

Western New York Section.

University of Buffalo Medical School, February 15, 1930.

4852

Passage of Water Through Frog Skin in Relation to Temperature.

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The rate of passage of fluid through the skin of an intact frog is markedly greater with increase of temperature, when frogs with cloacae ligated are transferred to any NaCl solution. In a hypotonic solution the frogs gain weight and therefore water; in a hypertonic solution they lose water. If desiccated and then placed in water they restore fluid to the body faster with increase of temperature, but the relative effect of temperature is smaller. All these influences might be due to changes in the rate of the circulation rather than to changes in the skin. If isolated skin is placed as an osmometer membrane between 2 solutions, a large increase in rate of passage with increase of temperature is manifested. But at higher temperatures the passage may be reversed in direction in certain solutions, rather than augmented in rate in the original direction.

There is no doubt that temperature influences the rate of passage through the skin independently of other tissues; but there is no constant temperature coefficient which holds over a large range. It is known that even isolated skin has more than one differentiable factor involved in its control of the passage of water. Returning to the intact frogs, the influences of temperature upon those forces that are present when frogs are placed in hypotonic solutions may be measured separately from the influences upon the force of osmotic pressure which is present in and proportional to all strengths of solutions. It is found that the movement of water due to all the forces increases very largely with temperature; the movement due to osmotic pressure gives coefficients from 1.4 to 5.0 for 10° increase of temperature, which values of the coefficient are, in each experiment, about as large as the coefficient of the movement due to other forces.