Structure of Averufin: a Metabolite of *Aspergillus versicolor* (Vuill.) Tiraboschi

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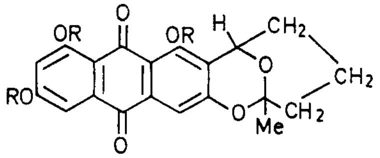
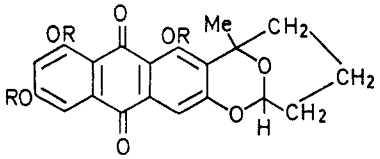
Summary The structure of averufin has been elucidated by using shift reagents and the nuclear Overhauser effect

Two structures (1a) and (2a) have been postulated for averufin [1,2] We have used the tris(dipivalomethanato)-europium[3] induced shifts in n m r spectroscopy to determine the structure unambiguously A plot of the molar ratio Eu(dpm)$_3$ substrate against the observed chemical shifts yields a straight line whose slope *S* quantifies the displacement effect [4] The *S* parameters obtained for most protons in the molecule are listed in the Table, along with those for the known methylated derivative of versicolorin B (3b) [5,6]

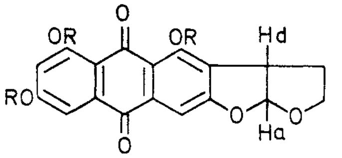


(1)



(2)

a , R = H
b , R = Me



(3)

The values observed for *S* in both compounds, which are very close, are indicative of similar structures Furthermore, since anisole, as a model compound, yields negligible complexation shifts, it can be inferred that for the metabolite under study, the complexation shifts arise mainly from interactions at the carbonyl sites By applying Demarco's relationship[7] for protons a and d (3b) and for the methine proton (1b and 2b), it is observed that the best agreement is obtained with (1b) The observed ratio

$$\frac{S(\text{C–H}_d)\ (3b)}{S(\text{C–H})\ \ (1b)} \simeq 2$$

is best explained by the difference in the proton environment This observation, along with the similarity of the *S* values (Table), points to structure (1a) for averufin

This conclusion has been confirmed by observation of a nuclear Overhauser effect (N O E) Indeed, irradiation of the methoxy-protons of trimethoxyaverufin results in a 17% increase of the intensity of the signal due to the methine proton (dipolar interaction) The magnitude of this enhancement agrees[8] with a *ca* 3 Å internuclear distance, as can be estimated from consideration of molecular models

More details will be published in the full paper

I thank Professor P Laszlo for our numerous helpful discussions

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S *Parameters for protons of trimethoxyaverufin and trimethoxyversicolorin*[a]

	Trimethoxyaverufin	Trimethoxyversicolorin (3b)
2-H	246 ± 9[b]	245 ± 27
4-H	204 ± 18	168 ± 12
5-H	183 ± 27	148 ± 6
3-OCH$_3$	284 ± 24	307 ± 39
8-OCH$_3$	146 ± 9	162 ± 12
1-OCH$_3$	15 ± 3	24 ± 6
C–H	48 ± 6	—
C–H$_a$	—	227 ± 27
C–H$_d$[c]	—	103 ± 3

[a] In all cases, the correlation coefficient ρ is better than 0 998 except for 1-OCH$_3$ (0 985)

[b] Error limit estimated by taking the systematic error as three times the standard deviation

[c] The chemical shifts of this proton have been measured by spin decoupling

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