3600

A Qualitative Indicator for the Testis Hormone.*

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Lack of progress in the study of the organs of internal secretion has often been due to the fact that sufficiently dependable, easily read indicators for the products of their activity, were not available. In the mammals this is especially true of the gonads, for these can be removed without causing death of the animals or exceptionally striking changes. In time, of course, certain changes occur that are of importance; in the male there is a diminution in size of the prostate, penis, and seminal vesicles when present, and in the female the reproductive tract undergoes retrogression. The psyche of copulation is often independable, for with the guinea pig I have noted males vigorously inclined to the female despite the fact they were castrated months before, and at an age of thirty days. It has likewise been reported that eunuchs, castrated at an early age, retain for years a persistent inclination to, and a degree of satisfaction in, the association with the female.

The work of Stockard and Papanicolaou[1] on the guinea pig, Long and Evans,[2] Allen,[3] and others on the mouse and rat has developed a dependable method for indicating the female hormone by using the vaginal smear as an indicator. The activity cycle of the female rat shown by the work of Wang, Wang, Richter, and Guttmacher[4] likewise gives promise as a dependable test for the female hormone. On the male side, however, the only promising qualitative test that can be relatively quickly applied to mammals is that of the "Activity" record developed along lines as indicated[4] which has been recently applied by Hoskins.[5] How safe an indicator this will finally prove to be is yet to be demonstrated.

During the last three years I have kept records of the motility of spermatozoa in the rat and guinea pig under many varying conditions, as these have developed in my experimental work on the testicle of mammals.[6] In this place I wish to call attention to one phase of the results obtained for the bearing it has upon the problem of hormone indicators.

In the guinea pig the spermatozoa present in the epididymis of

* This investigation has been aided by a grant from the Committee of Research in Sex Problems of the National Research Council; grant administered by F. R. Lillie.

one side, at the time the testis is removed from it, retain their power of motility if properly stimulated, for a period of two months or longer, provided the animal's opposite testis is present. Since the source of spermatozoa on the operated side (the testis) has been removed it should be clear that each spermatozoon present was in the epididymis at the time of testis removal, and has therefore persisted and retained its capacity for motility for a period longer than 60 days. Under similar conditions, with the exception that both testes have been removed from the animal, the spermatozoa retain their capacity for movement for approximately but half the time (usually for less than 30 days). Since all conditions in the two cases are alike except that *in one case the testis secretion is being supplied to the animal (by one testis) and in the other case not,* it should be evident that *the length of retention of spermatozoon motility* supplies us with an indicator for the presence of the testis hormone.

With this indicator as a tool I have been studying many phases of the problem as they would be at once indicated. Up to the present time, I have records of sperm motility on considerably over two hundred males that involves the many phases of this study. A more extensive report of these studies will appear elsewhere.

Benoit[7] noted that sperm motility persisted longer in the isolated epididymis when the testes were present than when they had been removed; this paper was not available to me until the last few months. Though noting the same effects that I have described, he makes no mention of its application for further work. It appears, from his findings, that certain cytological pictures of cells of the epididymis may afford a means of reading the results of experimental procedures even quicker than the sperm motility reaction. Since reading his paper, I have been making an attempt to extend the indicator along these lines.

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[1] Stockard, C. R., and Papanicolaou, G. N., *Am. J. Anat.*, 1917, xxii, 225-264; *Biol. Bull.*, 1919, xxxviii, 222-245.

[2] Long, J. A., and Evans, H. E., *Mem. Univ. of Calif.*, 1922, vi,

[3] Allen, Edgar, and others, *Am. J. Anat.*, 1924, xxiv, 133-182.

[4] Wang, G. H., *Comp. Psychol. Monographs*, 1923, ii, Ser. No. 6, 1-26. Wang, G. H., Richter, C. P., and Guttmacher, A. F., *Am. J. Physiol.*, 1925, lxxiii, 581-599.

[5] Hoskins, R. G., *Am. J. Physiol.*, 1925, lxxii, 324-330; *Endocrinology*, 1925, ix, 277-295.

[6] For a review of much of this work see Moore, *Quat. Rev. in Biology*, 1926, i, and subsequent papers.

[7] Benoit, *Thesis, U. of Strasbourg*, 1925.