

be assumed that healthy leaves from trees affected with Exanthema contain more "active copper" than diseased leaves, although their total copper content may be smaller, or it could be assumed that the copper is more efficient in its function in healthy leaves, whatever that function may be. In any event, the fact remains that the copper content of leaves, whether diseased or healthy, from trees affected with Exanthema was found to be invariably lower than that of healthy trees in soils free of the disease.

While Exanthema in pear trees is due most likely to a deficiency of copper, no evidence is available at present to decide whether the disease is caused by a deficiency of copper *per se*, or indirectly, as, for example, by the action of copper in neutralizing the effect of soil toxins absorbed by the plant.

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THE HUMORAL EXCITATION OF THE NESTING INSTINCTS IN RABBITS¹

OBSERVERS of animal life always remark on the skillful preparation made for the reception and care of the new-born. These activities are called instinctive and are considered to be purely nervous in origin and mechanism by the majority of physiologists. It is the purpose of this paper to suggest that the excitation of the nesting instinct may follow the injection of the urine of pregnant women.

The female rabbit living in the ground or in out-of-door cages is almost always seen to pull out the hair from her anterior body wall for a day or two before her young are "kindled." Immediately before delivery she fluffs or cards the fur with her claws until it is extraordinarily light and arranged so as to form a rounded nest. After each of the litter is born and the cord and placenta are eaten by the mother, the fur is loosely piled over the young animal (as protection against chilling and drying?).

The pulling out of large amounts of hair and the fluffing of it into a nest has sometimes been observed to follow sterile copulation or pseudo pregnancy induced by "hopping" or by mechanical stimulation. Such procedures likewise result in a transient corpus luteum formation. When, therefore, we observed nesting to follow the injection of the urine of a pregnant woman into an isolated doe, it appeared that the excitation of this instinctive behavior might well be the result of ovulation and corpus luteum formation.

A number of female rabbits were isolated for at

least one month and then injected with the urine of pregnant women. A few others were injected with commercial extracts of the urine of pregnant women (Antuitrin S.) All were closely observed by repeated laparotomies for the occurrence of ovulation and corpus luteum formation and the nesting activity carefully noted. It was discovered that the animals which ovulated and developed corpora lutea showed definite loosening of the fur as determined by repeated combing tests. This occurred at the end of the second week following injection. The rabbits that developed pseudo pregnancies showed it again at the end of the third week, and the normally pregnant animals showed this second loosening at the end of the fourth week. The rabbits were seen to pull hair only when it was in a loosened condition, but all animals which showed loose fur did not pull it out.

Only seven of fourteen rabbits injected with pregnancy urine built nests. The commercial extracts all proved negative as far as the nesting activity was concerned, although they led to corpus luteum formation. In the pseudo pregnant animals nesting occurred at the end of the third week following injection.

These findings lead us to conclude that the loosening of the hair in the rabbit parallels the involution of the corpus luteum and that some additional factor is necessary for excitation of the nesting instinct. The latter activity can be induced in the absence of pregnancy and through the injection of the urine of pregnant women. The nature of this additional factor is now being studied.

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