carrying out molluscicide tests and to Professor J. Lauterwein, University of Lausanne for NMR spectra measurements.

REFERENCES

1. Marston, A., Msonthi, J. D. and Hostettmann, K., *Planta Med.* (submitted).
2. Hostettmann, K., Kizu, H. and Tomimori, T. (1982) *Planta Med.* **44**, 34.
3. Ransford, O. N. (1948) *Trans. R. Soc. Trop. Med. Hyg.* **41**, 617.
4. Kloos, H. and McCullough, F. S. (1983) *Scientific Working Group on Plant Molluscicides.* W.H.O., Geneva.
5. Adewunmi, C. O. and Sofowora, E. A. (1980) *Planta Med.* **39**, 57.
6. Still, W. C., Kahn, M. and Mitra, A. (1978) *J. Org. Chem.* **43**, 2923.
7. Moring, S. E. and McChesney, J. D. (1979) *J. Assoc. Off. Anal. Chem.* **62**, 774.
8. Crombie, L. and Lown, J. W. (1962) *J. Chem. Soc.* 775.
9. Mabry, T. J., Markham, K. R. and Thomas, M. B. (1970) *The Systematic Identification of Flavonoids.* Springer, Berlin.

Phytochemistry, Vol. 23, No. 8, pp. 1825–1826, 1984.
Printed in Great Britain.

0031–9422/84 $3.00 + 0.00

RAVESILONE, A QUINOLONE ALKALOID FROM *RAVENIA SPECTABILIS*

P. BHATTACHARYYA and B. K. CHOWDHURY*

Department of Chemistry, Bose Institute 93/1, A.P.C. Road, Calcutta 700009, India; *Department of Pharmaceutical and Medicinal chemistry, Ahmadu Bello University, Zaria, Nigeria

(*Received* 24 *January* 1984)

Key Word Index—*Ravenia spectabilis*; Rutaceae; leaves; ravesilone; 2-quinolone alkaloid.

Abstract—A new quinolone alkaloid designated ravesilone has been isolated from the leaves of *Ravenia spectabilis*. From spectral evidence the structure of the compound has been established as 3,4,5,6-tetrahydro-7-hydroxy-2,2,6-trimethyl-5-oxo-2H-pyrano[3,2-c]quinoline.

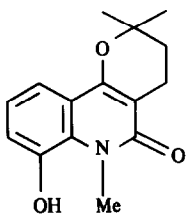
INTRODUCTION

Ravenia spectabilis, an ornamental plant in Indian gardens, is known to furnish quinolone alkaloids [1]. Quinolone alkaloids from the Rutaceae are remarkable in bioactivity [2, 3]. In the course of our investigation of carbazole alkaloids of this family further chemical examination of the plant was undertaken. Our investigation reveals the presence of a new quinolone alkaloid designated as reversilone from the leaves of *Ravenia spectabilis*.

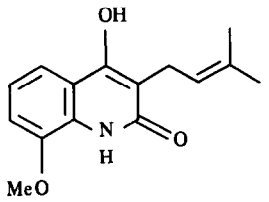
RESULTS AND DISCUSSION

Ravesilone **1**; $C_{15}H_{17}NO_3$ ([M]$^+$ *m/z* 259) mp 272° was homogeneous by TLC and mass spectrometry. The ready solubility of the compound in alkali and the formation of a green colour with ferric chloride indicated the presence of a phenolic hydroxyl group in the compound. The UV spectrum of **1** [λ_{max}^{EtOH} nm: 216, 230, 250, 256, 280, 292 and 325 nm with log ε 4.4, 4.4, 4.45, 4.49, 3.90, 3.92 and 3.48] indicates the presence of a 2-quinolone moiety in the compound [4]. The UV absorption maximum remains unchanged on acidification which is also suggestive of a 2-quinolone structure. The shift of the UV maximum in the presence of alkali is indicative of the presence of a phenolic hydroxyl group. The IR spectrum (KBr) showed absorption peaks at 3130 (hydrogen bonded OH), 1640 (>N–CO), 1600, 1565 (aromatic residue) and 845 cm^{-1} (substituted benzene derivative). The ^{1}H NMR spectrum (60 MHz, $CDCl_3$ solvent) showed signals at δ 7.5 (*m*, 1H, C-5), 7.1–6.9 (*m*, 2H, C-6, C-7), 3.90 (*s*, 3H, N–Me), 2.7 (*t*, *J* = 6.5 Hz, 2H, Ar–CH_2–), 1.84 (*t*, *J* = 6.5 Hz, 2H, Ar–CH_2–CH_2–) and 1.45 (*s*, 6H, gemdimethyl).

The absence of any proton in the region δ 6.07 suggests substitution at C-3 [1]. The appearance of two symmetrical triplets at δ2.7 and 1.84 along with a sharp singlet for six protons in the region δ 1.45 indicates the presence of a 2:2-dimethyl dihydro pyran chromophoric system in **1**. The appearance of a C-5 aromatic proton at lower field (δ 7.5) is due to the deshielding effect of the oxygen function at C-4. It has been observed that the C-5 proton in 4-alkoxy-2-quinolones appears at lower field due to the



1



2

deshielding effect of the oxygen function at the 4-position [5]. The appearance of one aromatic proton at lower field (δ 7.5) indicates that the oxygen function is present at C-4 of compound **1**.

