

Saudi Arabian Medicinal Plants I: *Ruta Chalepensis*S.T. EZMIRLY^a AND S.R. WILSON^b^aDepartment of Chemistry, Riyadh University, Riyadh, Saudi Arabia^bS.R. Wilson, Indiana University, Bloomington, Indiana 47401. U.S.A.

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Summary: The medicinal plant *Ruta chalepensis* called in Arabia Al-Shathap is used in Saudi Arabia as an ointment. Extraction and isolation gave several furocoumarins. The chemistry and pharmacology of these constituents will be discussed.

Introduction

In order to learn as much as possible about the native medicine of Saudi Arabia and to evaluate untapped material resources⁴ of Saudi Arabia we currently have underway a systematic investigation of the chemistry and pharmacology of Saudi Arabian medicinal plants. Although Arabian pharmacology and medicine played an important historical role^{5,6}, there has been relatively little recent research in this area. A review on medicinal plants mentioned at reference⁷, but no chemistry was mentioned.

One of the plants of Arabian folklore still in use today is *Ruta chalepensis*, called in Arabic Al-Shathap. This plant is used by the Bedouin as an ointment for various skin diseases. The same plant is used by the natives of Central America in the treatment of measles, scarlet fever, headaches and heart conditions⁸. Samples of *Ruta chalepensis* were collected from the Al-Shapha area south of Tiaf, Saudi Arabia, and were identified by Dr. A.M. Mojahed (Department of Botany, Riyadh University). The dried and ground plant was extracted with petroleum ether and ethanol and the crude extracts submitted to a pharmacological screen and TLC analysis (Figure 1).

The three major components shown in Figure 1 (1, 2, and 3) were isolated by direct preparative liquid chromatography.⁹ Although 1 could not be identified, compound 2 was identified as *chalepensis*⁸ and compound 3 as *chalepin*.⁸ Such furocoumarins are known in many plants traditionally used as medicines and some have irritant or carcinogenic properties.¹⁰

Experimental

Infra-red spectra were recorded on a Perkin-Elmer 137 spectrometer. NMR spectra were taken on a Varian T-60 in CDCl₃ solution with internal Me₄Si standard and 500 Hz sweep. Mass spectra were obtained on Varian MAT CH-7 and AEI MS-9 mass spectrometers.

Melting points are uncorrected. Thin-layer chromatography employed Brinkman precoated silica gel F-254 plates.

Extraction: *Ruta chalepensis* was collected from the Al-Shapha area south of Tiaf. Leaves and stems were air dried and then ground to a fine powder. 76 g were extracted with petroleum ether in a modified soxhlet¹¹ extractor for one day and then with 95% ethanol for two days. Evaporation of the petroleum ether yields 1.61 g (2.1%) dark oil and evaporation of the ethanol yields 11.51 g (15%) dark oil. TLC on silica gel of both extracts is shown in Figure 1. Silica gel column chromatography of the petroleum ether extract (ether/pentane gradient elution) separated 1, 2, and 3.

Isolation of Compound 1: Early fractions of the chromatography gave 36 mg 1 (0.04%), m.p. 70-71°C. TLC (Silica Gel/40% ether, 60% petroleum ether): Rf= 0.74. Anal: 76.51%C, 12.06%H.

Isolation of Chalepensis (2): Fractions 36-54 of chromatography of the petroleum ether extract were combined and crystallized from ether to yield 44 mg 2, m.p. 88-90°C (0.06%). TLC (Silica Gel, 40% ether-60% petroleum ether) Rf= 0.48. IR: 1725 cm⁻¹ (C=O). NMR 1.43 δ (6H-s), 5.1 δ - 5.32 δ (2H-m), 6.14 d (1H-dd, J=10Hz, J=18Hz), 6.75 δ (1H-m), 7.36 δ (1H-s), 7.59 δ (3H-bs). MS [m/e (% base)]: 254 (100), 239 (76), 211 (54), 199 (66). Calculated for: C₁₆H₁₄O₃: 254.0944. Found: 254.0949.

