

either 4 or 5 days), whereas the treated animals showed a marked reaction to the extract and showed cycles ranging as high as 13 days in length. In sharp contrast, the solutions prepared from anterior lobe and thymus and containing approximately the same total solids were apparently without effect on the normal cycle. On a repetition of the first experiments, using a more dilute extract of corpus luteum, essentially the same result was obtained.

Since all extracts contained approximately the same total solids and very little protein, it seems that the corpus luteum extracts did contain some factor which acted directly in inhibiting ovarian activity and the effect was not merely due to an impairment of the general bodily metabolism.

## 5629

### A Conditioned Emetic Reflex in the Pigeon.

OSCAR RIDDLE AND FRANCES H. BURNS.

*From Carnegie Institution of Washington, Station for Experimental Evolution, Cold Spring Harbor, N. Y.*

In 1912 one of us administered a series of daily doses of yohimbine hydrochloride to several pairs of pigeons and doves which were kept in quite large cages. It was our custom to walk into a cage, catch the pair of birds, and then place the dry pellets of the drug into the upper throat with long, curve-tipped artery forceps. These pellets were readily swallowed but, unless restrained, many of the birds almost immediately regurgitated part or all of the contents of their crops. Several days after beginning this treatment it was observed that some of these birds began to vomit as soon as the person administering the drug entered their cage for this purpose—and *before* the bird was caught for dosage. Not all of this group of birds were seen to give this response, and complete records of the behavior were not obtained; those tests were made for a wholly different purpose and were not favorable to a study of the conditioned reflex. Recently we have repeated these tests on mature and immature ring doves, definitely attempting to provide *equal* externals and stimuli to the several birds, and also making complete records concerning the time and degree of exhibition of both the normal and the conditioned reflex in each of the birds tested. It is the purpose of this paper to report, without further analysis, the

data thus obtained in this recent study. The classical studies of Pavlov,<sup>1</sup> Thorndike<sup>2</sup> and others, have provided a large body of knowledge within which the present item may have a value sufficient to make it worthy of record.

Emesis serves in both mature and immature doves and pigeons not only to rid the food-crop of objectionable material but it is also employed by the mature birds as the normal method of feeding their young. Moreover, males often combine a light regurgitation with the "billing" which immediately precedes copulation with their mates. In these particular animals emesis therefore involves motor responses which are easily induced, and which (at least in adults) are apparently induced by quite dissimilar stimuli. Hanzlik<sup>3</sup> has shown that pigeon-emesis may be used for estimating the potency of intravenously injected digitalis preparations.

Yohimbine has a bitter taste to humans; this, and also the sharpness or angularity of the tablet fragments used (a 5-grain tablet cut into 4 parts), may have contributed to the bird's employment of vomiting movements against its presence in throat or crop. Yohimbine may have produced nausea, though in no case was the first or second dose regurgitated during the 10 to 15 minutes of observation which followed its administration. It was almost certainly responsible for a watery diarrhea which plainly developed in several birds. This diarrhea and the undernourishment incident to the repeated regurgitation of food prevent a prolonged study of this reflex in normal animals.

The 12 quite tame doves used in our recent tests were placed in pairs in large cages which were entered through man-sized doors. For some days preceding the tests the person who was to administer the yohimbine did not enter these cages; during the tests he entered the cages only to administer the drug. While entering the cage the white pill-box was always held plainly in sight and its contents were rather noisily rattled.

One of the 6 mature birds vomited as we entered the door to give it its fourth dosage—thus it showed the conditioned emetic reflex after only 3 doses; another bird was thus conditioned by 5 doses; 2 by 6 doses; one by 13 doses; and one was not conditioned by the total of 14 doses. The 2 last-named very stubborn cases were given double the usual dose ( $1\frac{1}{4}$  grain) after the 8th day. Of the 6 immature doves, one showed similar emesis—or perhaps only

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<sup>1</sup> Pavlov, I. P., *Lectures on Conditioned Reflexes*, New York, 1928.

<sup>2</sup> Thorndike, E. L., *Animal Intelligence*, New York, 1898.

<sup>3</sup> Hanzlik, P. J., *J. Pharm. and Exp. Ther.*, 1928, **35**, 383.

partially successful vomiting movements—after 6 doses; four after 7 doses; and one after 8 doses.

After its development, or first exhibition, the conditioned reflex was not invariably obtained on succeeding days from all of the birds. In one mature bird it was invariable during the 11 tests. In the mature birds which developed the reflex it was thus present in 63% of the later tests. On several days the immature birds were dosed twice daily; and the 16th to 20th doses (for 3 birds continued beyond the 15th dose) were of double strength. During this latter period only one bird continued to show the reflex before feeding, and only in a few cases was the normal reflex observed after feeding. Omitting this exceptional period of heavy feeding and unusual response, 4 of the immature birds showed the conditioned reflex to the following extent; in 8 of 9 tests; in 8 of 8 tests; in 2 of 8 tests; and again in 2 of 8 tests. One bird sickened early, showed the reflex once, and died 4 days later; another exhibited the conditioned reflex on the 8th day and failed to do so on 8 days thereafter.

*Summary.* A conditioned emetic reflex was usually, but not always, obtained in mature and immature doves and pigeons after 3 to 8 oral administrations of yohimbine hydrochloride. Individuals vary greatly in their normal emetic response to this drug, in their development of the conditioned emetic reflex, and in the constancy of its exhibition after it is developed. Though emesis is utilized normally to a far greater extent in mature than in immature birds our tests do not show that the conditioned emetic reflex is obtained in one age-group more readily than in the other.

## 5630

### Serological Tests With the Blood of *Cavia porcellus* and *Cavia rufescens*.

K. LANDSTEINER.

*From the Laboratories of the Rockefeller Institute for Medical Research,  
New York City.*

In order to gain further information on the inheritance of serological characters in the hybridization of species,<sup>1</sup> an attempt has been made to find an instance of fertile species hybrids where a serological differentiation of the parent types would be possible. A

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<sup>1</sup> Landsteiner, K., and Van der Scheer, J., *J. Immunol.*, 1924, 9, 213, 221.