duces in calves the typical TESOM toxicity syndrome, suggest that S-(dichlorovinyl)-L-cysteine may be related in structure to a part of, or may possibly be, the toxic principle of TESOM. Attempts to isolate sufficient toxic material from TESOM for chemical characterization are under way at the present time.

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THE MAGNETIC SUSCEPTIBILITY OF MOLTEN NICKEL(II) COMPLEXES

Sir:

The paramagnetism exhibited by the bis-N-methylsalicylaldiminenickel(II) complex, diamagnetic in the solid state, when dissolved in "non-coördinating" solvents such as benzene and chloroform, has been interpreted as being due to the conversion of a proportion of the molecules of the complex from a planar to a tetrahedral configuration.[1] A similar behavior is observed for complexes of the series from bis-N-ethyl- to bis-N-amylsalicylaldiminenickel(II).[2]

The electric dipole moment measurements made on such complexes dissolved in dioxane and benzene have afforded evidence against such a view.[2] On the other hand, the hypothesis that paramagnetic octahedral disolvated complexes are formed, although improbable in the light of the investigations by Basolo and Matoush[3] on the coördinating tendencies of the methylbenzenes, cannot be ruled out.[4] In fact the existence of a silver perchlorate–benzene complex[5] shows that benzene and metal atoms may bind together.

In order to determine whether or not benzene molecules do coördinate with these nickel(II) complexes to yield paramagnetic solutions, magnetic measurements have been made on bis-N-alkylsalicylaldiminenickel(II) complexes, from bis-N-ethyl- to bis-N-decyl-, in the molten state. The magnetic susceptibilities of the molten compounds were measured between 80 and 200° by the Gouy method. In order to have samples of a lower melting point, mixtures of two complexes in the molecular ratio of 1:1 also were used.

Complexes which are diamagnetic in the solid state are paramagnetic with moments ranging from 0.8 to 1.15 B.M. in the molten state. Graphs of the magnetic moment *vs.* temperature for all of the complexes examined have very similar shapes and sometimes coincide. In the case of complexes or mixture of complexes melting below 100°, the curves have a minimum near 120°. Since the paramagnetism of bis-N-methylsalicylaldiminenickel(II) in benzene and chloroform, as measured by Clark and Odell,[1b] decreases steadily with increasing temperature from -16 to 43°, magnetic measurements have been also made on solutions of the complexes in dibutylphthalate which permits measurements up to 200°.

Curves of the magnetic moments of these complexes dissolved in this solvent likewise show a minimum. For the bis-N-methyl- complex this minimum falls near 120°. Beyond this point the magnetic moment rises steadily with increasing temperature. This suggests that the mechanism of the transition from diamagnetism to paramagnetism is the same for solutions as it is for the molten systems. The results of this investigation also show that the presence of solvents is not necessary to give rise to paramagnetism in these complexes, their diamagnetism being a property peculiar to the solid state only.

The equilibrium constants K = [paramagnetic form]/[diamagnetic form] have been calculated from values of magnetic susceptibility. The plots of log K against $1/T$ give a minimum which demonstrates an inversion of sign in the enthalpy of values of the equilibrium.

The possibility that the paramagnetism of the molten compounds can result from dissociation of the complexes into free Ni^{++} ions and chelate molecules has been excluded by measurements of electrical conductivity made on these complexes in the molten state.

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[1] (a) J. B. Willis and D. P. Mellor, THIS JOURNAL, **69**, 1237 (1947); (b) H. C. Clark and A. L. Odell, *J. Chem. Soc.*, 3431 (1955).

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[3] F. Basolo and W. R. Matoush, *ibid.*, **75**, 5663 (1953).

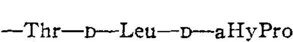
[4] *Cf.* H. C. Clark and A. L. Odell, *J. Chem. Soc.*, 520 (1956).

[5] R. E. Rundle and J. H. Goring, THIS JOURNAL, **72**, 5337 (1950).

THE STRUCTURE OF ETAMYCIN

Sir:

This communication reports the complete structure of the antibiotic Etamycin[1] (Viridogrisein[2]), the isolation of which recently was described independently and simultaneously by two groups.[1,2] The antibiotic possesses interesting activity against Gram-positive organisms, and in addition causes a reversible leucopenia in dogs. Etamycin is a surprisingly lipophilic peptide (soluble in benzene and carbon tetrachloride) with a molecular weight in the range 800–900. The presence of 3-hydroxypicolinic acid, L-alanine, *allo*-hydroxy-D-proline, D-leucine and threonine was reported.[1,2] We have now shown Etamycin to be a macrocyclic lactone (22-membered ring) which contains in addition to the above-mentioned components sarcosine, α-



$$CH_3—\underset{\displaystyle CH_3}{\underset{|}{CH}}—\underset{\displaystyle CH_3}{\underset{|}{CH}}—\underset{\displaystyle NHCH_3}{\underset{|}{CH}}—CO_2H$$

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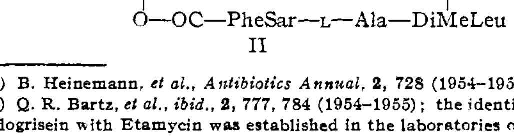

II

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[1] B. Heinemann, *et al.*, *Antibiotics Annual*, **2**, 728 (1954–1955).

[2] Q. R. Bartz, *et al.*, *ibid.*, **2**, 777, 784 (1954–1955); the identity of Viridogrisein with Etamycin was established in the laboratories of the authors of refs. 1 and 2 and at M.I.T.