XCVIII. THE PRODUCTION OF VITAMIN D IN A GLOW DISCHARGE.

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VARIOUS workers have shown that vitamin D can be formed from ergosterol not merely by "ultra-violet light," but also by X-rays and cathode rays. We have, however, found no record of similar tests with a glow discharge, and we have therefore conducted a few experiments as described below.

The current used was 150 to 250 milliamp., alternating at 50 cycles from a transformer with a voltage of 2000. In the earlier tests ergosterol vapour at a temperature of about 130° and at a low pressure was passed through the whole discharge. As charring occurred round the electrodes, these were removed to side branches of the main (glass) tube so that the vapours passed through the positive column only. This procedure avoided the charring, but only gave a very small yield of vitamin D. It appeared possible that the formation of vitamin was due to ultra-violet radiation in the discharge rather than to electron bombardment. Accordingly, a 0.05 % solution of ergosterol in alcohol was passed at a rate of 16 cc. per min. through a silica tube of 5 mm. bore which traversed the centre of the positive column of the discharge for a length of 1 metre. This caused transformation of 18 % of the ergosterol to a resinous mixture containing a quantity of vitamin D (calciferol) equal to about 6 % of the original ergosterol. A similar test in which the glow discharge was passed through argon instead of air gave a destruction of 37 % of the ergosterol, and a mixture with an antirachitic activity corresponding to a yield of vitamin D equal to 16 % of the original ergosterol. In some tests the discharge tube was immersed in water at 0°. This caused a concentration of the "glow" to a cylindrical space closely surrounding the silica tube, but had little other effect. A similar test with a tube of greenish glass in place of the silica tube showed negligible destruction of the ergosterol, supporting the hypothesis that the action is due to radiation.

It is thus practicable to produce vitamin D in quantity in a glow discharge, but in our hands the yield per unit of electrical energy was much smaller than that obtained with a mercury vapour lamp.