

at Honolulu. One possibility is that the 'tail' effect in s.c.'s may be connected with such oscillations, as movements found during storm periods bear strong resemblance, superficially at least, to s.c. types (Fig. 2a). At times, too, the s.c. cannot be separated from the subsequent oscillations of the storm (Fig. 2b), merging imperceptibly into them, while at others a normal s.c. at one station may appear as a succession of strokes or oscillations at another (Fig. 2c). If the serrated nature of the magnetogram traces during storms is due to superimposed oscillations, the presence of the 'tail' may also be explained in this way. One would then expect dependence on geomagnetic latitude in their occurrence, as the oscillations increase with latitude, but the evidence from stations like Apia and Hermanus would scarcely support this. A possibility is that the absence of the preliminary movement at some stations may be due to damping caused by induced ionospheric currents; the differing rates of change with time of the main stroke when s.c.'s at several stations are compared would suggest such damping. But evidence from a number of widespread stations would be necessary to establish such effects.

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¹ *Mon. Not. Roy. Ast. Soc., Geophys. Supp.*, 5, 159 (1948).

² *Nature*, 165, 243 (1950).

Role of the Thyroid in Sexual Development in the Male

CONSIDERABLE work has been done in the field of thyroid physiology; but the role of the thyroid in male fertility needs further clarification, since extremely variable results have been observed, due, it is believed, to species and breed differences, age and stage of sexual development, dose and duration of the hormone administration, plane of nutrition and environmental temperature. With the previous work in view, an attempt has been made to study the effects of known levels of thyroid stimulation and inhibition, under natural environmental conditions, upon the gonads, that is, on spermatogenesis, the development and secretory activity of the interstitial cells, accessory male organs, sex behaviour and semen evaluation of the growing male rabbit and the ram at various stages of sexual development.

In a series of experiments, it was observed that mild hyperthyroidism within the physiological range stimulated spermatogenesis and increased the secretory activities of the interstitial cells of the testis as judged by the growth and functional activities of the accessory male organs and the sex behaviour in growing male mice¹, buck rabbits and rams. On the other hand, thyroidectomy or prolonged thiouracil-treatment interfered with the normal process of spermatogenesis; the seminiferous tubules showed atrophic and degenerative changes, the spermatogonial cells being disorganised and the tubules appearing to contain an abnormal accumulation of cells. The Leydig cells showed greater abnormal appearances, and the normal interstitial spaces showed an increase in the fibrous tissue but with reduced cellular elements. Mild hyperthyroidism resulted in precocious sexual development in the young male rabbit and the ram, while prolonged

hypothyroidism or severe hyperthyroidism interfered with the normal reproductive processes.

Thyroxine-treatment at the above levels greatly improved the sexual libido and sex drive in the buck rabbit, ram and boar, which previously had shown lessened sexual libido and poor sex drive. Thyroidal stimulation during the non-breeding season prevented to a great extent the seasonal variations in sexual desire and quality of semen in the young ram. There was a considerable improvement in the semen of the treated buck and the ram. Continued administration of larger doses of thiouracil to the growing male markedly impaired the sex behaviour and the semen was of very poor quality. The degree of impairment of these functions depended upon the age of the treated male, dose and duration of treatment and the environmental conditions.

The mechanism whereby the thyroid influences gonadal functions probably involves a complex series of interactions. The depression of sexual development during hypothyroidism may be due, in part, to reduced secretion of the pituitary gonadotrophins, while the increased functional activities of the testes and accessory male organs of young mice¹, the buck and the ram, observed in mild hyperthyroidism, is probably due to the increased output of hypophyseal gonadotrophic hormones which in the presence of thyroxine are responsible for the growth of the male sex organs. The follicular stimulating hormone stimulates the growth of the seminiferous tubules, and the increased production of luteinizing hormone stimulates the secretion of the male sex hormone by the Leydig cells of the testes. The increased output of the male sex hormone in turn is responsible for the growth and functional activities of the accessory male organs and sexual behaviour. Further, the thyroid hormone may also facilitate the utilization of hypophyseal gonadotrophic and gonadal hormones by the organism due to its metabolic conditioning of the cells involved.

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¹ Maqsood, M., and Reineke, E. P., [*Amer. J. Physiol.*, 162, 24 (1950)].

Effect of Acetoacetic Acid on Reduced Glutathione Content of Blood in Rabbits

Nath and Brahmachari¹ have shown the hyperglycaemic effect of injections of sodium acetoacetate in rabbits. Lazarow² has attempted to correlate the diabetogenic action of some chemical compounds with their ability to lower the reduced glutathione content of the blood. With the view of finding whether acetoacetic acid influences the reduced glutathione content of blood, some experiments were conducted on rabbits. The number of animals used was ten. It was found that the repeated injection of small doses gradually increasing from 25 to 75 mgm./kgm. of body-weight of sodium acetoacetate to rabbits lowered the reduced glutathione content of their blood on an average by 40-50 per cent in twenty days.

The effect of single massive subcutaneous injection of sodium acetoacetate was also studied. The doses employed were 100, 200 and 300 mgm./kgm. of body-