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THE MOLECULAR STRUCTURE OF HODGKINSINE, $C_{33}H_{38}N_6$.

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Hodgkinsine, an alkaloid from Hodgkinsonia frutescens F. Muell., first reported by Anet, Hughes and Ritchie(1), has been discussed(1,2,3) on the basis of the constitution $C_{22}H_{26}N_4$ and as being isomeric with the dimeric indole alkaloids calycanthine and chimonanthine.

The ready formation of a crystalline product with benzene(1) suggested preparation of a similar crystalline adduct with bromobenzene for the purpose of an X-ray study. Comparison, Table 1, of the crystal data for the two adducts revealed that the $C_{22}N_4$ formulation was unacceptable and necessitated alteration to $C_{33-34}H_{38-39}N_6$, allowing for the error range of the measurements. The mass spectrum, also previously commented on as a $C_{22}N_4$ formulation(3), has three principal peaks at 172, 344 and 518 indicating a

Adduct Molecule Unit cell Dimensions	Benzene	Bromobenzene
a	13.56	13.50Å
b	13.27	13.38Å
c	9.445	20.16 (2 x 10.08)Å
β	104.4°	102.0°
Measured density	1.20	1.30
Mass of asymmetric unit	595	1392 (2 x 696)
calculated from crystal data	($C_{33}H_{38}N_6$ + C_6H_5)	2 x ($C_{33}H_{38}N_6$ + C_6H_5Br)

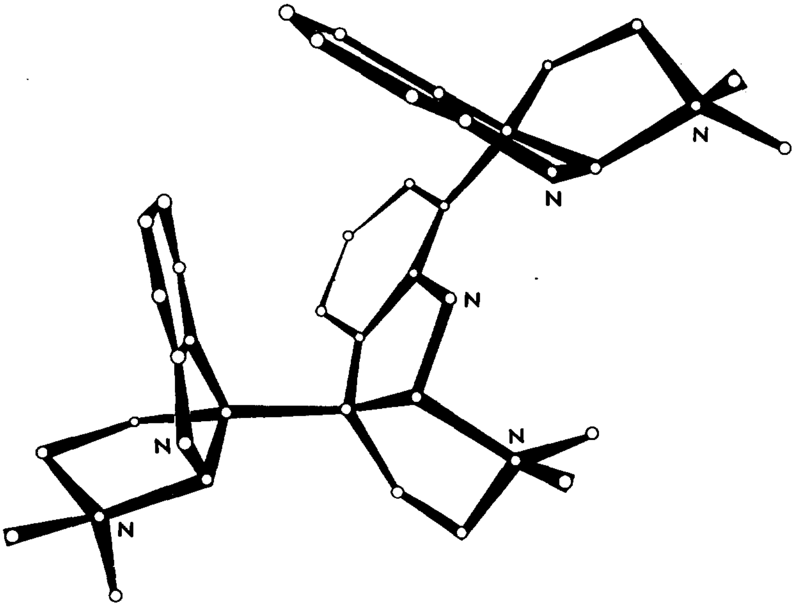
molecule consisting essentially of three $C_{11}H_{12}N_2$ units.

Recently Attitulah, Bardsley, Smith and Lahey(4) have reported on similar conclusions regarding the correct molecular constitution of hodgkinsine, essentially in accord with the present study.

The early attempts to effect an X-ray analysis with crystals of the bromobenzene adduct proved abortive since the Br sites could not be located, presumably due to the disorder in the site occupation of the bromobenzene molecule. An alternative derivative, the trimethiodide(4), proved successful.

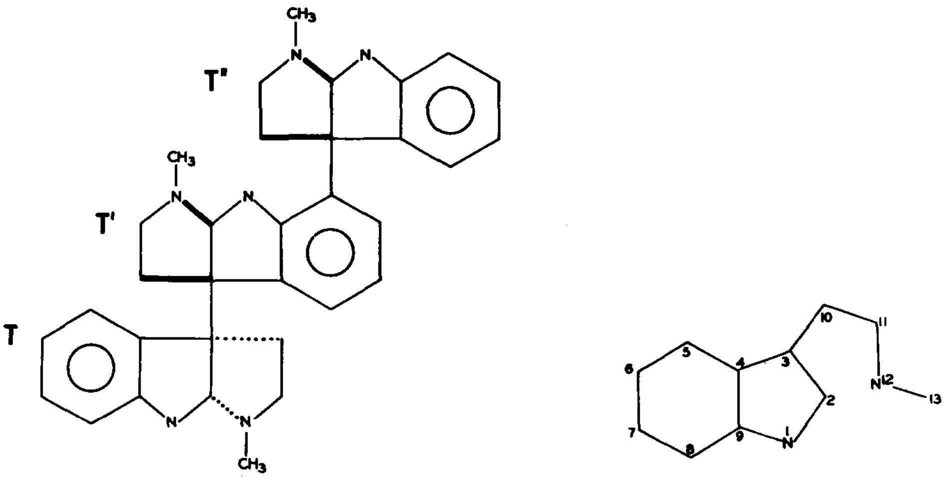
Crystals of hodgkinsine trimethiodide, $C_{36}H_{47}N_6I_3$, are monoclinic, $\underline{a}$ = 12.775, $\underline{b}$ = 13.938, $\underline{c}$ = 11.176Å, β = 107.8°, the space group being $P2_1$. Intensity data for 3198 reflexions were measured with CuK_α radiation on a Picker automatic single-crystal diffractometer. From the vector map, the sites of the three iodine atoms were determined and an electron-density distribution, phased on these atoms, yielded the sites of the 42 atoms constituting the organic ion. The reliability index, R, has been reduced to 0.14 at the present stage of refinement.

FIG. 1



The molecular structure of the organic cation of hodgkinsine trimethiodide, as viewed down the b axis, is shown in Figure 1. The structure of hodgkinsine is therefore as given in Figure 2(a), the molecule consisting of three units, T, T' and T", each unit being probably derived from N-methyltryptamine with N12 ring-closed to C2, Figure 2(b). Units T and T' are linked C3 to C3' while T" is linked to T' C3" to C5'. The two five-membered rings of each unit are cis-fused. T and T' are opposite in configuration while T' and T" have the same configuration vide Figures 1 and 2(a).

FIG. 2



(a) (b)

Hodgkinsine is similar to chimonanthine, in respect of ring components, particularly that part of hodgkinsine comprising TT'. In chimonanthine, the corresponding units are of the same configuration whereas in hodgkinsine they are opposite. Mason and Vane(6) have interpreted the observed circular dichroism (C.D.) of chimonanthine, calycanthidine, folicanthine and hodgkinsine in terms of an average of contributions from all conformations, appropriately weighted. For hodgkinsine, the C.D. contributions of units T and T' are however internally compensated for all conformations around C3-C3' and the sole contribution to the C.D. will be that from unit T".

That the units T and T' are of the same chirality in chimonanthine and opposite in hodgkinsine leads to different conformational dispositions of the units in the two molecules cf. Figure 2 in (5) with Figure 1.

Full details will be presented subsequently.

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