

Physiology. — “*A Simple Method to obtain a Curve of the Contraction of the M. arrectores pilorum*”¹⁾. By Miss L. KAISER. (Communicated by Prof. G. VAN RIJNBERK).

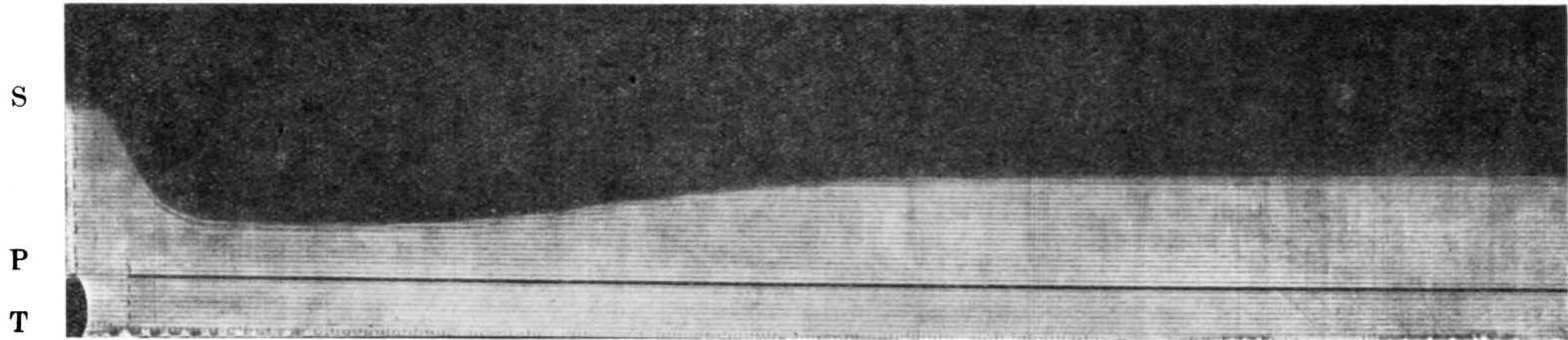
(Communicated at the meeting of June 25, 1921).

When placing the tail of a cat before the slit of a camera with a vertically moving plate, so that the dorsal side of the tail is directed towards the middle of the slit, we obtain on the sensitive plate a rather well-defined shadow. When stimulating the sympathetic chain, by which process the hairs are elevated, this elevation is imaged on the plate as a broadening of the shadow. The outer border of this shadow being, indeed, a rather sharp line, it affords a curve of the contraction of the *M. arrectores pilorum*, illustrating various features of this contraction, such as duration of the latent period, duration and shape of the crescent, etc. as the figure shows.

By this method I made several records. In all cases the sympathetic chain was stimulated with the tetanic current of an ordinary induction-coil. The curve, then, represents a tetanic contraction and not a simple one. We ascertained the average duration of the latent period, and its variations by altered strength of the stimulus, by fatigue, etc. We also determined the duration and the steepness of the ascending part of the curve under different conditions. Finally also the height of the contraction was estimated.

From this height the real shortening of the *M. arrectores pilorum* might be derived. Mr. WOERDEMAN furnished me with some necessary data, which he found by measurements in a microscopic preparation of a cat's skin. Let the distance from the insertion of the *M. arrectores* into the hair to the turning point of the latter be 400μ , and let the length of a hair be $2\frac{1}{2}$ cm., then, at the extremity of the hair the magnification of the contraction will be $\times 60$. The projection caused an additional enlargement of $\times 1.2$, so that the entire magnification must be fixed at about $\times 75$. An average broadening of the shadow of 2,5 cm, as found in my curves, points, therefore, to a shortening of the muscles of 250μ .

¹⁾ After experiments made in the Laboratory for Physiology of the Amsterdam University.



duration
of the
stimulation

S = the shadow of the tail retaining its original breadth for some time after the beginning of the stimulation (latent period) then broadening rather rapidly, in order to narrow again very slowly.

P = sign marking the stimulation.

T = the time in $\frac{1}{f}$ seconds.

This shortening amounts to about half the length of the muscle in rest, as found in the above preparation of the *M. arrectores*.

It goes without saying that with this method, as well as by writing a contraction curve on a rotating drum, we obtain an imperfect image of what really takes place. The error made in this way is easily reduced to a minimal value, and is moreover easy of calculation, so that the true curves can be deduced from those obtained.

Since, to my knowledge, LEWANDOWSKY¹⁾ is the only researcher who has written curves of a smooth muscle in warm-blooded animals, contracting by indirect stimulation, it seems to me that valuable data may be obtained by using the method here described.

¹⁾ Du Bois REYMOND's Archiv. 1899.