

Physiology. — *The revival of the heart by means of soft Röntgenrays, after its arrest through the removal of its diffusible Potassium.* By H. ZWAARDEMAKER and T. P. FEENSTRA.

(Communicated at the meeting of December 21, 1929).

A heart after its arrest through the removal of its diffusible potassium can be revived by means of any corpuscular radiation (alpha or beta) of the right intensity (with a threshold of 0.8 radiumelement filtered only through mica or thin glass), but not by electromagnetic radiation ¹⁾. Since however the biological effect of the Röntgen-rays is generally attributed to the rapidly moving electrons deliberated by the rays in the tissues, we tried to obtain an analogous result by means of increasing the absorbility of the rays by diminishing their hardness ²⁾. Not before this year under the directory of Prof. NOYONS we were able to surmount all the technical difficulties we met with and could we obtain a complete success.

The isolated heart of an eel or of a frog was placed before a Röntgentube with LINDEMANN window (permeable to soft rays) at a distance of 5 millimeter. The organ, armed in the case of the eel with a sinuscanule, in that of the frog with a KRONECKER canule, was permanently perfused, firstly during ¼ to 1¼ hours with normal Ringersolution, then with Ringersolution without potassium. When the heart had come to a critical standstill without grouping it was radiated during 5 times 5 minutes (with pauses of 5 minutes between the expositions) by soft Röntgenrays, created by a secondary current of 10 milliamperes at a potential of 9000 Volts measured on a statical Voltmeter. The glowcurrent measured 4.5 Ampere. The radiant heat coming from the tube, when working was of no influence, as controlling experiments proved.

If we do not count the preparatory experiments performed before, and only pay attention to a technically perfect series of 14 experiments, performed in recent days, we found :

no revival	0 times
a somewhat dubious revival	6 „
a perfect revival	8 „

When we put together 10 complete experiments with a perfect revival we calculated the following average values :

the time elapsing between the moment of the critical arrest and the beginning of the Röntgen-radiation	10 minutes
the latency counted from the beginning of the radiation to the beginning of the pulsation	28 „
the duration of the full and regular pulsations	6 hours

¹⁾ Ned. Tijdschr. v. Geneesk. 1916, II. N^o. 22.

²⁾ Strahlentherapie, Bd. 29, p. 527. 1928.

The result was attained by the sacrifice of 4 milliamperes-hours in the tube whilst earlier ¹⁾ the same was obtained by means of cathode rays with 0.25 milliamperes-hours.

The Röntgen-rays we used belong to the BUCKY zone and give an erythema dosis in 10 minutes.

Physiol. Lab.

Utrecht, 14 December 1929.

¹⁾ Verslag Kon. Akad. v. Wetensch. Amsterdam, June 27, 1925.