9. HIRSCHFELDER, J. O., MAGEE, J. L., and HULL, M. H. *Phys. Rev.*, 1948, **73**, 852.
10. JOHNSTON, F., and WILLARD, J. E. *Science*, 1949, **109**, 11.
11. KAMEN, M. D. *Radioactive tracers in biology*. New York: Academic Press, 1947.
12. PARKINSON, W. C. *Phys. Rev.*, 1949, **76**, 1348.
13. RASETTI, F. *Elements of nuclear physics*. New York: Prentice-Hall, 1936. P. 85.
14. RUTHERFORD, E., CHADWICK, J., and ELLIS, C. D. *Radiations from radioactive substances*. Cambridge: Cambridge Univ. Press, 1930.
15. SOLOMON, A. K., and ESTES, H. D. *Rev. sci. Inst.*, 1948, **19**, 47.

The Curarelike Effect of Thiamine Hydrochloride Solution on Vagal Inhibition of the Frog Heart

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The curarelike effect of thiamine hydrochloride upon the frog has been described by Smith *et al.* (*2*). In their study, 2000 mg of thiamine hydrochloride per kg of body weight was injected into the ventral lymph sac of adult frogs. By exposing both gastrocnemius-sciatic systems and ligating one of these muscles from the systemic circulation prior to the injection, it was possible to demonstrate that stimulation of the sciatic nerves produced contraction of the gastrocnemius muscle only on the ligated side. The same phenomenon was observed with injections of 80 units intocostrin per kg body weight.

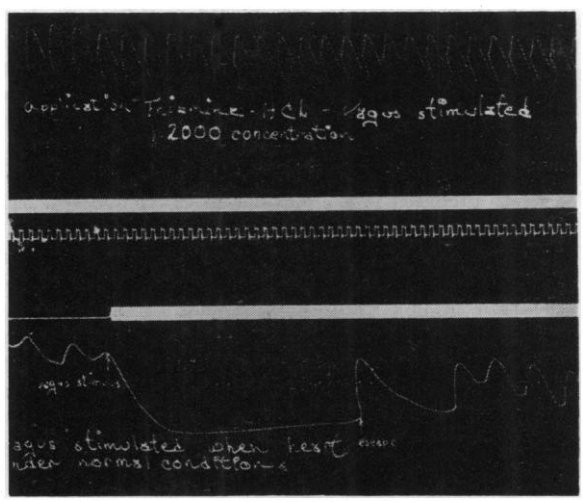

FIG. 1.

Inhibition of the vagus effect on the frog heart by addition of thiamine chloride to a perfusion fluid has been shown by Gross (*1*).

To determine if thiamine hydrochloride would also produce a curarelike effect on vagal inhibition of the frog heart, solutions buffered at pH 7.2 and ranging in concentration from 1: 5000 to 1: 1000 were applied to the exposed heart. The right cardiac vagus was then stimulated with induction shocks. At dilutions of thiamine hydrochloride greater than 1: 2000, vagal stimulation was effective in stopping the heartbeat. Dilutions of 1: 2000, however, resulted in complete blocking of the vagus inhibition (Fig. 1). Application of approximately 1 ml (500 μg) was effective in accomplishing this result. The vagus effect was again restored after flushing with Ringer's solution and allowing a 3-min interval.

References

1. GROSS, F. *Helv. Physiol. Acta*, 1946, **4**, 47.
2. SMITH, JAY A., FOA, P. P., and WEINSTEIN, H. R. *Science*, 1948, **108**, 412.

On the Existence of Bonds between Ossein and Inorganic Bone Fraction

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The problem of the existence of bonds between the ossein and the inorganic fraction of bone is as yet unsettled: Is the ossein physically mixed or chemically bound with the inorganic bone fraction?

Caglioti (*4*) has shown that the bone x-ray pattern gives evidence of the existence of a semicombined lattice formed by ossein and the inorganic fraction.

On the other hand, Dallemagne and Mélon (*5*), from quantitative research upon the optical properties of ox bone, claim to have demonstrated that its composition obeys Wiener's law (*10*) concerning form birefringence of rodlet composite bodies. Consequently, the organic and inorganic fractions of the ox bone appear to be physically mixed.

In previous research on the optical properties of human bone (*1*, *2*), I pointed out that the conclusions attained by the latter authors do not seem wholly acceptable for the following reasons: (*a*) Dallemagne and Mélon do not take any account of the birefringence of ossein itself; and (*b*) technical difficulties do not allow precise measurements of the refractive index of ossein by means of the Becke and Schroeder van der Kolke methods, so that the value found for ossein ($n = 1.385$) actually appears to be excessively low.

The present note is an attempt to bring further knowledge to bear on this subject. Details of this investigation will be published elsewhere.

The ossein (ground substance + fibers), like the inorganic fraction, follows Wiener's law of form birefringence. This property seems to be related to the submicroscopic spaces occupied by the inorganic fraction. Contrary to Baud and Dallemagne's statements (*3*), it is possible to obtain the ossein form birefringence curve without any evident anomalies in its general behavior. This is easily obtainable (provided that the imbibition of