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## PERSISTENCE OF TRANSCELLULAR SODIUM TRANSPORT BY AN EPITHELIAL CELL MEMBRANE IN THE ABSENCE OF OXIDATIVE PHOSPHORYLATION

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Active ion transport across cell membranes constitutes an essential endergonic biologic process which derives metabolic energy from high energy phosphate bonds (ATP). For epithelial cell systems transporting Na transcellularly (e.g. frog skin, toad bladder, renal tubule), this energy transformation is coupled to respiration. The availability of epithelial cells capable of anaerobic Na transport could facilitate investigation of energetics and mechanisms of active transport. The fresh water turtle urinary bladder has been found to possess this biologic attribute.

Isolated turtle bladders (Pseudemys scripta elegans) were suspended between symmetrical lucite chambers and bathed with modified Ringer's solution containing glucose as substrate. In 100% oxygen, spontaneous potential difference (P.D.) equaled 20 to 90 mV (serosa +) and short-circuit current (S.C.C.) 100 to 600 $\mu$amps per 7 $cm^2$. In 100% nitrogen, P.D. and S.C.C. persisted for > 90 min., P.D. often > 50 per cent and S.C.C. > 25 per cent of control levels. In $O_2$, $Na^{22}$ influx (mucosa → serosa) approximated S.C.C., and efflux was small. In $N_2$, $Na^{22}$ influx exceeded S.C.C. by up to 100 per cent but efflux was increased proportionately. This apparent increase in passive Na conductance occurred despite an invariable increase in total resistance. In $O_2$, KCN ($10^{-3}$ M) produced only modest decrements in P.D. and S.C.C. Na F ($10^{-3}$ M) and monoiodoacetate ($10^{-4}$ M) inhibited S.C.C. and P.D. in $N_2$. Dinitrophenol ($10^{-4}$ M) inhibited in $N_2$ as well as $O_2$. It is especially significant that strophanthin ($10^{-4}$ M) strongly inhibited in both $O_2$ and $N_2$.

These data indicate that energy requirements for sustained transcellular active Na transport could be met in the absence of molecular $O_2$; hence, energy transformation was not obligatorily coupled with respiration. Presumably, this metabolic energy arose from glycolysis and was delivered as ATP.

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## REGULATION OF ELECTROLYTE IN ELASMOBRANCH FISHES

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Following the discovery in 1959 that the rectal gland of the spiny dogfish is a salt gland, the summers of 1960, 1961 were devoted to the physiology of this organ. The results have been published: Physiol. Zool. 35:205-217, 1962. During the summer of 1962 this work continued with special emphasis on long experiments with fish from which the rectal gland was removed. In addition to analyses for electrolyte in blood, urine, and rectal gland fluid, osmotic measurements were made. In general, the 1962 work was an expansion and confirmation of previously published shorter term experiments. While a miscellany of new facts were gathered, it is felt another sum-