

## Structure of the 1-Dimethylaminoethylphenanthrene Base from *Aristolochia argentina* Gris.

By H. A. PRIESTAP, E. A. RUVEDA, and S. M. ALBÓNICO

(*Facultad de Farmacia y Bioquímica*)

and V. DEULOFEU\*

(*Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires, Argentina*)

WE already described<sup>1</sup> the isolation from the roots of *A. argentina* of the aporphine base, magnoflorine, and of an acidic fraction, from which the aristolochic acid (I) described by Pailer,<sup>2</sup> was isolated and fully characterized.

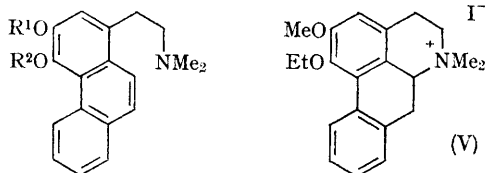
From the basic fraction of the extracts, a second component was obtained which gave a crystalline oxalate,  $C_{21}H_{23}NO_6$ , m.p. 176—177°, and a picrate,  $C_{25}H_{24}N_4O_9$ , m.p. 235—236°. The ultraviolet spectrum (ethanol) of the oxalate [ $\lambda_{max}$  210 m $\mu$  ( $\log \epsilon$  4.26); 232 (4.32); 255 (4.64); 310 (4.00)] indicated a phenanthrene chromophore, while the

appearance of a bathochromic shift by addition of alkali, suggested the presence of a phenolic hydroxy-group.

The oily free base gave a n.m.r. spectrum (CDCl<sub>3</sub>, 60 Mc./sec.) showing two *N*-methyl groups (singlet,  $\tau$  7.60); a complex of signals in the range  $\tau$  7.50—6.50 corresponding to four protons, assigned to the aliphatic side chain; and one *O*-methyl group (singlet,  $\tau$  6.18). A broad signal at  $\tau$  3.20 (1 H), eliminated by D<sub>2</sub>O exchange, was additional evidence for the presence of a phenolic group. In the aromatic region, a singlet (1 H) at

$\tau$  2.73 can be assigned to the proton on C-2; a multiplet (1 H) at  $\tau$  0.48 to that on C-5, and a complex multiplet (5 H)  $\tau$  2.00—2.60 to the remaining aromatic protons, following the assignments of Bick and Douglas<sup>3</sup> in the case of a similar base.

Thus we assigned to the new base a 1-dimethylaminoethylphenanthrene structure with the substituents located at carbon atoms 3 and 4 (I or II).



- (I) R<sup>1</sup>=H, R<sup>2</sup>=Me  
 (II) R<sup>1</sup>=Me, R<sup>2</sup>=H  
 (III) R<sup>1</sup>=Et, R<sup>2</sup>=Me  
 (IV) R<sup>1</sup>=Me, R<sup>2</sup>=Et

The structure and type of substitution was confirmed when on treatment with diazomethane a methoxy-derivative was obtained, the hydroiodide of which was identical (mixed m.p.; i.r.) to the same salt prepared from 1-dimethylamino-3,4-dimethoxyphenanthrene, which was isolated by Cook and Haynes<sup>4</sup> from *Cryptocarya angulata* C. T. White.

To determine which of the alternative structures (I or II) correspond to the base, it was treated with diazoethane and transformed into the *O*-ethyl derivative (oxalate, m.p. 202—203°; methiodide, m.p. 289°). The methiodide was found to be identical (mixed m.p.; i.r.) to the methiodide of *O*-ethylnornuciferine methine (III) which was prepared by Tomita *et al.*,<sup>5</sup> from nornuciferine.

Further confirmation that the substituents are located as indicated in (III), was obtained by synthesis of the substance with the alternative structure (IV) which gave a crystalline oxalate, m.p. 211°, and a methiodide, m.p. 265°, and an i.r. spectrum different from that of (III).

To synthesize (IV), the methiodide (V), C<sub>21</sub>H<sub>26</sub>INO<sub>2</sub>, m.p. 222°, was prepared starting from *N*-(4-ethoxy-3-methoxyphenethyl)-2-nitrophenylacetamide, C<sub>19</sub>H<sub>22</sub>N<sub>2</sub>O<sub>5</sub>, m.p., 144°, following the usual steps of the Pschorr reaction and then submitted to a Hofmann degradation. (All new compounds gave correct analysis.)

Paper and thin-layer chromatography of extracts from fresh roots of *A. argentina*, revealed that they always contain base (I), showing that it is not an artifact. Evidently base (I) is a new member of the small series of dimethylaminoethylphenanthrene alkaloids found in Nature.

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<sup>5</sup> M. Tomita, Y. Watanabe, and H. Furukawa, *J. Pharm. Soc. Japan*, 1961, **81**, 942.