

149 days. The cells remaining are either associated with the infundibular stump still attached to the brain and the median eminence of the tuber cinereum or are part of non-hypophyseal circuits. Retrograde degeneration in the supraoptic nucleus of the rat is sufficiently extensive to leave no doubt about this nucleus being primarily concerned with the neural lobe of the hypophysis. There are indications that the ventrolateral or magnocellular portion of the paraventricular nucleus also reacts to hypophysectomy by a loss of cells, but to a lesser extent. More extensive studies along this line are being carried on by Dr. L. S. Meriwether. The technical skill of Mr. Dwight Ingle, who performed the operations is gratefully acknowledged.

9376

Augmentation of Gonad Stimulating Hormone of the Hypophysis by Copper

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In a recent report¹ it was shown that zinc sulphate in combination with antuitrin S augmented the weights of the ovaries of immature rats above that obtained with antuitrin S alone. In contrast to this, zinc sulphate had no augmentative effect when given in combination with pituitary implants. Copper, on the other hand, seems to differ from zinc in certain of these ovarian augmentative reactions. Fevold, *et al.*,² obtained ovulation in rabbits by intravenous injections of copper salts but failed to do so with zinc. In these rabbits the copper may have altered the response of the gonad stimulating hormones present in the blood. It, therefore, seems likely that a similar mechanism might be induced in immature rats by combinations of copper salts and pituitary implants. The data on this point are described in the present study.

The recipients were albino rats of approximately 38 gm. body weight. All donors were normal adult male rats. The pituitary implants were made in the abdominal cavity under ether anesthesia. Copper sulphate was given intraperitoneally once or twice daily in doses up to one-third of a milligram at a time in one cubic centi-

¹ Emery, F. E., *Am. J. Physiol.*, 1937, **118**, 316.

² Fevold *et al.*, *ibid.*, 1936, **117**, 68.

TABLE I.
Ovarian Weights in Milligrams of Rats at 30 Days of Age.
The CuSO_4 represents the total amount given over the 5-day period.

Groups	No. of Rats	Pituitary Implants	CuSO_4	Median	Mean	Range	% Increase	Groups Compared	Mean Difference	
									S.E. of Difference	
A	15	None	0	13.0	13.0	9 to 18	—	—	—	—
B	30	1 ♂	0	15.0	17.0	9 to 52	30.7	A, B	1.4	1.4
C	26	1 ♂	0.5 to 2 mg.	17.5	22.3	10 to 64	71.5	B, C	1.7	1.7
D	16	2 ♂	0	50.0	45.4	12 to 73	249.0	B, D	4.4	4.4
E	12	2 ♂	0.5 to 2 mg.	50.0	47.7	14 to 93	267.0	D, E	0.2	0.2

meter of saline solution. The ovaries were removed 5 days after the implants were made.

One normal male pituitary increased the average weight of both ovaries from 13.0 mg. (controls) to 17.0 mg. (groups A and B, Table I). Under the same treatment but with copper sulphate the ovaries weighed 22.3 mg. (group C). In this group the distribution of the ovarian weights was more even throughout the range while in those without copper (group B) in only 2 cases were the weights above 24 mg. The median like the mean was higher in the copper treated group but the differences are small and not statistically significant. The mean difference divided by the standard error of the difference is only 1.7. One male rat pituitary gland is quite a minimal stimulus and positive vaginal smears are produced without much change in ovarian weight. This we have previously noted^{1, 3} and it is evident here in groups A and B.

When the stimulus was doubled and 2 rat pituitary glands implanted in the body cavity, the ovaries were significantly larger than when only one pituitary was given (groups B and D). Here again copper was without effect, the medians being the same at 50 mg. each in the 2 groups and the means only slightly different (groups D and E). Thus, one may conclude that copper does not significantly change the reaction of the ovaries to pituitary implants when either the stimulus is minimal, as when one male rat pituitary gland is given, or when the stimulus is considerably above threshold.

9377 P

Experimental Alveolar Bone Atrophy Produced by Ascorbic Acid Deficiency and Its Relation to Pyorrhea Alveolaris.*

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Vitamin C (ascorbic acid) has been characterized by Wolbach and Howe¹ as necessary for the production of intercellular substances. Failure of connective tissue cells to form collagen matrices adequately accounts for the clinical signs and pathology of scurvy.

³ Emery, F. E., *et al.*, *Proc. Soc. Exp. Biol. and Med.*, 1931, **29**, 42.

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¹ Wolbach, S. B., and Howe, P. R., *Arch. Path.*, 1926, **1**, 1.