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# RIBALINIDINE, A PHENOLIC TERTIARY BASE FROM BALFOURODENDRON[1]

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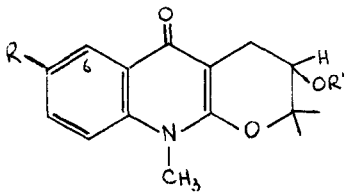
All the numerous natural tertiary bases with a furo- or pyrano-quinoline skeleton have been isolated from genera, including Balfourodendron, belonging to the Rutaceae family. Most of them bear alkoxy groups as aromatic substituents, usually one or more methoxyl and/or methylenedioxy groups; in spite of this, no representative with a free phenolic function has hitherto been found. We now wish to report the structure elucidation of the first phenolic tertiary base isolated from the trunk bark of Balfourodendron riedelianum[1,2].

Ribalinidine (I), m.p. 257-258º(dec.), $[\alpha]_D^{20º}$ -15º(c, 1.0 in methanol), possesses the molecular formula $C_{15}H_{17}NO_4$ with one N-methyl and a gem-C-dimethyl groups, two active hydrogens and no methoxyl group according to analytical, NMR and mass spectral data.



| | R | R' |
|---|---|---|
| I | OH | H |
| II | $OCH_3$ | H |
| III | OAc | H |
| IV | OAc | Ac |
| V | H | H |

It is easily recognized as a 2-alkoxy-4-quinolone derivative[3,4] taking into account the infrared bands (in KBr 1610, 1578, 1558, 1520 and 1470 $cm^{-1}$) and ultraviolet absorption maxima at 220(sh), 235, 245(sh), 301, 331 and 346 mμ (log ε 4.31, 4.48, 4.43, 3.88, 3.87 and 3.81) changing on acidification to 220, 243, 301 and 342 mμ (log ε 4.34, 4.48, 3.90 and 3.64).

The presence of a phenolic group is indicated by the pronounced bathochromic shift of the ultraviolet spectrum on basification and by methylation with diazomethane to compound (II), m.p. 232-233º. The latter gives identical UV curves in neutral and basic media and displays a NMR spectrum almost identical to that of (I) except an extra sharp-signal (three protons) at $\delta$ 4.05 ppm in trifluoracetic acid.

Treatment of (I) with acetic anhydride-pyridine at 25º affords a monoacetylderivative (III; m.p. 240-242º; in Nujol, hydroxyl and ester bands at 3185 and 1752 $cm^{-1}$; in $CDCl_3$, acetyl peak at $\delta$ 2.30 ppm) and a diacetylderivative (IV; m.p. 203-204º; ester bands at 1750 and 1730 $cm^{-1}$ but no hydroxyl absorption; acetyl groups at $\delta$ 2.04 and 2.31 ppm).

The NMR curve of (IV) in $CDCl_3$ presents a well-defined triplet at $\delta$ 5.13 ppm while in the spectrum of (III) it appears at 3.83; this signal is assigned to the $\alpha$-proton of a secondary alcoholic function of (III), which therefore possesses its acetyl group on the phenolic function. In agreement, the triplet in (I), (II) and (IV) appears at $\delta$ 4.50, 4.45 and 5.54 ppm respectively (trifluoracetic acid solution).

As 4-quinolone derivatives[4], compounds (III) and (IV) in $CDCl_3$ solution display the hydrogen at position-6[5] strongly shifted downfield respect to the remaining aromatic protons (at 60 Mc/s, $\Delta$ 42 and 40 c/s respectively).

The H-6 signal is a quartet with J-values of 1.0 and 2.5 c/s corresponding to <u>para</u> and <u>meta</u> coupling respectively, implying that the aromatic substituent is located at position-7.

Apart of the acetyl absorption, the non-aromatic portion of the spectrum of (III) shows a pattern coincident with that reported[1] for ribalinine (V); the $\delta$-values for (III) in $CDCl_3$ are 1.33 and 1.51 (<u>gem</u>-C-dimethyl), 2.86 (centre of methylene doublet), 3.50 (N-methyl) and 3.83 ppm (triplet; $H_\alpha$ to secondary alcohol). Furthermore, the same coincidence is observed between (I) and ribalinine (V) in trifluoracetic acid solution.

The above results establish the structure (I) for the new alkaloid ribalinidine. Synthetic work on this base is in progress.

## REFERENCES

1. Part XIII of "Studies on Plants"; preceding part, R.A. Corral and O.O. Orazi, Tetrahedron Letters 583 (1967)
2. R.A. Corral and O.O. Orazi, Tetrahedron 21, 909 (1965) and references therein cited
3. H. Rapoport and K.G. Holden, J.Amer. Chem. Soc. 82, 4395 (1960); S. Goodwin and E.C. Horning, J.Amer. Chem. Soc. 81, 1908 (1959)
4. A.V. Robertson, Austral. J. Chem. 16, 451 (1963)
5. This same ring position was numbered as 5 in reference 1