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Coproporphyrin Excretion in East Coast Fever of Cattle.

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THE object of this note is to put on record observations concerning the presence of porphyrin in the urine and faeces of bovines experimentally infected with East Coast fever, at Onderstepoort. These observations are noteworthy in that they constitute additional evidence of the excretion of porphyrins in pathological conditions. Moreover they contribute as far as can be ascertained the first definite evidence of the excretion of these substances in a protozoal disease like East Coast fever.

The series III porphyrins, which are regarded as the normal "physiological" type, occur in certain pathological conditions including cirrhosis of the liver (Dobriner, 1936), hepatic tumours (Dobriner, 1936), lead poisoning [Grotepass (1932), Mertens (1937), Fischer and Deusberg (1932), and after the administration of salvarsan (Schreus, 1935) and sulphonilamide (Rimington, 1938). In congenital porphyrinuria, series III, porphyrins are found to be excreted simultaneously with excessive amounts of series I [Fischer and Libowitzky (1936), Fischer and Hofman (1937), Rimington (1937), Rimington and Roets (1937)]. In idiopathic porphyrinuria series III has been demonstrated by Waldenström (1935) and Mertens (1936), whilst Dobriner (1936) detected the presence of the I and III series in the faeces of one case.

In the East Coast fever cases investigated this duality of the coproporphyrins was found. The total coproporphyrin extracted from faeces having a porphyrin content of 94-104 γ per 100 gm. fresh faeces, was esterified and the methyl esters separated by dissolving the Copro III ester in cold methyl alcohol. In one animal the ratio of Copro I : Copro III was 1 : 1·15, whilst in another only a trace of the I series was present.*

* Determinations were made by the methods described by Rimington, Roets and Fourie in a paper "Quantitative Studies upon Porphyrin Excretion in Bovine Congenital Porphyrinuria". (Onderstepoort Jnl. of Vet. Sci. Vol. 10, No. 2, p.p. 421-430, 1938).

Working with a disease like East Coast fever the danger of spread of the disease must constantly be guarded against. The experimental animals had to be closely confined and the conditions were such that it was impossible to collect and examine their urine daily; consequently what urine it was possible to collect was worked up and the extracted porphyrins accumulated. In such urine the ratio of Copro I : Copro III was found to be 1 : ·31.

The copro I ester, see Fig. 1, has a melting point of 240-244°. The M.P. of a mixture of this ester and coproporphyrin I ester, of M.P. 240-246° which was obtained from the faeces of congenital porphyrinuric animals was 240-246°. Therefore there was no depression. The spectrum, solubility and acid number are like that of copro-porphyrin.

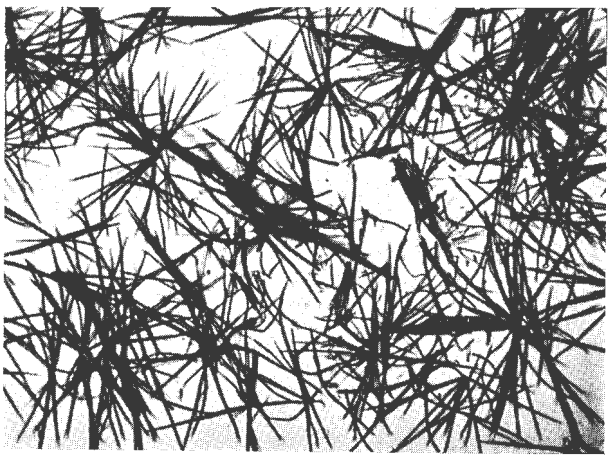

Fig. 1. —Copro I ester. Magn. 300×.

The Copro III ester crystallised in small clusters of fine needles, see Fig. 2, on allowing a solution to evaporate spontaneously in a tube either from methyl alcohol or ether (compare Rimington, 1938). The melting point of the combined ester from the urine and faeces was found to be 136-170°, remelt 160°. It has the coproporphyrin spectrum acid number and solubility.

It might be mentioned here that 14-25 γ coproporphyrin was detectable in 100 gm. samples of fresh faeces before the animals were infected, which agrees with Dobriner's findings, namely that coproporphyrin is normally excreted in small amounts in faeces (Dobriner, 1937). Further investigations are being continued with the object of obtaining data which may contribute towards a clearer understanding of the relationship existing between the natural porphyrins and the process of haemopoeiesis in a disease such as East Coast fever.

Fig. 2.—Copro III ester. Magn. 300×.

Summary.

1. Coproporphyrin I and Coproporphyrin III were isolated from the faeces and urine of cattle suffering from East Coast fever.

2. The ratio of the I to the III series in the faeces of one animal was 1 : 1·15, whilst in that of another only traces of the I series could be detected.

3. In an accumulated sample of coproporphyrins extracted from the urine of East Coast fever cattle the ratio of the I to the III series was found to be 1 : ·31.

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