in detecting dehydroascorbic acid as well as the reduced form of the vitamin.

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Effect of Electrotonus on Accommodation in Nerve.

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Hill[1] has proposed an approach to the response of excitable tissues involving two processes, one a rise of the "local potential" and the other a change of threshold called "accommodation", the rates of which are represented by the time constants "k" and "λ" respectively. Blair[2] has pointed out some theoretical inadequacies arising from investigations of the effects of electrotonus on rheobase and chronaxie (theoretically .693k), but in the absence of similar studies on λ, the extent of such limitations is not clear. Consequently, the present investigation of λ was undertaken.

The technic described by Solandt[3] employing exponentially rising currents was used to determine the λ of the sciatic nerves of *Rana pipiens.* The same nonpolarizable electrodes, 2 cm apart, were employed to produce a 2-second electrotonus and to apply the exponential currents. Special precautions were taken to minimize residual and progressive effects. Most experiments were performed at 20°C.

The chief results obtained are summarized in the accompanying figure. The ordinate represents the relative change in λ (*i.e.*, the ratio of λ during electrotonus, λ_e, to λ of the normal nerve, λ_n) and in rheobase (*i.e.*, the rheobase during electrotonus, V_e, divided by its normal value, V_n), while the abscissa is the intensity of electrotonus (E/V_n) in rheobases. It can be seen from the continuous

1 Hill, A. V., *Proc. Roy. Soc. London,* Ser. B, 1936, **119**, 305.

2 Blair, H. A., *Cold Spring Harbor Symposia of Quantitative Biology,* 1936, **4**, 63.

3 Solandt, D. Y., *Proc. Roy. Soc. London,* Ser. B, 1936, **119**, 355.

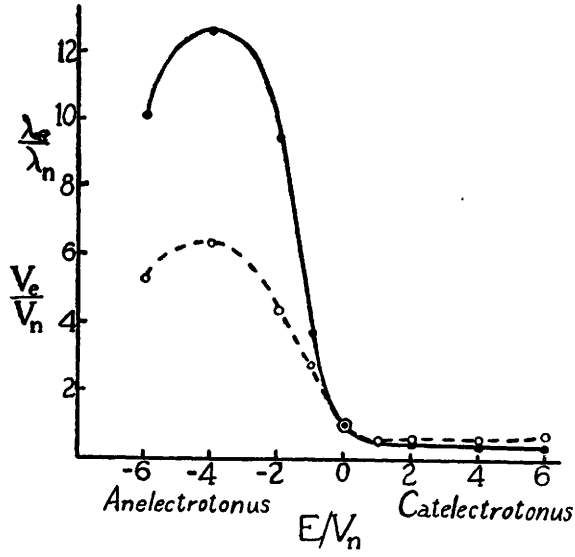

FIG. 1.

curve, which represents the modifications in λ, that λ is increased by anelectrotonus and decreased by catelectrotonus. In none of the 168 measurements of λ during electrotonus was an exception to this found. It is obvious, too, that λ is a continuous function of the electrotonic intensity, a function which is similar to that of rheobase represented by the broken curve.

Such similarity is exactly contrary to the behavior to be expected if alterations of k and λ alone govern the behavior of the nerve. For example, an increase in rheobase is often interpreted as being caused by faster accommodation. Experiments not involving electrotonus have also shown rheobase and λ to behave in such a theoretically unexplainable manner. Thus, unsoaked nerves of summer frogs mounted in a moist chamber at 29°C also exhibited an increase of both rheobase and λ with time; measurements before and after soaking in Ringer's solution often indicated the same. Furthermore, preliminary experiments indicate that although nerves soaked in calcium-rich Ringer's solution show an increase in rheobase, as expected from the concomitant decrease in λ, the order of magnitude of this increase is much larger than theoretically accountable by the change in λ. This excessive alteration in rheobase can be shown to explain the absence in calcium-treated nerves of the initial curvature theoretically predicted for the curve relating the relative thresholds of stimulation and the time constants of exponential current rise (from which λ is determined). The absence of this

curvature was noticed by Solandt, who was unable to account for this divergence from theory.

Comparison of the electrotonic effects which have been described with those obtained by Nivet[4] for chronaxie and rheobase indicates a possible relationship between λ and k which is contrary to the suggestion of their independence made by Hill and Solandt but which is not the simple direct one insisted upon by the Lapicques.[5]

Confirmation of the effect of electrotonus on λ is seen (1) in the observation by Parrack[6] that accommodation at the anode is smaller than at the cathode, (2) in the decline of excitability following the initial rise during the passage of a linearly increasing current (Fabre[7]) instead of a rise in excitability to a maximum which should theoretically be maintained, and (3) in the decrease of "Einschleichzeit" (which Hill has shown is related to λ) obtained by Schriever[8] with catelectrotonus.

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Occurrence of Tremors and Incoördination in Vitamin E-Deficient Adult Rats.

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Paralysis in adult rats grown and maintained on a vitamin E-deficient diet was first described in detail by Ringsted[1] and later by Burr, Brown and Moseley.[2] Einarson and Ringsted[3] reported degenerative changes in the central nervous system and voluntary muscles, that were prevented but not cured by wheat germ oil. The

4 Nivet, M., *C. R. Soc. Biol.*, 1934, **116**, 1013; *Ibid.*, 1939, **131**, 262.

5 Lapicque, L., and M., *C. R. Soc. Biol.*, 1937, **125**, 260; *Ibid.*, 1938, **129**, 724.

6 Parrack, H. O., *Am. J. Physiol.*, 1939, **126**, 597; *Proc. Am. Physiol. Soc.*, 52nd Annual Meeting, 1940, p. 142.

7 Fabre, P., *C. R. Soc. Biol.*, 1934, **116**, 1065.

8 Schriever, H., *Zeitschr. f. Biol.*, 1932, **93**, 123.

1 Ringsted, A., *Biochem. J.*, 1935, **29**, 788.

2 Burr, G. O., Brown, W. R., and Moseley, R. L., PROC. SOC. EXP. BIOL. AND MED., 1937, **36**, 780.

3 Einarson, L., and Ringsted, A., 1938, *Effect of Chronic Vitamin E Deficiency on the Nervous System and the Skeletal Musculature in Adult Rats*, Oxford University Press.