settled, however, and it should be stated that work in other laboratories points toward a more specific effect of the pituitary luteinizer.

8429 P

Quantitative Interpretation of Biological X-Ray Effects.*

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In dark-field photomicrographs[1] of microincinerated pollen mother cells of the lily, the chromosome ash is most conspicuous against the black background which results from the paucity of ash in the karyolymph or nucleoplasm. Animal cells yield a similar picture (Scott,[2] Kruszynski[3]). This marked concentration in the chromosomes of elements of comparatively high atomic weight, as potassium, calcium and iron probably and phosphorus certainly, may be related quantitatively to X-ray phenomena in at least 3 ways.

First, rough calculations based on microincineration evidence and on the composition of nucleic acid indicate that the mass absorption coefficient of chromatin is more than double that of air and, hence, that of nucleoplasm. This relatively greater absorption of radiant energy by the chromosomes may account in large measure for the greater sensitivity of the nucleus compared to the cytoplasm, an experimental fact confirmed by a number of investigators.

Second, the amount of chromatin in a "sensitive volume," a concept associated with the quantum hit theory of radiation injury, would be but a fraction of that computed for it on the ordinary assumptions, *i. e.*, those which underlie the definition of the roentgen as a dosage unit. Were the validity of the theory established and relevant measurements precise enough, this size factor might prove important in assigning the "sensitive volume" to a definite cytological entity.

Third, the localization of nuclear ash in the chromosomes should manifest itself in a biologically detectable wave-length effect at

* Part of investigation supported by grant of the Rockefeller Foundation to Prof. T. H. Goodspeed.

1 Uber, F. M., and Goodspeed, T. H., *Bot. Gaz.*, 1935, **97**, No. 2, in press.

2 Scott, G. H., *Bull. d'Hist.*, 1930, **7**, 251.

3 Kruszynski, J., *Bull. internat. Acad. Polonaise, Cl. Sci. Math. et Nat.*, 1934, **2**, 105.

the absorption discontinuity of any comparatively heavy element present in relative abundance. The fact that the wave-lengths for the elements concerned lie in the range 3-6 Angström units probably explains why no such effect has been discovered to date. Conversely, if a sufficiently sensitive criterion of biological effect could be found, perhaps some genetic change, it would serve as a test for the presence of specific heavy elements in the hereditary material.

8430 P

A Quantitative Study of the Cochlear Response.*

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Quantitative measurements of the cochlear response in animals have been part of a program concerned with investigations on hearing problems during the past year and one-half in these laboratories. The methods and apparatus used for the detection of the responses was similar to that described by Garceau and Davis.[1] An accurate system for the measurement and generation of pure stimulation tones was essential. An audio-frequency oscillator generated electrical voltages for the production of these tones. The voltages were amplified, measured, attenuated to the desired level and finally transformed into sound by a Western Electric 555 speaker unit. The harmonic content of the sound wave as measured by means of a Brush crystal microphone, amplifier and General Radio Distortion Factor meter was never more than one per cent for tones below 4000 cycles per second. The total power of the harmonics was therefore 40 decibels below that of the fundamental in this range. A fabric reinforced rubber tube 6 feet in length conveyed the sound to the animal's ear.

The stimulus was calibrated in terms of microwatts of acoustical energy. This was accomplished by measuring the power level to the speaker necessary to produce threshold stimuli for each ear of 6 humans. The mean value of these thresholds was considered

* Aided by a grant from the John C. and Edward Coleman Memorial Fund, University of California.

[1] Garceau, E. L., and Davis, H., *Am. J. Physiol.*, 1934, **107**, 305.