

ISOLATION AND IDENTIFICATION.—Bark (150 g) from freshly collected roots was subjected to steam distillation and the distillate multiply extracted with CH_2Cl_2 . After drying over Na_2SO_4 , the CH_2Cl_2 was removed at room temperature in a nitrogen stream to yield 140 mg of a pale yellow liquid. Capillary gc (22m \times 0.25mm DBI, 70°-250° at 5°/min, flow 0.7 ml/min, He) demonstrated the liquid to be an essentially pure (>99.9%) compound. The retention time (8.14 min), mass spectrum, 60 MHz ^1H -nmr, and ir of the substance were identical with those of authentic 2-hydroxyacetophenone (Aldrich Chemical Co., Inc.).

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A FLAVONE WITH ANTIINFLAMMATORY ACTIVITY FROM THE ROOTS OF *RHUS UNDULATA*¹

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In the course of our search for biologically active compounds from indigenous South African flora, we have investigated the roots of *Rhus undulata* Jacq. var. *undulata* (Anacardiaceae, Kuni-bush), a tree widespread in southern Africa (1). Plant material and extracts were worked up in accordance with our normal procedures (see Experimental section) (2) and yielded 5-hydroxy-4',7-dimethoxyflavone (apigenin dimethylether) in addition to some nonpolar compounds that were not characterized.

Apigenin dimethylether showed a 25% inhibition (75 mg/kg dose) [phenylbutazone (reference), 81% inhibition at 75 mg/kg dose] of the phlogistic response (carrageenan-induced edema) (3) in the rat, an activity reported (4-6) for several closely related flavonoids (Table 1). The presence of antiinflammatory activity may provide an explanation for the claims made with regard to the therapeutic value of *R. undulata* roots in infective disorders of the gastrointestinal tract.

TABLE 1. Antiinflammatory Activity of Some Flavonoids Compared with Apigenin Dimethylether

Test Compound	ED ₂₅ (mg/kg)	Potency (Antiinflammatory units/g)
Naringin	Inactive	0
Nobiletin	20	50
Hydrocortisone phosphate (reference)	13.5	74
Apigenin dimethylether	75	13

¹Part 3 in the series "Studies of South African Medicinal Plants." For Part 2, see *S. Afr. J. Chem.*, **36**, 114 (1983).

EXPERIMENTAL

PLANT MATERIAL.—The roots of *R. undulata* were collected April 8, 1976, at Hennopspride near Pretoria. Voucher specimen (no. 882) is deposited in the Botanical Research Institute, Pretoria.

EXTRACTION AND FRACTIONATION.—Air-dried, milled, roots of *R. undulata* (3.5 kg) were successively extracted with C_6H_6 (235 g extract), EtOAc (83 g extract) and MeOH (279 g extract) at room temperature for 48 h. After removal of the solvents, the crude extracts were fractionated separately over silica gel (Kieselgel 60, 70-230 mesh; Merck). Elution was conducted with mixtures of petroleum ether, EtOAc, and MeOH of increasing polarity. Fractions with corresponding R_f values on the tlc [petroleum ether-EtOAc (1:1)] were combined into three groups. Of the groups obtained, group 2 was found to exhibit antiinflammatory activity.

ISOLATION OF APIGENIN DIMETHYLETHER.—The active group was chromatographed over silica gel and elution with C_6H_6 gave the title compound that crystallized from EtOAc as fine yellow needles (1.1 g; 0.18% of total extract), mp 171°-172° [Lit (7) mp 170°-171°]; ir ν max (KBr) 3450, 1665, 1605, 1510, 1338, 1310, 1270, 1215, 1190, 1185, 1160, 1022, 1012, 830, 815, and 760 cm^{-1} ; 1H -nmr ($CDCl_3$) δ 12.67 (1H, s, disappears on deuteration, OH), 7.83 (2H, dd, $J=2.5$ Hz and $J=8.5$ Hz, H-2', 6'), 6.99 (2H, dd, $J=2.5$ Hz and $J=8.5$ Hz, H-3', 5'), 6.55 (1H, s, H-3), 6.46 (1H, d, $J=2.5$ Hz, H-8), 6.33 (1H, d, $J=2.5$ Hz, H-6), 3.8 (6H, s, 2×OMe); ms m/z (%) 398 M+ (100).

IDENTIFICATION OF APIGENIN DIMETHYLETHER.—The physical data of apigenin dimethylether are in agreement with those reported in the literature (7,8).

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FIVE COUMARINS AND A CARBAZOLE ALKALOID FROM THE ROOT BARK OF *CLAUSENA HARMANDIANA*

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Clausena harmandiana Pierre (Rutaceae) is a reputed folk medicine, decoctions of the roots being used as a stomachic and antipyretic. The root bark of this species has yielded five known coumarins and a carbazole alkaloid, which are reported for the first time from this species.

EXPERIMENTAL

GENERAL EXPERIMENTAL PROCEDURES.—Spectral data were obtained with the following instruments: a Perkin-Elmer 283 grating infrared spectrophotometer; a JEOL FX90Q (90 MHz nmr spectrometer); a Shimadzu UV-180 spectrophotometer; and a JEOL DX 300 mass spectrometer.