

and at the same time nucleotides reappear in the cytoplasm even though the chromosomes are still clearly distinguishable in the reconstituting nuclei, and no nucleoli have been reformed. In none of our micrographs of recently divided cells is there any suggestion of a greater concentration of absorbing substance directly surrounding the nuclear membrane which might imply a nuclear origin of cytoplasmic nucleoproteins. On the contrary, the nucleus is often surrounded by a relatively clear area. Our observations implicate the mitochondria rather than the nucleolus in cytoplasmic nucleoprotein synthesis.

Ultra-violet microscopy affords unique opportunities for studying the internal structure of the living nucleus. Some micrographs of dividing cells at late anaphase show the chromosomes already divided longitudinally, and this double thread-like structure persists in the 'resting' nucleus. Under appropriate conditions, nuclei can be seen to be composed of attenuated double threads upon which are disposed parallel pairs of minute granules that are not properly resolved with a wave-length of 2570 Å. These would seem to be chromomeres or possibly gene loci.

Comparison of micrographs of fibroblasts from connective tissue with malignant fibroblasts (sarcoma cells) reveals a definite correlation between the amount of nucleotides and the rate of cell-growth. Particularly striking is the intense cytoplasmic absorption of rapidly growing sarcoma cells in comparison with the relatively clear cytoplasm of 'resting' fibroblasts.

Additional ultra-violet micrographs illustrating the various observations reported here will be published in subsequent communications.

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### Cytochemistry of the Gonadotropic Hormones

DESCRIBING the histological demonstration of mucin after periodic acid, McManus<sup>1</sup> states that a positive reaction is given, *inter alia*, by "certain pituitary cells" and "the colloid of the pituitary stalk". According to Chow<sup>2</sup>, the follicle-stimulating and luteinizing fractions of the anterior pituitary secretion are glycoproteins, and Evans *et al.*<sup>3</sup> confirm that the former contains 10.3–13.1 per cent carbohydrate and 8 per cent glucosamine. According to K. Meyer's classification, it is thus a mucoprotein, that is, it contains more than 4 per cent hexosamine. Furthermore, Gurin<sup>4</sup> has shown that chorionic gonadotropin is also a mucoprotein, containing galactose (10–12 per cent) and hexosamine (5–6 per cent) as an integral part of its molecule, and Gey *et al.*<sup>5</sup> have demonstrated the production of this hormone by cytotrophoblast cells in tissue culture.

On the contrary, Fraenkel-Conrat *et al.*<sup>6</sup> have shown that the growth-hormone fraction of the pituitary contains only 0.25 per cent sugar and less than 0.9 per cent glucosamine.

The technique I have used is that described by Hotchkiss<sup>7</sup>, which is essentially like McManus' and gives positive results with a wide variety of carbohydrate substances; but of these, after ordinary aqueous fixatives, only mucopolysaccharides, mucoproteins, glycoproteins and traces of glycogen remain. If it is true that the gonadotropic hormones are produced by the basiphil cells of the pituitary, these should be stained by the McManus-Feulgen technique, with the acidophils remaining colourless.

This has been found to be the case. The colloid of the stalk, the colloid of the acini and the granules of the basiphils are stained positively. In addition, a variable proportion of the chromophobes contain vesicles and granules which are stained bright red, and these are occasionally present in mature basiphils. It is concluded (a) that the secretion of the basiphils is the gonadotropic hormone, and (b) that some chromophobes are, as Severinghaus<sup>8</sup> has postulated, predestined basiphils.

Similar granules are found in the Langhans' cells of the chorionic villi and of chorion epithelioma. It is suggested that these granules may be the chorionic gonadotropin.

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May 29.

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### Relative X-Ray Sensitivity of Metaphase and Interphase Chromosomes

MANY investigators have studied the problem of radio-sensitivity of cells in different stages of mitosis and meiosis in a wide range of plants and animals. Much disagreement still exists, however, as to which stages of the nuclear cycle are stages of high sensitivity to chromosome breakage and which stages are relatively resistant.

It is generally acknowledged that radio-sensitivity varies inversely with the degree of tissue differentiation, and that the change in sensitivity during differentiation is relatively high. However, it is not generally realized that the extent of sensitivity changes which may occur within a single cell-generation is also very high. A preliminary report is given here of the range of sensitivity of chromosomes to X-ray breakage during microsporogenesis in *Trillium erectum*.

Rhizomes of *Trillium erectum* were stored at 4–6° C. for several weeks before irradiation. Shortly before treatment a test slide was made from one or more anthers from each flower bud to determine the stage of division. Due to the high degree of synchronization of meiotic divisions, it may be assumed that the remaining anthers contained mostly microsporocytes in a similar stage. After