in view of the fact that the experiments of Table III indicate that direct treatment with cathode rays does not interfere with the healing produced by ultraviolet light.

The fact that the direct exposure of rats to cathode rays has not been found to cure rickets is presumably to be explained by the fact that, owing to severe damage done to the animal by the treatment, it is not possible to give the dose which would be required to activate enough of the cholesterol of the skin to bring about the desired result.

Along with these experiments we have also studied in some cases the ash content of dry extracted femurs, inorganic blood phosphorus, and the line test, upon which we will report in detail elsewhere.

[1] Coolidge, W. D., *J. Franklin Institute*, 1926, ccii, 693.

[2] Steenbock, H., and Black, A., *J. Biol. Chem.*, 1925, lxiv, 263.

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Contaminating Substances as a Factor in the Activation of Cholesterol by Irradiation.

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In a recent communication[1] we reported the effects of irradiation on a large number of cholesterol derivatives prepared by one of us (Windaus). Among other derivatives which were tested biologically, and which failed to be activated, was a phytosterol extracted from rapeseed oil. It had been expected that this preparation would develop antirachitic properties after subjection to the rays from the mercury-vapor lamp. This failure indicated that activation in general may be due to some contaminating substance rather than to an alteration in the cholesterol itself.

Some previous experiences had suggested a similar interpretation—for example, the slight changes in physical constants which came about in cholesterol following irradiation, and again the fact that activated cholesterol could be fractionated into an active and an inactive fraction by means of liquid ammonia[2]. The ammonia-soluble fraction, representing somewhat less than 4 per cent of the original cholesterol, was found to have antirachitic potency.

A preparation of cholesterol was purified by means of being separated twice as the dibromide and subsequently recrystallized. This preparation failed to be activated by ultra-violet rays. O. Rosenheim has communicated to one of us (Windaus) that he has had a similar negative result with brominated cholesterol. Furthermore, it did not give the characteristic absorption spectrum of ordinary cholesterol, nor did it show a decrease in absorption following irradiation, a phenomenon which takes place in ordinary cholesterol. Likewise phytosterol, which had been purified similarly by means of a bromine derivative, failed of activation by ultra-violet irradiation.

Over-radiated cholesterol which had been recrystallized, could not be activated.

These experiences lead us to question whether cholesterol itself develops antirachitic properties through ultra-violet irradiation, or whether it is not rather some contaminating substance intimately associated with it which acquires this specific property.

[1] Hess, A. F., and Windaus, A., PROC. SOC. EXP. BIOL. AND MED., 1926, xxiv, 171-172.

[2] Hess, A. F., Weinstock, M., and Sherman, E., *J. Biol. Chem.*, 1926, lxx, 123-127.

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Antagonistic Action Between NaCl and $CaCl_2$ as Influencing the Penetration of Dye into Nitella.*

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This paper deals with the effects of several chlorides upon the penetration of the basic dye, dahlia, into the sap of *Nitella* sp. The plants were placed in solutions containing .0125, .025, and .05 M NaCl, KCl, $CaCl_2$ or $MgCl_2$, respectively, and .000476 per cent dahlia. The concentration of the dye in the sap was determined colorimetrically. The control solutions consisted of distilled water and tap water.

When the external solution contained any of the chlorides used the amount of dye found in the sap was less than that found when distilled water or tap water was used. NaCl was least effective in

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