

micron. The constituents with higher vapor pressures than lithium are deposited beyond the lithium, and those with lower vapor pressures than lithium are either deposited before it or remain with the undistilled charge material.

References

1. *Isotopes, Catalog and Price List*, Oak Ridge National Laboratory, Oak Ridge, Tenn., July, 1952.
2. *Liquid Metals Handbook*, R. W. Lyons, Ed., Washington, D. C.: G.P.O. NAVEXOS.
3. EPSTEIN, LEO F., and HOWLAND, W. H. *Science*, **114**, 443 (1951).
4. ROGERS, R. R., and VIENS, G. E. *Can. Mining Met. Bull.* No. 465, 15 (1951).
5. BREWER, LEO. *Chemistry and Metallurgy of Miscellaneous Materials: Thermodynamics*. L. L. Quill, Ed. New York: McGraw-Hill, p. 31, 1950.

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Differential Dietary Choices of Albino Rats Occasioned by Swimming¹

William J. Griffiths, Jr., and T. J. Gallagher

Department of Psychology,
The University of Mississippi, Oxford

Claude Bernard (1) first enunciated the principle of the constant internal environment. Later Cannon (2) extended the concept in the field of physiology and spoke of the steady state, or homeostasis.

Richter (3) was the first to employ the concept of homeostasis in the area of behavior when he and his associates reported that rats were able to grow and thrive on a self-selected diet containing as many as 15 purified foodstuffs. Richter (4) also reported that when particular "part-regulators" of body balance were removed, such as the adrenal glands, the total organism through its behavior in a free dietary choice situation would compensate for the loss of the "part-regulators" and, in the case mentioned, would consume excessive amounts of sodium chloride and thus remain alive in spite of bilateral adrenalectomy. Similar observations on increased calcium and decreased phosphorus intakes of parathyroid-ectomized rats have been interpreted homeostatically by Richter and Eckert (5). Pancreatized rats were found to ingest large amounts of water and to select fats and protein and refuse carbohydrate, thus losing the symptoms of diabetes (6). From these and similar studies (7, 8), Richter and his associates concluded that behavior itself could act as a homeostatic mechanism for the total organism.

The present study was designed to investigate further the concept of homeostasis at the level of the total organism, the behavioral level. Specifically, we were interested to determine whether, after swimming in a tank of water until symptoms of exhaustion were

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TABLE 1
COMPARISONS OF FOOD SELECTIONS OF TEN RATS ON
MODIFIED SELF-SELECTION DIET PRIOR TO AND
DURING SWIMMING

Food element	Av. intake during rest	Av. intake during swimming, cc	t	Level of significance
Dextrose	3.69 cc	43.00	11.30	Beyond 0.1%
Saccharine	3.46 cc	2.40	0.31	Not signif.
Water	20.53 cc	6.71	3.97	1%
McCullum	12.74 g	5.02	2.22	Not signif.

evident, rats would choose between calorically useless saccharine and valuable dextrose.

Ten Wistar inbred male albino rats, averaging 250 g body weight at the start of the study, were used as subjects. The diet of this group, a modified self-selection type, consisted of the following: in solution form—20% solution of dextrose, 0.15% solution of saccharine distilled water; in solid form—McCullum stock diet. The solutions were presented in 100-ml graduated inverted bottles affixed to specially constructed living cages. The solid was available in a nonspillable food cup placed within the living cage. The positions of the solutions were switched in a random manner to prevent establishment of position habits. Daily records were kept on the quality and quantity of dietary choices during an 8-day "rest period." Following this period was a 14-day interval during which the animals were swum daily in an inverted glass bell jar containing moderately warm water for an average of 1 hr 50 min, or until distress was evident.

Table 1 shows the average daily dietary selections of the 10 subjects during the 8-day rest period and the 14-day swimming period.

The data treated statistically, using the F and T tests, indicate that significantly more dextrose was consumed during the swimming period in comparison with the rest period. No significant differences were found in the amounts of saccharine and McCullum diet chosen during the two periods.

The results of this study make it apparent that rats will alter their dietary selections in relation to the requirements of the situation. They tend to prefer a calorically valuable substance to a similar tasting but calorically useless substance when forced to expend energy.

References

1. BERNARD, C. *Leçons sur les propriétés physiologiques et les altérations pathologiques des liquides de l'organisme*. Baillière, Paris, 1859.
2. CANNON, W. B. *The Wisdom of the Body*. New York: Norton, 1932.
3. RICHTER, C. P., HOLT, L. E., JR., and BARELARE, B., JR. *Am. J. Physiol.*, **122**, 734 (1938).
4. RICHTER, C. P. *Ibid.*, **115**, 155 (1936).
5. RICHTER, C. P., and ECKERT, J. F. *Am. J. Med. Sci.*, **9**, 198 (1939).
6. RICHTER, C. P., and SCHMIDT, E. C. H., JR. *Endocrinology*, **28**, 179 (1941).
7. RICHTER, C. P. *Proc. Assoc. Research Nervous Mental Disease*, **115**, 155 (1936).
8. RICHTER, C. P., and ECKERT, J. F. *Ibid.*, **17**, 561 (1936).

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