cellular potassium considerably. For example, if half the extracellular potassium in man suddenly shifted into muscle, the concentration of potassium in muscle would increase by only about 1 per cent. Such movement of potassium should lead to hyperpolarization of muscle, for reasons discussed in the preceding paragraph.

However, before we accept the possibility that insulin-induced potassium shifts might hyperpolarize muscle, let us ask why potassium moves into muscle under the influence of insulin. It is generally assumed that it does so because insulin has a primary effect upon glucose uptake. This view, possibly correct, is not yet supported by substantial data and is opposed by observations suggesting independence of potassium uptake from increased glucose uptake due to insulin action.

With these reservations in mind we can re-examine the statements made previously about the relation between membrane potential and ion ratios. The equations can be inverted. If it is true that E_R depends on ion ratios, it is equally true that if by some independent means we can fix E_R and maintain it at its new value, then ions must flow from one side of the membrane to the other until their ratio conforms to that demanded by the new E_R.

These ideas have been explored in part. When insulin is added to a solution bathing rat muscle the membrane potential is increased.[3] In this experiment, in which extracellular potassium concentration is held constant, insulin effect on potassium movement is demonstrated only by an increase in intracellular potassium concentration. The question is which is the horse and which the cart. Serial measurements of potassium concentration in muscle compared to measurements of E_R show that intracellular potassium increases only slowly in the presence of insulin. After three hours' exposure to insulin intracellular potassium is still not as high as predicted by the increase in membrane potential produced in only one hour's exposure to insulin; that is, insulin probably hyperpolarizes muscle before there is appreciable movement of potassium. The degree of hyperpolarization is at least adequate to account for the subsequent movement of potassium. If this is a correct description of the sequence of events, the next question is by what means does insulin produce hyperpolarization. Whatever the intimate details of the answer, the observation hints strongly that insulin acts directly on the muscle membrane. This conclusion, when taken in conjunction with other evidence in the literature, lends added weight to the validity of the transport hypothesis as a prime action of insulin in accelerating glucose metabolism by muscle.

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BOOK REVIEWS

PSYCHOLOGICAL ASPECTS OF AGING. *Edited by John E. Anderson. $2.00, pp. 323, American Psychological Association, Washington, D.C., 1956.*

The "Conference on Planning Research" is one of the current scientific fashions. Whether such conferences succeed in stimulating research is not clear, but occasionally the papers presented at them can be stimulating. This volume represents the proceedings of such a conference on "Planning Research on the Psychological Aspects of Aging." It contains more than a score of papers on personal and social adjustment; on the assessment of aging; on perceptive and intellective abilities; on learning, motivation and education; and on functional efficiency, skills and employment—contributed by social and behavioral scientists from universities throughout the country.

Although the volume contains little that the practitioner can apply directly to the treatment of his patients, and little that the investigator can utilize immediately, it contains a great deal of food for thought. For example, William E. Henry's paper on "Affective Complexity and Role Perceptions," despite its formidable title, considers some very important problems about men and their relation to the world around them. John B. Calhoun's paper on "The Use of Animals in Research on Aging" reminds us again that aging is a phenomenon of all metazoan organisms, and that much can be learned from the laboratory animal. Nancy Bayley and Wayne Dennis have each contributed papers indicating how much can be learned from the longitudinal study of the patient. Ross A. McFarland in his description of the functional efficiency, skills and employment of the aged illustrates how much more precisely one can measure the physiological changes which come with age than the psychological.

Since the management of diabetes is always of long duration, and since a patient with diabetes is most frequently in the older age group, those who concern themselves with the design of therapeutic or investigative procedures to be used with diabetics will do well to study this volume.