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KOKUSAGININE AND EVOLITRINE FROM *ACRONYCHIA PEDUNCULATA*

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Key Word Index—*Acronychia pedunculata*; Rutaceae; furoquinoline alkaloids; kokusaginine; evolitrine.

Abstract—Kokusaginine and evolitrine are the major alkaloids present in Sri Lankan *Acronychia pedunculata*. The Indian variety of *Acronychia laurifolia* collected in Madras does not contain these alkaloids.

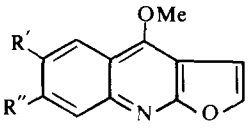
INTRODUCTION

The occurrence of acridine and furoquinoline alkaloids in *Acronychia* (Rutaceae) is well established [1–6]. There is added interest in these alkaloids after the discovery that acronycine, one of the constituent alkaloids of the Australian shrub *Acronychia baueri* Schott, exhibited significant anti-tumour activity [7]. The Indian variety of *Acronychia laurifolia* collected in Madras was reported to contain the phenolics acronylin **1** and demethylacronylin (**2**) [8, 9].

1 R = Isopentenyl, R′ = Me, R″ = COMe
2 R = Isopentenyl, R′ = H, R″ = COMe

RESULTS AND DISCUSSION

The Sri Lankan variety of *Acronychia pedunculata* (L.) Miq. (syn. *A. laurifolia* Bl.) has been examined for alkaloids and found to contain kokusaginine (**3**) in 0.1% yield in the leaves and evolitrine (**4**) in the timber in 0.05% yield.



3 R′ = R″ = OMe
4 R′ = H, R″ = OMe

The major alkaloid in the petrol extract of the leaves is kokusaginine (**3**). **3** a creamish solid, mp 172°, was identified from spectral analysis and comparison of its picrate with an authentic sample. The mass spectrum of **3** showed a molecular ion at *m/e* 259 and the rest of the fragmentation pattern is identical to the reported MS of kokusaginine [10]. The ^{1}H NMR spectrum exhibited two doublets at δ 7.49 and 6.94, two furan protons, two singlets at δ 3.98 and 3.95, 6,7-methoxy groups and a singlet at δ 4.33 4-methoxy group. It was converted to the picrate and identified by direct comparison with an authentic sample provided by Professor Scheurer. The major alkaloid in the petrol extract of the timber is evolitrine **4**. **4** gave a single spot on TLC. Since it resisted attempts at crystallization, it was converted to the picrate. The MS and the elemental analysis of the picrate showed that it contained one methoxy group less than kokusaginine. The ^{1}H NMR spectrum indicated the presence of a 4-methoxy group and the other methoxy group at position 7. Comparison of the picrate with the authentic sample of evolitrine picrate provided by Professor Rapoport showed complete identity.

EXPERIMENTAL

^{1}H NMR spectra were determined on a Varian 90 MHz spectrometer, chemical shifts are reported in units (ppm) relative to TMS (δ = 0) as internal standard. MS were determined with an A.E.I. MS 30 instrument. Plant material was identified by Prof. B. A. Abeywickrema, Univ. of Sri Lanka and a herbarium specimen is deposited in the Botany Dept.

Isolation of kokusaginine from leaves. Powdered air-dried leaves (1.2 kg) collected in the suburbs of Colombo in December, 1976, were continuously extracted with hot petrol (bp 62–82°) for 24 hr. The petrol extract was evapd to dryness and the black residue was repeatedly extracted with hot 10% HCl until the HCl extracts no longer gave a ppt. with Mayer's reagent. The combined acid extracts were basified with excess NH_3 and extracted with $CHCl_3$. This extract was dried, evapd to dryness and the residue was dissolved in MeOH; the methanolic soln was decolourized with animal charcoal, concd and allowed to cool. The creamish-yellow crystalline solid was collected, dissolved in a little $CHCl_3$ and passed down a column of basic Al_2O_3 (10 × 0.5 cm). The eluate was evapd to dryness and recrystallized from $CHCl_3$–petrol (bp 60–80°) to give creamish needles (1.2 g), mp 172° (lit. [11] mp 171°). (Found: C, 64.68; H, 5.22; N, 5.41. $C_{14}H_{13}O_4$ requires: C, 64.92; H, 5.06; N, 5.41%). IR (KBr) cm^{-1}: 3125, 2990, 2825, 1630, 1590, 1010, 990, 950, 865. MS *m/e*: 259, 244, 216, 201, 186, 173, 158. ^{1}H NMR ($CDCl_3$): δ 7.49 (*d*, 1H, *J* = 3.6 Hz), 6.94 (*d*, 1H, *J* = 3.6 Hz) 2 furan protons; 7.39 (*s*, 1H), 7.28 (*s*, 1H) 2 benzene protons; 4.33 (*s*, 3H) 4-methoxy group; 3.98 (*s*, 6H) 6,7-methoxy groups. To a soln of kokusaginine in MeOH, a soln of picric acid in MeOH was added. Recrystallization of the product from Me_2CO–MeOH gave kokusaginine picrate as yellow needles, mp 182° (lit. [11] 182–183°).

Isolation of evolitrine from timber. Powdered timber (1 kg) collected in the suburbs of Colombo in December, 1976, was

exhaustively extracted with petrol (bp 62–82°) for 24 hr. The petrol extract was evapd to dryness. The residue was repeatedly extracted with 10% HCl until the HCl extracts no longer gave a ppt. with Mayer's reagent. The combined acid extracts were basified with excess NH_3 and extracted with $CHCl_3$. The $CHCl_3$ extract was evapd to dryness and the residue was dissolved in C_6H_6 and passed through a basic Al_2O_3 column (2.54 cm). The eluate was evapd and the residue obtained was further purified by PLC (Si gel, cyclohexane–$CHCl_3$–$NHEt_2$ (3:7:3) as eluant) to yield a white solid (500 mg). The solid was dissolved in MeOH and picric acid in MeOH was added and the product was recrystallized from Me_2CO–MeOH to give evolitrine picrate as yellow needles, mp 190° (lit. [11] 191°). (Found: C, 50.02; H, 3.07; N, 12.20. $C_{19}H_{14}O_{10}N_3$ requires: C, 49.78; H, 3.06; N, 12.2%). MS *m/e*: 229, 214, 186, 158. ^{1}H NMR (DMSO-d_6): δ 8.80 (*d*, J = 3.6 Hz) 2 furan protons; 8.15 (*d*, J = 8 Hz), 7.15 (*d*, J = 8 Hz) benzene protons; 4.00, 4.50 (2 *s*) 2 methoxy groups.

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