Most quinolone alkaloids of the Rutaceae contain an isopentyl group at position 3 and possess an oxygen function at position 8. It has been suggested [6] that a possible biosynthetic precursor of these alkaloids is **2**. From biogenetic consideration and spectral evidences the structure of ravesilone has been assigned as **1**. The isolation of ravesilone provides strong circumstantial evidence for the above idea.

EXPERIMENTAL

All mps are uncorr. UV and IR spectra were recorded in EtOH and as KBr pellets, respectively.

Isolation of **1**. Air dried finely powdered leaves (1 kg) of *R. spectabilis* (Farm) were first extracted with petrol (60–80°) for 36 hr. After this extraction, the residue was re-extracted with C_6H_6 for 36 hr. The solvent was then distilled off. The residue was taken up in Et_2O and fractionated into neutral, acidic and basic fractions in the usual way. The acidic fraction was then dissolved in a small vol of C_6H_6 and chromatographed over silica gel (400 g). The column was eluted with petrol, C_6H_6, C_6H_6–EtOAc (5:1) and EtOAc. From the C_6H_6–EtOAc eluate a solid was obtained. This was recrystallized from EtOH–petrol (40–60°) yielding a homogeneous white crystalline solid mp 272°. TLC (C_6H_6–$CHCl_3$; 1:1, R_f 0.68). (Found: C, 69.40; H, 5.98; N, 6.01. Calculated for $C_{15}H_{17}NO_3$; C, 69.46; H, 6.56; N, 5.41%.)

Acknowledgements—The authors express their respectful thanks to Dr. S. C. Bhattacharyya, Director and Professor A. K. Barua, Chairman, Department of Chemistry, Bose Institute for their interest in the work.

REFERENCES

1. Paul, B. D. and Bose, P. K. (1968) *J. Ind. Chem. Soc.* **45**, 552.
2. Minker, E., Kollai, M., Blazo, G., Szendrei, K., Novak, I., Korosi, J. and Reisch, J. (1976) *Herba Hung.* **15**, 93.
3. Mitscher, L. A., Clark, G. W., Suzuki, T. and Batnala, M. S. (1975) *Heterocycles* **3**, 913.
4. Sangster, A. W. and Stuart, K. L. (1965) *Chem. Rev.* **65**, 69.
5. Goodwin, S., Shoolery, J. N. and Johnson, L. F. (1950) *J. Am. Chem. Soc.* **81**, 1908.
6. Clarke, E. A. and Grundon, M. F. (1964) *J. Chem. Soc* 4196.

Phytochemistry, Vol. 23, No. 8, pp. 1826–1827, 1984.
Printed in Great Britain.

0031-9422/84 $3.00 + 0.00

INDOLIC COMPOUNDS IN THE LEAVES OF *TECOMA STANS*

SATYA P. KUNAPULI* and C. S. VAIDYANATHAN

Department of Biochemistry, Indian Institute of Science, Bangalore 560012, India

(*Received* 18 *November* 1983)

Key Word Index—*Tecoma stans*; Bignoniaceae; indole; skatole; tryptophan; tryptamine; anthranilic acid.

Abstract—Indole, tryptophan, tryptamine and skatole were isolated from the leaves of *Tecoma stans*. Anthranilic acid was also identified in its free form, in contrast to its glucoside, in *Jasminum grandiflorum*. The presence of both indole and anthranilic acid in the leaves of *Tecoma stans* indicates that they are the true substrate and product of indole oxygenase from the leaves of *Tecoma stans*.

INTRODUCTION

The indole ring is present in many physiologically important molecules and hence it has attracted the increasing attention of biochemists in recent years. The presence of indole itself was detected in jasmine oil as early as 1899 [1]. Indole was also found in the perfume of *Hevea brasiliensis* and *Raudia formosa* [2]. Later, Sack [3] reported the occurrence of indole in the wood of *Celtis reticulosa*. Sack [4] detected indole in citrus, coffee and mango plants, but no enzymes which metabolize indole from any of these plants except from jasmine were isolated [5]. A few reports are available on indole metabolizing enzymes from *Tecoma stans* [6, 7] and *Zea mays* [8], but nothing is known about the indolic compounds present in these plants. The enzymes from *T. stans* degrade indole to anthranil [6] and anthranilic acid [7]. Although indole was the best substrate tested, it may not be the true substrate. The aim of the present investigation was to carry out such a systematic study.

*To whom correspondence should be addressed at the author's present address: Department of Human Biol. Chem. and Genetics, C313, Child Health Centre, University of Texas Medical Branch, Galveston, TX 77550, U.S.A.

RESULTS AND DISCUSSION

Various indolic compounds such as indole, tryptophan, tryptamine and skatole were isolated from the leaves of *Tecoma stans L.* The R_f values of these compounds and