of those obtained with other dogs and with rabbits, although the rabbits were not so regular.

It is not shown why calcium from $CaCl_2$ solution should be more readily absorbed from acid than from neutral solutions, as its ionization would be nearly total in either case and its solubility complete. The injected salt, however, would gradually receive contributions from the several sources of intestinal fluids, producing a quite different solution. Calcium salts would be limited in solubility to that of their least soluble combination, and under such conditions an acid buffer would preserve them in solution. The general separation of the curves with increasing time agrees with this idea, for absorption from neutral or alkaline solutions gradually decreases, while from buffered acid solutions it remains about constant.

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The action of strophanthus on the chloralized heart.

STEPHEN d'IRSAY. (Introduced by Frederick Eberson).

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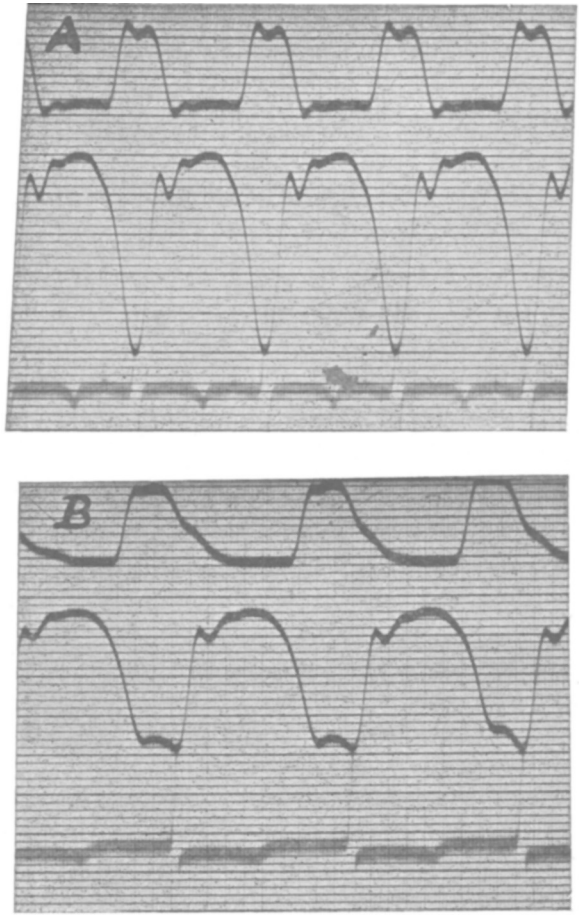
In a recent paper[1] I was trying to show—for the cold blooded heart—that in chloral hydrate, if applied in appropriate concentrations, we possess a substance which paralyzes the nervous elements of the heart in precedence to the muscular ones. It was suggested there that we might take advantage of this functional interval (elapsing between the elimination of the nervous elements and the paralysis of the sinus: the end stage of chloral action) in order to analyze the point of attack of certain pharmacological agents. The reactions of the digitalis group were tested first, for, although it is generally known that digitalis action is primarily myotropic, there remains a possibility of neurotropic action, particularly concerning chronotropic and dromotropic activities. The experiments have been carried out on the perfused heart of terrapin (Engelmann's method.) The chloral

[1] d'Irsay, S., and Priest, W. S., *Am. J. Physiol.*, 1925, lxxi, 563.

hydrate concentrations used were 0.01-0.025 per cent. With these concentrations, the functional "denervation level" was reached in about 15-35 minutes.[1] The action, with changes in conductivity and latent period as criteria, is reversible, if Ringer's solution is reapplied before the denervation level of these functions is reached; in later stages chloral hydrate creates irreversible conditions. The perfusion in the interval was therefore conducted with the test drug alone. For this strophanthus was used, in concentrations of from 0.1-0.02 per cent, under pressures of 5-10 mm. Hg., at a perfusion rate of 3-5 cc. per min. Optical auricular and ventricular myograms were taken simultaneously with electrograms. Perfusion with chloral hydrate alone and with stro-



phanthus without previous action of chloral served as controls.

