more completely in Fig. 1.

[2] R. C. Ingraham, H. C. Peters and M. B. Visscher, *Jour. Phys. Chem.*, 42: 141, 1938.

[3] C. Dennis and M. B. Visscher, *Am. Jour. Physiol.*, 131: 402, 1940.

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THE MOUSE ANTIALOPECIA FACTOR

WOOLLEY[1] described a syndrome produced in mice on a synthetic diet containing thiamine, riboflavine, nicotinic acid, pyridoxin, β-alanine, pantothenic acid and choline. The symptomatology as described was one in which the hair on the entire body excepting the head and tail falls out, leaving the trunk naked. The denuded areas showed a reddening, and sores developed. Woolley[2] identified this factor as inositol or phytin. Norris and Hauschildt[3] reported the development of somewhat similar lesions on a diet deficient in pantothenic acid and inositol.

Using a basic diet of casein, 18; sucrose, 67; salts, 4; cod liver oil, 2, and butter fat, 9, supplemented with 20 ug. of thiamine, 15 ug. of riboflavine, 10 ug. of pyridoxine, 0.5 mg. of nicotinic acid, 1.0 mg. of choline, 10 ug. of pantothenic acid and 50 ug. of β-alanine, we noted after six weeks a slight loss of hair on the back, and some graying. On the same basic diet with the same supplements, but with added inositol at 250 ug. daily, we noted exactly the same symptoms. Following both groups of 100 mice each for three months, no differences were observed. Thus, we have been unable to detect any effect from added inositol.

Using the Norris and Hauschildt diet, which is deficient in both inositol and pantothenic acid, we observed in 100 mice all the symptomatology reported by these workers, but immediate responses are observed to 150 ug. of pantothenic acid daily.

The mouse on a diet including thiamine, riboflavine, nicotinic acid, β-alanine, pyridoxin, pantothenic acid, choline and inositol responds to Labco Rice Polish Factor II, at 250 mg. daily.

It is suggested that the discrepancies observed are due to genus variation, imbalance of vitamin B complex members or altered intestinal bacterial flora. Under our experimental conditions, inositol has no effect on the nutrition of the Rockland strain black mouse. Furthermore, pantothenic acid, while curing the skin lesions described by Norris and Hauschildt[3]

[1] D. W. Woolley, *Jour. Biol. Chem.*, 136: 113, 1940.

[2] D. W. Woolley, SCIENCE, 92: 384, 1940.

[3] E. R. Norris and J. Hauschildt, SCIENCE, 92: 316, 1940.