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On the Protein Nature of Prolactin and of Follicle-Stimulating Hormones.

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The methods used in the separation and purification of prolactin suggest that this hormone is a protein, but since it has not yet been obtained in a pure state the possibility of its adsorption on inert protein is not thus excluded. It is therefore desirable to learn whether prolactin is affected by tryptic digestion.

That prolactin is rapidly destroyed by trypsin is shown by the data of Table I. Almost complete destruction in 2 hours by a

TABLE I.

Destruction of prolactin (preparation No. 237) by digestion with trypsin (2 hours at 37° C.). Tests made on crop-glands of immature ring doves (material injected in 4 equal daily doses and weights taken 96 hours after first injection).

Preparations	Test animal	Mg. prolactin	Crop-gland weights, mg.		Potency in bird units
			Untreated controls	Treated	
Prolactin, no trypsin	A	16	300-400	2,400	400
	B	16	" "	2,410	
Prolactin + trypsin (digest)	C	16	" "	410	2
	D	16	" "	380	
	E	16	" "	430	
	F	16	" "	610	

purified trypsin is obtained. The prolactin preparation used in this test was relatively pure and highly potent. Both the control and digest were, at the beginning of the test, at pH 8.0 and were similarly kept at 37°C. At pH 8.0 we have repeatedly found that prolactin will withstand boiling for 1 hour with only slight or moderate loss of potency. No earlier observations on the effect of digestive enzymes on prolactin have been reported.

The rapid destruction of follicle-stimulating hormone (F.S.H.), obtained from the anterior pituitaries of beef by methods previously described,[1] is shown by the data of Table II. The testes of both birds given F.S.H., heated at pH 8.0 but not subjected to trypsin, are indicated as having increased by something more than 500%. The testes of all of the 4 birds receiving the trypsin digest (birds

[1] Riddle, O., Bates, R. W., and Dykshorn, S. W., *Am. J. Physiol.*, 1933, **105**, 191.

TABLE II.

Destruction of follicle-stimulating hormone (preparation No. 243) by digestion with trypsin (4 hours at 37° C.). Tests made on the testes of immature (2.1-2.9 months) ring doves (material injected in 4 equal daily doses and weights taken 96 hours after first injection).

Preparations	Test animal	Mg. F.S.H.	Weights of testes, mg. Average control for age	Weights of testes, mg. Treated
F. S. H., no trypsin	G	4	8.7	49.2
	H	4	6.5	34.0
F. S. H. + trypsin (digest)	I	8	6.3	6.6
	J	8	6.3	8.8
	K	4	6.5	6.8
	L	4	7.8	10.7

I and J got double dosage) showed only or relatively insignificant gains in weight. Since size increase in testes of the immature dove represents a specific response to the F.S.H. (here the weight is not increased by a Prolan B factor) this result has definite significance. Under these conditions still other relatively pure preparations of F.S.H. have been shown to withstand heating to 37° for 2 and for 4 hours with little loss of potency. A quite different test for F.S.H. potency has been used in another study; that test likewise shows that trypsin rapidly destroys the F.S.H. derived from both pituitary and pregnant urine.

It has recently become evident that one substance (Prolan A) which has long been recognized in pregnant urine is the equivalent of the F.S.H. of the pituitary. Reiss and Haurowitz[2, 3] have previously shown that F.S.H. from both sources is digested by trypsin (completely in 3 or 20 hours) and not by polypeptidases. The mouse ovary and uterus served as test objects for potency in their studies. Our tests made on the true F.S.H therefore confirm earlier work.

Summary. Prolactin is a protein-like substance which at pH 8.0 is almost completely destroyed by trypsin in 2 hours at 37°C. In confirmation of previous work though using the bird testis instead of the rodent ovary to test potency, it is found that the follicle-stimulating hormone obtained from the anterior pituitaries of cattle is very rapidly destroyed by trypsin under the above-named conditions.

[2] Reiss, M., and Haurowitz, F., *Z. Ges. Exp. Med.*, 1929, **68**, 371.

[3] Reiss, M., Schäffner, A., and Haurowitz, F., *Endokrin.*, 1931, **8**, 22.