

with a sudden decrease to little or none within the first 24 hours after parturition. Close analysis of the data shows certain discrepancies between them and the general statement just made. Cows in the same stage of pregnancy do not seem to give the same amount of hormone per day. Further, a cow may give more hormone in the early stages of pregnancy than at a later time as indicated in the case of cow 71A, table I. More data on these and other points are being collected and will be presented at a future time.

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The Histologic Effects Produced in Albino Rats by High Frequency Currents.

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Beginning in March, 1928, with the advice and help of H. R. Hosmer regarding the physical apparatus employed, a series of experiments was begun, the object of which was to ascertain the histologic effects produced in the animal body by high-frequency currents. A current oscillating at a rate of from 5 to 6 million cycles per second under a current strength of 2 to 4 amperes and a pressure of 3000 volts between the plate electrodes was employed. Anesthetized albino rats interposed between these electrodes, spaced from 3.5 to 6.0 cm., for time intervals varying from 4 to 30 minutes demonstrated a body-temperature rise directly dependent upon the duration of the exposure. Both rectal and abdominal temperatures of as high as 45° were obtained before the death of the rats. The most definite and constant cytologic results were produced in these rats, however, by rayings repeated on alternate days at rectal temperatures of from 40° to 42°, and especially when such body-temperatures were maintained over periods of time varying from 10 to 30 minutes.

Upon autopsy there was observable a definite diminution in the quantity of the body fluids and in blood volume. The ventricles of the heart were filled with clotted blood, usually in complete diastole. The periphery of the lungs, of the heart, and of the liver afforded evidences of an incipient coagulation necrosis. The blood vessels, likewise, in these superficial areas were dilated and filled with clotted blood. Such cytologic changes as were presented by the blood and bone-marrow are to be reported at a later date. The spleen was not

markedly increased in size but on section was found to be choked with red blood cells in various stages of degeneration.

The sinusoids of the liver were dilated and likewise filled with blood cells while leucocytes with fragmented and pyknotic nuclei were conspicuous both within the blood vessels and among the liver cells. Small foci formed by a coagulation necrosis of the liver cells measuring from $1/6$ to $1/4$ the diameter of an hepatic lobule were restricted to and characteristic of the periphery of these lobules. Such foci were invariably associated with the region of the afferent blood vessels.

Extravasations of blood were not infrequent in both cortex and medulla. The glomeruli of the kidney were dilated and the capillaries of the kidney filled with the clotted blood. The presence of altered red blood cells, fibrin and cell detritus seemed not to be inconstant features of Bowman's capsule and of the proximal and distal convoluted tubules. Evidences of a degeneration of the cells lining these convoluted tubules and the ascending loop of Henle were generally present.

The stomach and proximal portion of the duodenum were normal, but beginning with the ampulla of Vater the mucosa of the small intestine was constantly found in a condition of degeneration and exfoliation, the lumen of the gut being choked with this cellular mucosal detritus. This exfoliation approached the level of the submucosa and the fundus of the intestinal glands. The entire thickness of the intact basal portion of the mucosa and the submucosa was infiltrated with leucocytes in various stages of degeneration. Likewise, such cells were found in great numbers in the detritus of the lumen. Small extravasations of blood were noted, chiefly in the submucosa and subserosa. The capillaries of the entire intestinal wall were distended and engorged with blood. There were no evidences of degeneration either in the sex organs or in the endocrine and nervous systems. Where the voluntary muscles had been greatly heated, the change noted was of the nature of a coagulation necrosis. The pancreas appeared normal.

These histologic changes produced by such energy conditions seem to bear out the contentions of Christie and Loomis¹ as opposed to those of Schereschewsky.² No evidence was obtained which might afford a basis for the assumption of a selective histologic action of this form of energy. The sharp restriction of the focal necrot-

¹ Christie, R. V., and Loomis, A. L., *J. Exp. Med.*, 1929, xlix, 303.

² Schereschewsky, J. W., *Pub. Health Rep.*, 1926, xli, 1939; *Ibid.*, 1928, xliii, 927.

ic areas to the periphery of the liver lobules argues in favor of the presence in the blood stream of some toxic material (as yet unidentified), which produces a necrosis in those cells of the liver lobule first encountered by this afferent blood. The necrotic mucosal conditions observed in the intestine, beginning at the ampulla of Vater and extending to the proximal portion of the large intestine, point towards an altered chemical constitution of the bile rather than pancreatic secretion. Deductively this seems referable rather to the altered hepatic features in view of the absence of any observable histologic pancreatic changes. The kidney changes may well be referred to the elimination function of this organ as regards the altered chemical constituent of the blood. There exists a striking parallelism between the conditions observed in these experiments and those noted as the result of extreme burns from various sources of external heat and, therefore, seem to substantiate the conclusions of Christie and Loomis that the changes effected are the result of a true heating condition of the body brought about directly as the result of the oscillating current.

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The Transportation of Carbon Dioxide by Paraffine Oil and Some Other Substances.

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In a previous paper¹ the use of luminous bacteria as an oxygen indicator was described. Some rough estimates of the passage of oxygen through a number of substances were given, as determined by the length of luminescent columns of bacteria. The properties of several of these substances, notably dry collodion, were of interest and these and some others were selected for further study with reference to carbon dioxide. In this case the time in hours required for one atmosphere of carbon dioxide to decolorize 1 cm. of phenolphthalein in NaOH agar is used for comparison. It is clearly recognized that this is not a quantitative method for the study of diffusion as there is a concentration gradient of carbon dioxide in the colorless portion of the phenolphthalein as well as through the membrane closing the tube. Nevertheless, it makes a very striking demonstration for class use and does give a qualitative expression for

¹ Hill, Samuel E., *Science*, 1928, lxvii, 374.