tion of anesthesia falls in the following ascending order: Procaine HCl, Metacaine, Cocaine HCl, Panthesine. 4. The relative variability in duration falls in the following order: Panthesine, Metacaine, Cocaine HCl, Procaine HCl. 5. All distributions of duration of anesthesia show a distinct measure of skewness, those for Procaine HCl and Panthesine being positive and those for Cocaine HCl and Metacaine being negative. 6. The differences in mean duration of anesthesia between the several drugs is highly significant in 4 pairings, probably significant in one, and doubtful in another.

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Effects of a Divalent Cation on Sodium Removal from Intestinal Loops.

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It has previously been found that in the presence of any polyvalent anion, the univalent anions such as chloride[1] or bromide[2] move from the intestinal loop into the blood against great concentration differences. The univalent anion may fall to a concentration in the intestine less than 1% of its blood concentration.

The comparable situation has now been tested with respect to cations. A solution containing sodium chloride and magnesium chloride, each in half isotonic quantities, was placed in a washed loop of the lower ileum of the amytal anesthetized dog as previously described.[1] Samples were taken at intervals and sodium determined by the Barber-Kolthoff[3] method, chloride by the Van Slyke[4] technique, and ammonia by the Nash-Benedict[5] procedure.

Figure 1 shows the results of a typical experiment. It is to be noted that the sodium content decreased over a period of 1½ hours, from an initial level which is approximately one-half of the blood plasma level, to 8 mM., which is approximately 5% of the blood plasma level. Meanwhile the chloride content fell to approximately its blood concentration. These results have been obtained uniformly in 10 trials. Other experiments, not reported in full in

[1] Ingraham, R. C., and Visscher, M. B., *Am. J. Physiol.*, 1936, **114**.

[2] Ingraham, R. C., PROC. SOC. EXP. BIOL. AND MED., 1935, **33**, 453.

[3] Barber, H. H., and Kolthoff, I. M., *J. Am. Chem. Soc.*, 1928, **50**, 1625.

[4] Van Slyke, D. D., *J. Biol. Chem.*, 1923, **58**, 523.

[5] Nash, T. P., and Benedict, S. R., *J. Biol. Chem.*, 1921, **48**, 463.

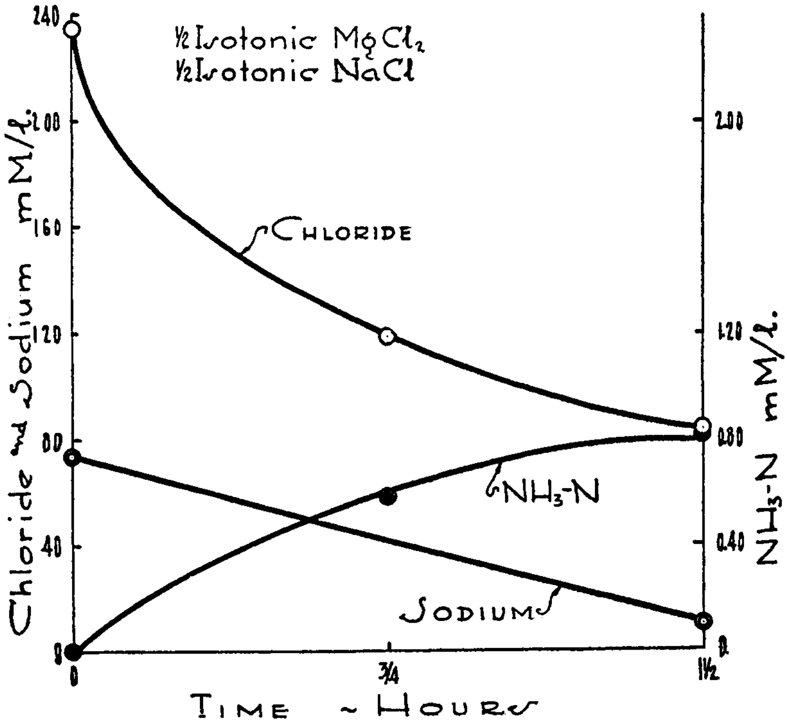

FIG. 1.

this communication, have shown that magnesium accumulates in the gut loop, and that its salts come to approximately isotonic concentration with respect to the total blood osmotic pressure. Certain other polyvalent cations may be substituted for magnesium.

The number of polyvalent cations which can be used to illustrate this phenomenon is limited because of the insolubility of their bicarbonates and other salts at or near neutrality. Aside from magnesium, only the several cobaltamine chlorides have proved useful.

Attention is called to the increase in concentration of ammonia in the intestinal fluid. This is a constant phenomenon in every experiment of this type. Its possible significance will be discussed in another place.

Summary and Conclusion. In the presence of polyvalent cations sodium is absorbed from the intestine from concentrations much lower than the blood sodium level. The sodium concentration in the intestinal fluid may fall to as low as 5% of the blood level. Thus, the previously described generalization that univalent anions move against high concentration gradients from intestine to blood when polyvalent anions are present in the intestine, can be extended to include the comparable situation with regard to cations.