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Physiology. — "*The negative-inotropic influence of the nervus vagus on the heart*". By Prof. TH. W. ENGELMANN.

The weakening influence of the vagus on the contractions of the heart, discovered and studied by NUEL in Professor DONDERS' laboratory, has been more closely examined by the speaker with the aid of the method of suspension and the pantokymographion. Speaker's experiments have mostly been made on the atria of the frog's heart, in which the above-named action can be examined most easily.

It can here be provoked by direct irritation of the vagus-root and the vagus-origines in the brain, as well as through direct irritation of the atria, eventually of the sinus or ventricle-base (irritation of the intracardial vagusbranches), also by reflexaction from different parts of the body, especially so from the intestines. Generally speaking the action is in all cases the same in quality; it is also a case of indifference whether the heart beats spontaneously or whether the ventricle is brought to regular beating, antiperistaltically, by artificial irritation of the ventricle.

The effect is furthermore independent of eventual other, chronotropic, dromotropic or bathmotropic actions of the vagus-irritation, although often combined with it.

It shows itself in the following manner after one single induction-shock causing momentary irritation: After a very short latent stage the diminution in size and length of the contractions commences, which very soon reaches its maximum; after that the systoles gradually become more considerable and of longer duration.

Intensity and duration of the whole process rise within ample limits with the strength of the irritation.

The duration of the period of increasing debility is comparatively constant; during the experiments of the speaker, taken at an ordinary temperature and retained circulation, it proved to be 3—4 sec.; the lowest value was found with the strongest irritation. The latency lasts in the most favourable case less than 0.5". The stage of the diminishing process can be prolonged for more than one minute. The weakening can lead temporarily to the entire cessation of the contractility.

The *phase* of the period of the heart in which the irritation takes place, has no perceptible influence. A refractory stage is therefore also wanting. Through superposition of cardiograms obtained by frequently repeated vagus-irritation of equal strength and duration, on the same absciss, the turning cylinder of the kymographion having

always the same position, this fact can be demonstrated very clearly, as can also the whole process of the negative-inotropic action.

By accumulating the irritation the process may be much increased and lengthened. Fatigue comes readily in consequence. To obtain an equally great effect each time, it is necessary to insert comparatively long intervals between the periods of irritation. The conduction of the negative-inotropic action within the ventricle-wall takes place in a way different from the motory irritation. By compressing the muscular wall by means of a clasp the inotropic conducting power is raised sooner and under lower pressure than the motory one.

Experiments must still be made with regard to the swiftness of the inotropic conduction.

The speaker illustrated his lecture by the aid of a number of cardiograms.

**Chemistry.** — Dr. A. SMITS: "*Investigations with the Micromanometer*". (Communicated by Prof. V. A. JULIUS).

1. After the investigations, published under this title in Sept. 1899 <sup>1)</sup>, I have been enabled by the great kindness of Prof. BAKHUIS ROOZEBOOM to continue my measurements.

Having made some improvements in the apparatus, which might possibly modify the results, it seemed very desirable to me to proceed with the measurements; moreover I considered the question, whether the decrease of the molecular vapour-tension continues to increase with the concentration also when the solution is still more diluted, as so important, that in my opinion nothing should be neglected, which might contribute to the solution of the question.

The improvements made were the following:

First the manometer was made from chosen tubes, which might be considered as perfectly cylindrical as appeared from the calibration.

Secondly all the taps were done away with, so that there was absolutely no occasion for leaks.

Thirdly the icebath was treated with more care, by excluding it from the surroundings by a thick layer of wool.

The measurements furnished the following result:

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<sup>1)</sup> Proc. Royal Acad. at Amsterdam, Vol. II. p. 88.