filled with substance secreted by the cell; S. H. Burnett[7] considered the vacuoled stage in the formation of the Kurloff body to be a degenerating mononuclear leucocyte; Weidenreich[8] said that it was formed by aggregations of coalesced vacuoles; Ciaccio[9] believed that the Kurloff body was caused by nuclear extrusions; Patella, Foa, and Carbona[10] at one time considered it to be a symbiotic protozoan; Patella[11] later supported the view that the structure was superimposed on the cell and not contained within it.

The experiments indicate that the Kurloff bodies are the nuclei of phagocytized cells and not the accumulation of extra-nuclear material from the cell itself, since we have been able to follow the evolution of this structure through all of its stages both in supravitally and in fixed stained preparations. A detailed discussion of these investigations will be forthcoming at an early date.

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[1] Betancès, L. M., *La Granulation Azurophile*, 1918.

[2] Burnett, S. H., Clinical Pathology of the Blood of Domesticated Animals, 1908.

[3] *Ibid.*

[4] *Ibid.*

[5] Schilling, V., *Folia Haematologica*, 1909, vii, 225.

[6] Weidenreich, F., Leucocyten, 1911.

[7] Burnett, S. H., Clinical Pathology of the Blood of Domesticated Animals, 1908.

[8] Weidenreich, F., Leucocyten, 1911.

[9] *Ibid.*

[10] *Ibid.*

[11] *Ibid.*

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Effects of Caffeine and of Paraldehyde Upon the Color of the Frog.

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Incidental to studies on caffeine tolerance in the frog, it was noticed that frogs placed in 1:3000 caffeine solution for 30 to 90 minutes became darker than the controls in water. To test the matter further, frogs were made pale by placing them in water, in glass jars, on a white background, before the window or a strong electric light, as described by Hogben.[1] Caffeine was then added to one jar to make a concentration of 1:3000, a second jar containing water was used for the control frogs. The frogs in caffeine always

became dark while the controls remained pale. The results were the same with frogs *(R. pipiens)* in spring, summer and fall of the year. Brown frogs of this species responded to caffeine with a more marked color change than did the green frogs. Injection, of one-half cubic centimeter of 0.7 per cent NaCl solution containing 0.08 g. caffeine, into the abdominal lymph sac of 5 frogs of about 20 g. body weight also resulted in darkening. Hogben[2] reported that caffeine injections had no effect upon the color of frogs.

Microscopic examination revealed the fact that the webb melanophores were contracted before placing the frogs in caffeine solution, but were expanded after the action of caffeine was in evidence.

Several investigators have shown a close relationship between the pituitary gland and the pigmentary system of frogs.[1] Therefore the entire pituitary gland was removed as carefully as possible by the method of Hogben,[3] except that a hand drill was used to bore through the skull. The fact that the operated frogs became pale and remained pale when placed in darkness and moisture, was taken as evidence that the gland had been successfully removed. Such hypophysectomized frogs, when placed in caffeine solution, were definitely darkened, but to a much less degree than the unoperated frogs. The webb melanophores were expanded to a slight degree, short processes, seldom branching, being sent out by the cells. Pieces of webb excised from hypophysectomized frogs, when placed in 1 :1000 caffeine, however, showed as marked an expansion of the melanophores as did the webb of a normal frog, the processes of the cells forming a dense reticulum.

Because of the difficulty of removing the base of the skull without injuring the hypophysis, no such operative controls were attempted.

Although it seems established that the melanophores of the frog have no nervous mechanism, nerve degeneration experiments were carried out. The cutaneous nerves to one side of the skin, in the trunk region of several frogs, were cut. Five weeks were allowed for degeneration. When these frogs were placed in caffeine, the skin of both sides darkened with equal intensity, indicating the absence of a nerve mechanism in the color response of frogs to caffeine.

Normal frogs, placed in 1 per cent paraldehyde solution, also showed marked darkening, while hypophysectomized frogs remained pale in the solution. Webb melanophores of the unoperated frogs were markedly expanded while those of the operated frogs remained strongly contracted. Degeneration of the cutaneous nerves to one side of the trunk did not prevent the darkening due to paraldehyde.

Incomplete microscopic studies of the skin of the dorsum of the

trunk of two hypophysectomized and one normal frog indicate that perhaps other factors than contraction and expansion of melanophores play a part in the color changes described above. The intact dorsal skin was observed under the low power of the microscope. In the pale state of the frog, it was observed that the epidermal melanophores were contracted, and that what were assumed to be dermal melanophores were also contracted. The condition of the xantholeucophores could not be determined by this method. After darkening of the skin of the unoperated frog by caffeine or paraldehyde, or of the skin of the hypophysectomized frogs by caffeine, the epidermal melanophores had sent out processes, but no other microscopic changes in the skin could be made out. It is possible that the darkening of the skin was due to the contraction of the xantholeucophores, allowing the more deeply seated black pigment to show up, as suggested by Smith.[4] The changes in the epidermal melanophores would probably not affect the gross appearance of the skin, since, these melanophores are very small and scattered. The changes in the epidermal melanophores are of interest in view of the fact that Hooker[5] reported that they do not contract.

From the above results it is apparent that the pituitary gland influences the response of the skin both to caffeine and to paraldehyde. Further studies are necessary before the site and manner of the influence can be definitely established.

[1] Hogben, L. T., The Melanophore Effector System, 1924; Oliver and Boyd, Edinburgh and London.

[2] Hogben, L. T., *Biochem. J.*, 1922, xvi, 5.

[3] Hogben, L. T., *Quart. J. Exp. Physiol.*, 1923, xiii, 177-9.

[4] Smith, P. E., PROC. SOC. EXP. BIOL. AND MED., 1918-19, xvi, 78.

[5] Hooker, *Science*, 1914, xxxix, 473.