

as by penetration of the integument and may account for the increased activity of the 20-hydroxyecdysone and the variable response to the *trans,trans*-10,11-epoxyfarnesenic acid methyl ester.

Endocrine activity regulates growth and metamorphosis in insects, and the hormones involved, such as 20-hydroxyecdysone, have been isolated from insects (9) and from crustacea (10). In addition, the juvenile hormone or its analogs terminate photoperiodically induced diapause in insects (2-4). My results demonstrate that molting hormones can be used to terminate larval diapause in a tick and are the first to demonstrate this phenomenon in an arthropod other than an insect. These results, added to evidence cited above, strongly suggest that there are similar hormonal systems among the Acarina, Crustacea, and Insecta.

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#### References and Notes

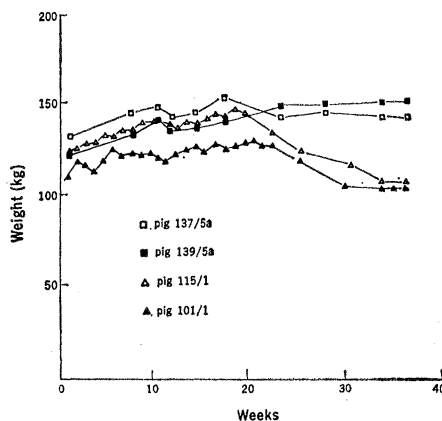
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11. I thank Drs. J. N. Kaplanis, W. S. Bowers, and M. J. Thompson for the 20-hydroxyecdysone,  $\Delta^7$ -5 $\beta$ -cholestene-2 $\beta$ ,3 $\beta$ ,14 $\alpha$ -triol-6-one, and the *trans,trans*-10,11-epoxyfarnesenic acid methyl ester; J. Sidall of Syntex Corporation for the synthetic  $\alpha$ -ecdysone; and C. C. Dawkins for technical assistance.

11 September 1968

#### Nicotine Hydrogen Tartrate: Effect on Essential Fatty Acid Deficiency in Mature Pigs

**Abstract.** *Nicotine (as the acid tartrate) prevented the development of essential fatty acid deficiency symptoms in animals receiving a linoleate-deficient diet.*

Uncastrated male pigs, 6 months old (grown on a normal commercial pig diet) and weighing about 100 kg, were used to study the effects of nicotine on



tissue and serum lipid concentration and composition (1).

Animals were kept in individual pens with concrete floors; all received an isocaloric diet containing 0.3 percent linoleate calories and yielding 4500 calories per day (Table 1). Twenty-two animals received this diet alone. Fifteen other animals received a daily injection (before feeding) of an aqueous solution of nicotine hydrogen tartrate equivalent to 1 milligram per kilogram of body weight, administered subcutaneously at the top of the forehock, in addition to the control diet. All animals were weighed weekly. Animals were killed at intervals for morphological study; thus only a relatively small number of animals remained for long-term observation.

All animals thrived for the first 6 months of the study, after which eight pigs on the low fat diet (without nicotine) remained and these lost weight steadily although they continued to consume their entire ration (Fig. 1). These pigs suffered from severe skin irritation with scaling, and seven of them died. Autopsy revealed no recognizable organic disease. The eighth pig was saved by isocaloric substitution of maize oil (28 g/day), from the age of 20 months, and gained 14 kg in the 21st month.

The changes observed are those produced by essential fatty acid deficiency (2). This is supported by the reversal of the condition by increasing linoleate calories to 2 percent with the maize oil supplement. In contrast, none of the 15 pigs receiving nicotine hydrogen tartrate showed either loss of weight or skin irritation, and all of them continued to thrive. By 35 weeks there were marked differences in the weight of the eight pigs receiving a low fat diet alone and the five receiving a low fat diet with injections of nicotine hydrogen tartrate (Fig. 1), and marked physical differ-

Table 1. Composition of isocaloric diet.

Substance	Composition (%)
Barley meal	70.0
Fine Millars Offal	20.0
Extracted soya bean meal	7.5
Salt	0.5
Ground limestone	0.5
Sterilized bone meal	1.0
"Eves" No. 32 (totally digestible)	0.25

Fig. 1 (left). Weight of four pigs. Numbers 137/5a and 139/5a were fed a low fat diet with nicotine supplement; 115/1 and 101/1 had no supplement. The other animals are omitted for reasons of clarity.

ences were observed between animals of the two groups.

The manner in which the nicotine salt produces this striking effect is not clear, but it may act by sparing the polyunsaturated fatty acid stores of the body.

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3. Supported by a Tobacco Research Council grant.

16 October 1968

#### Histone Structure: Asymmetric Distribution of Lysine Residues in Lysine-rich Histone

**Abstract.** *Structural studies on a very lysine-rich histone show that the carboxyl-terminal half of the molecule is enriched in lysine (and proline), which suggests that it is a site for binding to DNA. The amino-terminal half, containing most of the acidic residues, resembles small, nonhistone proteins and so might have specificity for factors other than DNA.*

The lysine residues in lysine-rich histones are not uniformly spaced (1). We now present evidence that most of the lysine residues are packed within the carboxyl-terminal half of the polypeptide chain and that other amino acids are clustered within certain regions of the histone molecule (2).