Activity of Cosmene and Alloöcimene as Nutritional Coagulation Factors

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In a previous communication [1] it was reported that oxalated chicken plasma contains several different coagulation factors which cannot be adsorbed by $SrCO_3$ or $BaCO_3$. Most of these factors are labile on storage. At present it is possible to distinguish between 7 different coagulation factors in oxalated $SrCO_3$-treated plasma, because of their different behaviour on treatment with selective adsorbents. It was also briefly mentioned that a quantitative "titration" of each factor with its selective adsorbent seemed possible, thus offering a method for the study of the relation between the concentration of each factor and nutritional coagulation factors (NC-factors).

A number of such factors have been shown to exist; they must be considered necessary for the formation of the coagulation factors in the body of chick[2]. Early work along these lines indicated that the formation of the π-factor (selectively adsorbed from $SrCO_3$-treated plasma by $PbCO_3$ and some other adsorbents) was dependent on a lipo-soluble factor present in cod liver oil, lard and corn oil, in addition to other water-soluble factors.

This factor has been concentrated from corn oil. It is non-saponifiable and its behaviour during chromatography and partition between solvents suggests that it might be a hydrocarbon. Spectrography suggests a diene or triene structure.

Through the courtesy of Professor, Dr. N. A. Sørensen, Trondheim, Norway, it has become possible to test some hydrocarbons, prepared in his laboratory, from animal and plant material. We have examined their ability to raise the π-level in chickens having a low level of this factor due to lack of the corn oil factor.

The basal diet is indicated in Table 1, and the results are presented in Table 2. Samples were given on 3 following days and the π-level was determined before feeding and on the 4th day.

Table 1. Composition of diet no. S—11. 2A.

Casein, vitamin low	150
Pancreas powder, defatted	80
Gelatine	80
Salt mixture *	50
Choline chloride	2
Vitamin mixture **	2
Inositol	1
p-amino benzoic acid	0.3
Cystine	2
Vitamin E acetate ("Ephynal", Roche)	0.1
Vitamin K substitute ("Synkavit", Roche)	0.01
Sugar	633
Alfalfa	80
Refined peanut oil	30

* McCollum-Simmond's Salt Mixture no. 185 supplemented with 0.013 % KJ, 0.13 % $CuSO_4$, $5H_2O$ and 0.52 % $MnSO_4$, $4H_2O$.

** Thiamine HCl: 3, riboflavin: 4, nicotinic acid: 50, Ca-pantothenate: 12, pyridoxine: 3.5, biotin: 2, sugar: 925.4.

Table 2.

Supplement	Amount fed per g body weight	π-factor levels in % of maximal: Start	End
Squalene	3.1 μg	23	<17
Pristan	3.3 »	30	<17
Farnesene	15 »	<17	<17
	30 »	<17	33
Cosmene *	0.35 »	<17	33
	0.40 »	<17	60
	0.41 »	<17	70
	0.42 »	<17	77
	0.43 »	<17	87
	0.45 »	<17	100
	0.50 »	<17	100
	0.70 »	<17	100
Alloöcimene	0.10 »	30	47
	0.12 »	<17	46
	0.12 »	<17	43
	0.13 »	<17	73
	0.14 »	20	100
	0.14 »	<17	100
	0.16 »	<17	100
	0.18 »	<17	100
	0.94 »	20	100

* 2,6-dimethyloctatetraene (1 : 3 : 5 : 7).

The results indicate that alloöcimene has considerable activity, the minimum dose for maximal action being 0.14 μ g per g body weight. The cosmene [3] preparation has about 1/3 of the activity of alloöcimene. The activity of the preparation rich in farnesene is very much lower. Squalene and pristan had no effect in the quantities tested. The factor in corn oil which can be replaced by cosmene and alloöcimene is being studied further.

1. Sørbye, Ø., Kruse, I., and Dam, H. *Acta Chem. Scand.* **5** (1951) 487.
2. Sørbye, Ø., Kruse, I., and Dam, H., and Kruse, I., Sørbye, Ø., and Dam, H. *2e Congrès Intern. de Biochimie, Paris, 1952. Résumés des Communications* 413, 417.
3. Sørensen, J. S., and Sørensen, N. A. *Acta Chem. Scand. To be published.*

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