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Constituents of the Stem Bark of *Dombeya Rotundifolia* Hochst

S.N. NDWIGAH*[1], G.N. THOITHI[1], J.W. MWANGI[2] AND I.O. KIBWAGE[1]

[1]*Department of Pharmaceutical Chemistry, School of Pharmacy, University of Nairobi, P.O. Box 19676-00202, Nairobi, Kenya.*
[2]*Department of Pharmacology and Pharmacognosy, School of Pharmacy, University of Nairobi, P.O. Box 19676-00202, Nairobi, Kenya.*

Two compounds isolated from *Dombeya rotundifolia* chloroform stem bark extract were identified as lupeol and β-sitosterol using infra red, nuclear magnetic resonance and mass spectrometry.

Key words: *Dombeya rotundifolia*; Lupeol; β-Sitosterol

INTRODUCTION

Dombeya rotundifolia Hochst (Planch) belongs to the Sterculiaceae family and is widespread in Kenya growing at an altitude of between 900 and 2250 m [1]. It is used in traditional medicine in the treatment of rheumatism and diarrhea [2], syphilis [3], heart problems, hemorrhoids, dyspepsia, to regulate the menses and to hasten the onset of labor [4], to manage abdominal pains, intestinal ulceration, headaches and hemorrhage, as a tonic and to cause abortion [5-6].

Some general phytochemical and pharmacological studies have been carried out on *D. rotundifolia*. It has notable anti-bacterial and anti-inflammatory activity, and has been found to contain cardiac glycosides, saponins and tannins. It does not contain cyanogenic glycosides and alkaloids [6]. The ethanolic leaf extracts are bacteriostatic against *Micrococcus luteus*, while the ethanolic shoot extracts are bacteriostatic against *Staphylococcus aureus*. Ethanol and water extracts had antibacterial activity against *Bacillus subtilis* and *S. aureus* [6-7]. There is no report on previous isolation of compounds from this plant.

METHODOLOGY

Dombeya rotundifolia stem bark was collected on 11th May 2000 at Gaitura village in Mang'u, Thika District, Kenya. An authentic voucher specimen (No. FOP0026) was identified at the Department of Botany, University of Nairobi and was also deposited at the School of Pharmacy Herbarium, University of Nairobi, Kenya. The plant's dried stem bark yielded 0.87 % chloroform extract. About 5 g of the extract was introduced into a column containing 100 g of silica gel using chloroform as the mobile phase and two fractions yielded two compounds which were further purified by re-crystallization in acetone. Both compounds, **I** (0.005 % w/w of dried stem bark) and **II** (0.004 % w/w of dried stem bark), were obtained as colourless needle-like crystals and had a R_f of 0.53 and 0.42 respectively using chloroform: methanol (197:3 v/v) as the mobile phase.

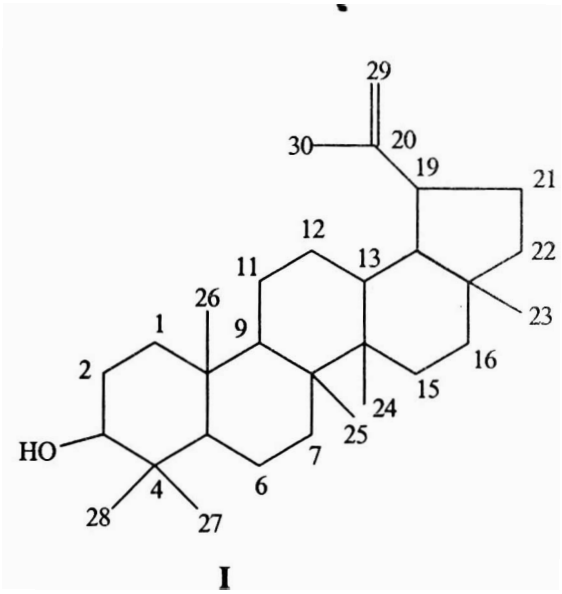
Structure Determination

Compounds **I** and **II** were subjected to spectroscopic analysis. Infra-red (IR) spectroscopy was carried out at The National Quality Control Laboratory, Nairobi. Nuclear magnetic resonance (NMR) spectroscopy was carried out at the Chiromo Campus Department of Chemistry, University of Nairobi, while mass spectrometry (MS) was done at the International Centre for Insect Physiology and Ecology (ICIPE) in Nairobi. Compound **I** was identified as lupeol based on spectroscopic data which were in agreement with standard compounds [8-10] while compound **II** was similarly identified as β-sitosterol [11-12].

