

will recover in the solution of certain electrolytes. The recovery depends upon the possibility of the diffusion of potassium salts out of the egg and not of the diffusion of the outside solution into the egg, since very toxic solutions of electrolytes, *e. g.*, NH_4NO_3 or $(\text{NH}_4)_3$ citrate, may be as efficient in bringing about the recovery of the egg as comparatively harmless or beneficial salts, like NaCl or $\text{NaCl} + \text{CaCl}_2$ or sea water. The relative efficiency of various salts for the production of the "general salt effect" depends to a large extent on the nature and valency of the anion and is for $\text{Cl} : \text{SO}_4 : \text{citrate} = 1 : 4 : 16$, *i. e.*, it follows Hardy's valency rule for the precipitation of proteins. This suggests that we may be dealing in this case with an action on some protein. The same valency rule holds not only for the acceleration of the rate of the diffusion of potassium salts but also for the opposite effect; namely, the antagonistic salt action.

Somewhat similar results were obtained for the diffusion of acid into the egg and these experiments seem to indicate that for the diffusion of these two groups of electrolytes, potassium salts and acids, in addition to the osmotic pressure of the substance a second effect is required which we call the general salt effect and which consists in the modification of a certain constituent of the membrane (possibly a protein) by the salt.

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The registration of heart sounds from the exposed heart and large vessels. A demonstration.

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For a number of reasons it was questionable whether the heart sounds recorded from the resonant thoracic wall are composed of the same vibrations as those actually arising within the heart. To assist in answering this question a method of registering the sounds from different spots on the exposed heart and large vessels was devised. The apparatus consists of a sound receptor

stitched to the heart, and a recording Frank capsule. The sound receptor consists of a light segment capsule 2 cm. in diameter and similar to the miniature myocardiograph recently described.¹ It differs in that it has only one arm connected with a trapezoidal plate which pivots on the segment capsule. When stitched to any portion of the heart this arm transmits the sound vibrations to a tensely stretched, heavy rubber diaphragm covering the segment capsule. The interior of the receptor communicates by tubing with a Frank segment capsule covered by a light film of dried rubber cement to which a tiny mirror is allowed to adhere. By leaving a side-tube open to an adequate degree, as is customary in sound registration, the gross mechanical changes are eliminated.

In comparing the sounds thus derived from the ventricle and the aorta essential differences were found, especially in the first sound. The first ventricular sound consists of three elements:

1. One or two initial vibrations which begin during auricular relaxation and precede by a variable interval the rise of intra-ventricular pressure.
2. The main vibrations composed of 7 to 13 irregular vibrations which begin with the onset of the intraventricular pressure rise.
3. The final vibrations, variable in number, which occur during the ejection period of the heart.

The first aortic sound is also divisible into three components, the second and third of which give the group a configuration essentially different from that of the first ventricular sound. They are:

1. One or two initial vibrations, evidently corresponding to the same vibrations in the ventricular sound.
2. A *first main component* consisting of a group of irregular oscillations beginning at the same time as the main vibrations of the ventricular sound.
3. A *second main component* occasionally consecutive with but often disconnected from the first component so as to give a reduplicated appearance to the sound.

¹ Wiggers, *Amer. Jour. Physiol.*, 1916, XL, 218.