

content of the blood. In some cases extremely high values for the blood urea nitrogen were obtained. In one animal about two weeks after operation there was 808 mg. urea nitrogen for each 100 cc. of blood. Subsequently the blood urea decreased considerably with the onset of symptoms of uremia, the animals surviving this type of transplantation for from 14 to 20 days. These animals demonstrate the non-toxic nature of urea, since extreme values of blood urea are found without the presence of any symptoms of uremia. The rapid rise of the urea in the blood is in marked contrast with the absence of any appreciable increase in the creatinine content of the blood. This would appear to indicate that creatinine is not readily absorbed from the intestine under these conditions. It was also noted that definite increases in the creatinine content of the blood occurred when the kidney was greatly injured by infection.

This is a preliminary report.

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Measurement by Vreeland Oscillator of Minimum Time Required to Stimulate Muscle or Nerve.

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Nernst's law of stimulation (stimulus = current \sqrt{time}) has been proven for currents from 0.0002 to 0.001 seconds duration, but Lapique showed that a minimum time was necessary and was different for different tissues. A minimal current flowing infinitely which just causes a contraction is called the rheobase, the rheobase is then doubled and the time for stimulation is measured, this time is called the chronaxie. Owing to the uncertainties of the form of many of the currents used in determining chronaxie or to the undesirability of the form of the current (asymptotic) we have adopted a different procedure.

Our studies of the electric stimulation of muscle with alternating current have led us to believe that what is called the "summation of stimulus" is due to the direct current component of the alternating current. The induction coil gives a current having a unidirectional competent, as shown by Washburn, who inserted a silver coulometer in series with the secondary of an induction coil and obtained a deposit of silver.

We have used a Vreeland oscillator, giving a current of pure sine wave form with no direct current component, the frequency of which can be changed by small gradations between 7000 and 300 cycles per second. Since the time of stimulation is one-half of a cycle, the minimum time of stimulation may be determined, our results on the stimulation of gastrocnemius muscle of the frog in Ringer's fluid being 0.000079 seconds. With curarized muscle it was found that the minimum time for stimulation was increased to 0.00009 seconds. The tongue muscle required 0.00013 seconds. The minimal time for stimulation of smooth muscle could not be determined by means of the oscillator because a low enough frequency could not be obtained, but this presents no difficulty since Englemann was able to determine it in 1870.

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An Indirect Calorimeter for the Determination of O₂ and CO₂.

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The essential parts of the calorimeter are: (a) a tank containing about 300 litres of water; (b) 2 cylindrical spirometer domes in the tank, the capacity of each being 100 litres and height 1 meter; (c) a tank containing 5 kilos of 4 mesh soda lime connected with each spirometer with a 3-way valve; (d) a glass tube of 2.5 cm. bore shaped like the Greek letter π , one end of the horizontal portion being the mouth piece, the other closed by a rubber stopper at the moment the experiment is to begin, and the 2 vertical portions fitted with 4 cm. lengths of Visking sausage casings (to act as valves) and connected by rubber tubing to the 3-way valves. Each spirometer dome is counterbalanced by a weight fastened to a bicycle chain passing over a large bicycle sprocket wheel. The thickness of the wall of the dome is such that the weight of water displaced equals the weight of the chain. A meter stick is used as a scale and each mm. corresponds to 100 cc. A thermometer is inserted in each spirometer dome. The tube leading from the 3-way valve up through the water into the spirometer has a large enough surface to bring the air passing through it to the temperature of the water and this tube in spirometer No. 1 contains a wick to saturate the air with moisture.