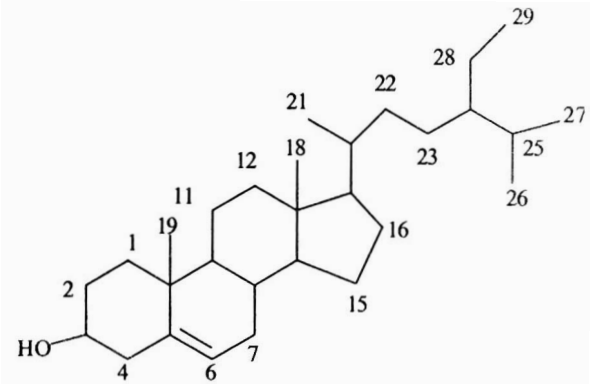
Lupeol (I)

IR bands (KBr): 3384.5 (s), 2941.9, 2854.4, 1637.4, 1457.4, 1380.1, 1038.0, 888.5 cm^{-1}.MS m/z (rel. int. %): 426 (M^+, 5), 411 (2), 365 (1), 257 (3), 218 (48), 203 (26), 189 (34), 147 (30), 135 (56), 95 (55), 55 (100), 43 (85), 39 (8).

* Author to whom the correspondence may be addressed



I



II

^{1}H-NMR (200 MHz, $CDCl_3$):): δ 0.61 (1H, d, H5), 0.69 (3H, s, H-24), 0.72 (3H, s, H-28), 0.76 (3H, s, H-25), 1.61 (3H, s, H-30), 2.33 (1 H, m, H-19), 3.12 (1 H, m, H-3), 4.50 (1 H, s, H-29e), 4.62 (1 H, s, H-29a).

^{13}C-NMR (200 MHz, $CDCl_3$): 39.61 (C-1), 28.38 (C-2), 79.84 (C-3), 39.79 (C-4), 56.14 (C-5), 19.29 (C-6), 35.18 (C-7), 41.73 (C-8), 51.30 (C-9), 38.08 (C-10), 21.88 (C-11), 26.05 (C-12), 38.95 (C-13), 43.73 (C-14), 28.95 (C-15), 36.50 (C-16), 43.93 (C-17), 49.17 (C-18), 48.90 (C-19), 151.68 (C-20), 30.77 (C-21), 40.92 (C-22), 30.69 (C-23), 16.38 (C-24), 17.13 (C-25), 16.95 (C-26), 15.54 (C-27), 18.99 (C-28), 110.11 (C-29), 20.29 (C-30).

β-Sitosterol (II)

IR band (KBr): 3423.7 (s), 2930.1, 1654.3, 1465.1, 1381.0, 959.0, 838.2, 800.7, 738.8, 627.4 cm^{-1}.

MS m/z (rel. int. %): 414 (M^+, 1), 396 (1), 329 (1), 279 (4), 255 (2), 231(1), 213 (2), 167 (35), 149 (100), 133 (7), 121 (9), 113 (15), 95 (12), 83 (22), 71 (40), 57 (82), 43 (66).

^{1}H-NMR ($CDCl_3$, 200 MHz): δ 0.67 (3H, s, CH_3-18), 0.79 (3H, m, CH_3-29), 0.82 (6H, d, CH_3-26 and CH_3-27), 0.90 (3H, d, CH3-21), 1.00 (3H, s, CH_3-19), 3.51 (1H, m, H-3), 5.34 (1 H, d, H-6).

^{13}C-NMR (200 MHz, $CDCl_3$): 38.2 (C-1), 32.6 (C-2), 72.7 (C-3), 43.2 (C-4), 141.4 (C-5), 122.5 (C-6), 32.8 (C-7), 32.8 (C-8), 51.0 (C-9), 37.4 (C-10), 22.1 (C-11), 40.7 (C-12), 43.2 (C-13), 57.6 (C-14), 25.3 (C-15), 29.2 (C-16), 56.9 (C-17), 13.0 (C-18), 20.0 (C-19), 37.1 (C-20), 19.8 (C-21), 34.9 (C-22), 26.9 (C-23), 46.8 (C-24), 30.0 (C-25), 20.8 (C-26), 20.4 (C-27), 24.0 (C-28), 12.9 (C-29).

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