Isolation of Chalepin (3): Fractions 95-101 were combined to yield 45 mg 3, m.p. 117-118°C (0.06%). TLC (Silica Gel, 40% ether-60% petroleum ether): Rf= 0.16 IR: 3400-3700 cm⁻¹ (-OH); 1720 cm⁻¹ (C=O). NMR: 1.25 δ (3H-s), 1.35 δ (3H-s), 1.46 δ (6H-s), 1.98 δ (1H-bs), 3.20 δ (1H-d, J=9Hz), 4.72 δ (2H-d, J=9Hz), 4.8 - 5.2 δ (2H-m), 6.2 δ (1H-dd, J=10Hz, J=18Hz), 6.6 δ (1H-s), 7.2 δ (1H-m), 7.45 δ (1H-s). MS [m/e (% base)]: 314 (100), 299 (90), 255 (40), 199 (20), 59 (52). Calculated for: C₁₉H₂₂O₄; MW = 314.1519. Found: MW = 314.1519.

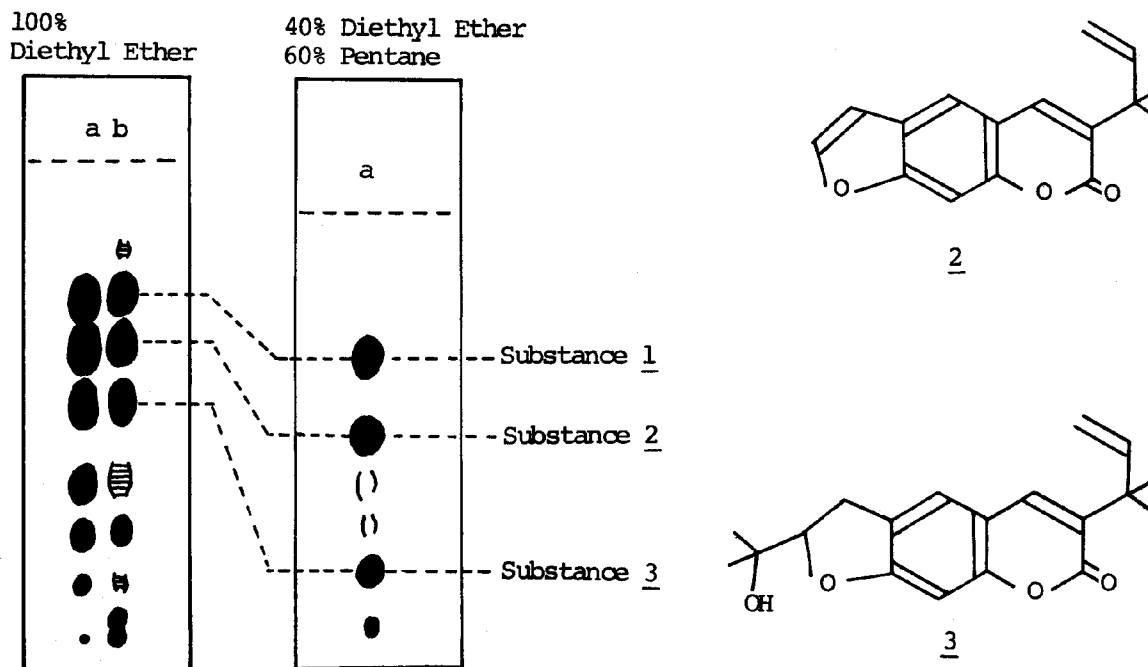


Figure 1: a. Crude petroleum ether extract.
b. Crude ethanol extract. (Silica gel).

Pharmacology

Compounds 2 and 3 were assayed for anti-bacterial activity against *Candida albicans*, *Staphylococcus aureus*, *Bacillus subtilis*, *E. coli*, and *Pseudomonas aeruginosa* (Figure 2).

Bacteria	Compound	1	2
<i>Candida albicans</i>		-	-
<i>Staphylococcus aureus</i>		-	-
<i>Bacillus subtilis</i>		+	-
<i>Esherichia coli</i>		-	-
<i>Pesudomonas aeruginosa</i>		-	+

The total crude ethanol extract was entered in a broad screening program,¹² but did not show any significant activity in a variety of tests. The extracts were also not toxic at doses up to 1200 mg/kg. Compound 2 has been reported to prolong hexabarbitol sleep time in mice.⁸

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References and Notes

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