the injection of morphine (3-6 cc. compared to 1-3 cc.), but none of the 3 dogs showed any conditioned secretion before feeding. All these dogs developed the conditioned salivary response to morphine on subsequent occasions in the course of a few days.

It seems that in the development of conditioned salivation, using the same conditioned stimulus, daily injections of morphine are efficacious, whereas daily feeding is not.

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Spontaneous Extinction of Morphine Salivary Conditioned Response in Dog.

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The conditioned response to morphine is developed by placing a dog, with a fistula of the duct of the submaxillary gland, into a stand for a definite period of time daily, and injecting about 30 mgm. of morphine subcutaneously at the end of each period. The injection of morphine, among other effects, produces a flow of saliva. After a few days, placing the dog in the stand is found to act as a conditioned stimulus, salivation starting before the injection of morphine. If, while continuing the daily placing of the dog in the stand, the injections of morphine be stopped, the conditioned response becomes weaker and gradually disappears.[1] This has been termed experimental extinction, and, as had been shown by Pavlov and others, it always follows the repeated application of the conditioned stimulus without "reinforcement" by the unconditioned stimulus. The present investigation was undertaken to determine whether the conditioned response to morphine would persist when not experimentally extinguished. After the dogs had fully developed the conditioned response they were left alone for from 3 to 15 days, and at the end of that interval of time placed in the stand once more, and the magnitude of the conditioned response (if any) determined. In this manner we determined the percentage of retention of the response. Five dogs were used, and each was put through 2 or more "forgetting" tests. The following facts were established:

1. The conditioned salivary response to morphine becomes partially or completely extinguished spontaneously, within a few days.

[1]Kleitman and Crisler, *Am. J. Physiol.*, 1927, lxxix, 571.

2. When the response is only partially extinguished, the percentage lost varies directly with the time elapsed.

3. Repeated establishment of the conditioned response leads to slower extinction.

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Lymph Production and Heat Regulation.

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Heat regulation in the mammalian body consists of a distinctly correlated reaction of almost all body organs toward changes of external temperature, among which the liver undoubtedly plays a most important rôle.

Changes of liver functions within this general reaction are only measurable from changes in the secretion from liver tissues. In order to draw some conclusions about the intensity of cellular activities, we have made experiments on lymph obtained from a thoracic duct cannula, since thoracic lymph originates almost entirely from the liver. It seemed advisable to test how cold or heat applied to the body surface of dogs would act upon lymph production in order to obtain further insight into the participation of the liver within the mechanism of heat regulation.

After a control period of about 1 hour (during which lymph was collected in 5 minutes samples) heat was applied by warm water bags or electric pads to the shaved abdominal skin while the dog was packed in cotton.

During such periods of heating a diminution could be observed, not only in lymph volume, but also a decrease of the percentage of lymph protein, indicating a possible decrease in cellular activity as well as in tissue permeability.

Application of cold (ice to the dog's skin by packing the animal into the ice mixture) altered the lymph production oppositely. Volume as well as the contents of lymph protein increased markedly under the influence of cold.

One of these tests charted below will best illustrate these correlations between the effect of temperature changes of the body surface and the alteration in lymph production as a manifestation of a simultaneously active liver reaction.