The rate decreased both with and without chloral hydrate, after short transitory acceleration, and the heart stopped always in systole. The auricle was the *ultimum moriens*. The conduction time is increased about 80-100 per cent, from 0.4 to 0.7-0.8 sec. This shows that the negative chronotropic and negative dromotropic influences of strophanthus are not dependent upon the functioning of nervous elements. The period of latency, a property depending upon the intactness of nervous activities[1]—being prolonged from 0.12 sec. to 0.36 sec. in average, is not affected by strophanthus. The amplitude of contractions is not markedly affected. The tonus, if judged by the sinking of the basal abscissa, is lowered after short rise, as it is in the normal digitalized heart. Other phenomena observed were (1) nodal rhythm, which can be explained by the positive bathmotropic action of strophanthus being coupled with the elimination of positive chronotropic and dromotropic nervous influences; (2) partial diastoles (peristalsis of the heart); (3) Luciani's periods, both in normal and denervated hearts, leading to the assumption that this is a purely muscular phenomenon; (4) distortion (broadening and notching) of the QRS complex of the electrogram, a

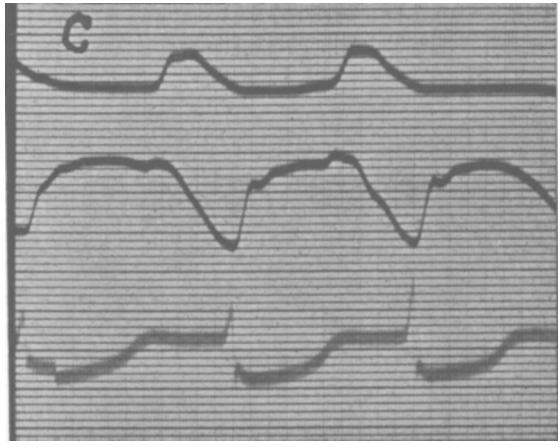


FIG. 1.

A. Typical experiment. Heart perfused with Ringer's solution.

B. The "denervation-interval", after perfusion with chloral hydrate.

C. Perfusion with Strophanthus during the interval. Upper curve: auricle, middle curve, ventricle, lower curve: electrogram. Abscissa: 1 mark: 0.04 sec. Ordinate: 1 mm:10^{-4} V. Resistance: 8000 Ohms.

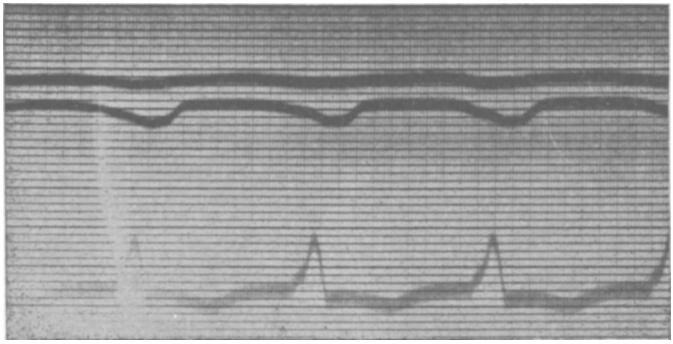


FIG. 2.

Nodal rhythm and depressed intraventricular conductivity under strophanthus. Coordinates as above.

sign of depressed intraventricular conductivity. These observations permit us to describe the action of a digitalis body as purely myotropic, having the same effects in the cold blooded heart denervated by chloral hydrate, as in the normal organ. These preliminary statements will be followed up by a report including particularly the bathmotropic and tonotropic reactions of the chloralized heart to digitalis substances.

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Cataphoresis of ultramicroscopic particles in protoplasm.

By C. V. TAYLOR.

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The cataphoresis of microscopic granules suspended in the fluid protoplasm of various cells was years ago recorded by several observers (Carlgren,[1] Pearl,[2] and others).

Recently, I have succeeded in demonstrating the cataphoresis not only of microscopic granules, but also of ultramicroscopic particles in the fluid plasmodia of the slime-mould *Stemonitis elegans.*

[1] Carlgren, *Archiv. f. Anat. u. Physiol.*, 1900, 49.

[2] Pearl, *Am. J. Physiol.*, 1900, iv, 96.