resistivities of the films in ohm cm., as a function of the temperature of deposition and film thickness, obtained on this reproducible surface.

If the deposition is stopped, the films normally show a decay of conductivity with time, even though the surface is maintained at the temperature of deposition. The magnitude of this decay depends critically on the condition of the surface on which the film is laid down, but becomes consistent after very vigorous heat treatment of the surface. It then decreases as the temperature of deposition is lowered and, provided the temperature is low enough, may be completely arrested. For example, a film of 10 atomic layers thickness deposited at 64° K. is quite stable, and a temperature/resistance curve can be obtained over the range from 64° K. to 90° K. Although this stable film of 10 atomic layers is quite invisible, the resistance has fallen so low as 30 ohms between opposite edges of a patch about 1 cm. sq., giving a resistivity only four times greater than that of the bulk metal at the same temperature.

At this temperature of deposition the conductivity first becomes appreciable with only $\frac{1}{2}$ an atomic layer on the surface. Apart from Reinders and Hamburger[2], previous investigators have been unable to detect conductivity in films of thickness less than about 40 layers. Also even for thicknesses of several hundred atomic layers, the resistivity of the film has not approached that of the bulk metal. For example, Reinders and Hamburger (*loc. cit.*), using evaporated silver films, only attained resistivities within ten times that of the bulk metal at about 400 layers. The improved vacuum conditions of the present work probably account for the marked difference in the results now obtained.

It seems possible to explain these resistivities by allowing for the modification in the mean free path of the electrons when the film thickness is less than the normal mean free path in the bulk metal.

A full account of this work will be published shortly, including a discussion of the complex phenomena of decay in terms of a tearing up of the film under surface tension forces.

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Biological Properties of Testosterone

THIS male sex hormone was extracted from testes by Laqueur and his co-workers[1] and prepared artificially by Ruzicka and Wettstein[2] and also by Butenandt and Hanisch[3]. In our experiments with testosterone (Ruzicka's artificial hormone, prepared and kindly supplied by Messrs. Ciba, Ltd.), the following results were obtained:

Castrated male rats. One rat unit (author's method of assay) was found to be contained in about 8 γ; that is, of the male hormones or their derivatives which have so far been obtained, the minimal dose, which shows a definite effect of the hormone, is least in the case of testosterone.

However, even a daily dose of 1410 γ (= 176 rat units), injected for 23 days, failed to bring about a complete restoration to the normal weight of the atrophied prostate and seminal vesicles of rats castrated about fifty days before starting the injections ('recovery test').

In contrast to this, a return to the normal condition after the injection of testosterone was obtained in the case of the adrenals (which are enlarged in castrated rats), liver, kidneys, heart and probably thyroid (all of which are decreased in weight by castration). The gain in body weight increases after injections without any definite changes in the deposition of fat, which indicates a favourable stimulating effect on the anabolic processes in the general metabolism of the tissues and organs.

Ovariectomised rats. Testosterone injected alone brought about hypertrophy of all the atrophied sexual organs towards but not to the normal weight (except in the case of the female preputial glands, the weight of which became normal); decreased the weight of the thymus and (slightly) that of the adrenals and hypophysis.

Co-operative activity of testosterone and œstrone. While the co-operative activity of these two hormones was slight in the case of male rats, it was very pronounced in bringing about the restoration of the atrophied female sexual organs to or towards the normal weight.

Histological investigation of the female sexual organs corroborated the results given above and further showed that there was great similarity between the changes in the female organs produced by testosterone and those produced by androsterone-diol (described by us previously, Korenchevsky and Dennison[4]). Thus a restoration towards the normal condition was seen in the mucosa and muscular layers of the uterus and vagina (atrophied in ovariectomised rats). Besides this, even with medium doses, but more especially with the large doses used, mucification of the vaginal epithelium was obtained to a degree (with large doses) which was similar to that observed during pregnancy.

Therefore, both our previous results, obtained with androsterone and androsterone-diol, and the present results with testosterone, show that the 'male' hormones have some of the important properties of 'female' hormones. Since the urine of females has been proved to contain 'male' hormones (not identified up to the present), there should be a co-operative activity in the female organisms between these hormones and œstrone, which, together, should control the structure and function of the sexual and some other organs.

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Stimulation of Root-Hair Growth in Legumes by Sterile Secretions of Nodule Bacteria

WHEN a legume root is infected by the nodule organism, the formation of the young nodule is brought about by the multiplication and growth in size of the root-cells, principally in the cortex. In lucerne and clover, the bacteria are at first enclosed in 'infection threads', and it can be seen in young