

Physiological Significance. Methæmalbumin is never found within the corpuscles, and cannot function as a respiratory pigment. It is derived from circulating extracorporeal hæmoglobin liberated during intravascular hæmolysis, or from blood which has escaped into cysts or other cavities. Evidently during the extracellular katabolism of extra-corporeal hæmoglobin hæmatin is formed, and in man and monkeys this unites with serum albumin to produce methæmalbumin, the molecular size of which renders it impermeable to the kidney. For this reason, it never appears in the urine.

The finding that only human and simian albumin combine with alkaline hæmatin to form methæmalbumin reveals a hitherto unsuspected chemical difference between these serum-albumins and those of other mammals.

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¹ Fairley, N. H., *NATURE*, **130**, 588 (1937).

² Fairley, N. H., and Bromfield, R. J., *Trans. Roy. Soc. Trop. Med. and Hyg.*, **28**, 307 (1934).

³ Fairley, N. H., and Bromfield, R. J., *Trans. Roy. Soc. Trop. Med. and Hyg.*, **31**, 139 (1937).

⁴ Fairley, N. H., and Bromfield, R. J., *Trans. Roy. Soc. Trop. Med. and Hyg.*, **31**, 372 (1938).

⁵ Foy, H., and Kondi, A., *Trans. Roy. Soc. Trop. Med. and Hyg.*, **32**, 49 (1938).

⁶ Hoppe-Seyler, F., "Handbuch der physiologisch- und pathologisch-chemischen Analyse", 2 Auflage, 205 (1865).

Production of Artificial Hibernation

As I have shown previously^{1,2,3}, the serum magnesium of the hedgehog is increased during hibernation and regular sleep, while calcium remains nearly constant. While serum magnesium reaches its maximum during the deepest hibernation, the adrenaline of the adrenals and the blood sugar simultaneously show their lowest seasonal values^{4,5}.

When magnesium injections (1 mol. MgCl₂) were given subcutaneously to hedgehogs in autumn, the animals went into the cold-blooded state, became very limp and insensible, and the depth and rate of their respiratory movements diminished. When the animals under magnesium anaesthesia received a calcium injection (1 mol. CaCl₂) they returned rapidly to the warm-blooded state. At the same time, sensibility, muscle tone, and motility returned. 1 mol. sodium chloride solution caused no appreciable change in the animals.

Table 1 shows that the magnesium caused also a considerable rise in blood sugar and in the adrenaline of the adrenals. After the animals had been revived by means of calcium, adrenaline and blood sugar had fallen again.

TABLE 1.

	Serum			
	Blood sugar (mgm.%)	Adrenaline (mgm.%)	Mg (mgm.%)	Ca (mgm.%)
Normal hedgehogs ..	125	86	3.2	10.0
After Mg injection ..	286	100	25.4	13.0
After Mg and Ca injections ..	138	45	17.3	23.9

The amount of injected magnesium is unnaturally large, but the intention was to give so much magnesium that the body temperature would fall to a level corresponding to that found in hibernation.

Typical features of hibernation are: the transformation of a warm-blooded animal into a cold-blooded animal, increase in serum magnesium, hypoglycæmia, and decrease in the adrenaline of adrenals. Magnesium injections caused the hedgehogs to go into the cold-blooded state, but produced hyperglycæmia and an increase in the adrenaline. Therefore to other animals insulin was given subcutaneously with magnesium.

These animals also went into the cold-blooded state, resembling, in contrast to those which had received only magnesium, very closely naturally hibernating animals. Sensibility and muscle tone were preserved. The animals were rolled up in the natural manner, and continued sleeping until they were sacrificed for analyses.

In Table 2 the results of these experiments are given.

TABLE 2.

	Serum			
	Blood sugar (mgm.%)	Adrenaline (mgm.%)	Mg (mgm.%)	Ca (mgm.%)
Normal hedgehogs ..	125	86	3.2	10.0
Artificial hibernation (Mg and insulin) ..	44	52	27.2	16.2
Natural deep hibernation ..	49	60	6.0	10.9

The results show that blood sugar and the adrenaline of the adrenals in artificial hibernation were approximately the same as in natural hibernation. Particular attention is directed to the fact that blood sugar always adjusted itself to approximately the same level as that found in natural hibernation, although the amounts of injected insulin varied within a wide range (1:10). Similar amounts of insulin given without magnesium caused fatal hypoglycæmia.

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¹ *NATURE*, **141**, 471 (1938).

² *Suomen Kemistilehti*, **B**, **11**, 25 (1938).

³ *Suomen Kemistilehti*, **B**, **11**, 29 (1938).

⁴ *Annal. Acad. Sci. Fennicæ. A*, **45** (1935).

⁵ *Biochem. Z.*, **295**, 145 (1938).

Anti-Encephalomalacia Activity of dl- α -Tocopherol

RECENT work on K-avitaminosis in chicks offered an opportunity of studying the nutritional encephalomalacia of growing chicks receiving certain supplements to their basal diet. Some groups of chicks were kept on diet 108 of Pappenheimer and Goettsch¹. On this diet the animals developed the symptoms as described by these authors. We have now studied the effect of the addition of certain vegetable products, as it was our intention to carry out an elaborate fractionation of these materials along with the search for vitamin K. In the meantime, synthetic dl- α -tocopherol prepared after the method of Karrer *et al.*² was made available³, and we therefore tested the effectiveness of this substance directly against the disease. Daily doses of the substance increasing proportionally to the weight of the animals in quantities of 0.0075 mgm. per gm. body weight per day completely protected the chicks against encephalomalacia.

In an earlier experiment in which another basal diet containing less fat was used, we had already noted