sterol,[9] rutin,[3] isoquercitrin[3] and quercetin;[3] *C. roxburghii*: lupeol,[7] glucocapparin[11] and thiodamine;[12] *C. tapia*: β-amyrin, lupeol and betulinic acid.[8]

Plant part examined. Trunk bark. *Isolation and identification.* The powdered bark was defatted with light petroleum. The petroleum fraction was concentrated *in vacuo* and a white precipitate was obtained in a 0·7% yield. After recrystallization (acetone and EtOH), the compound was identified as lupeol by the following physical methods. It gave a positive Lieberman–Burchard test for triterpenes; m.p. 212–214°; $[\alpha]_D^{25}$ +26·2° (conc. 0·67 in $CHCl_3$); a violet chromogenic reaction with 70% H_2SO_4 after spraying TLC chromatograms. TLC on silica gel G gave the following R_f values: benzene (0·25), CH_2Cl_2 (0·40); EtOAc–MeOH (4:1) (0·90). The UV spectrum (MeOH): λ_{max} 200 nm (log 3·81). IR spectrum (KBr) at ν_{max} 3320(s), 1640(w), 1445(m), 1380(m), 1180(w), 1105(w), 1040(w), 1010(w), 980(w), and 940(w) cm^{-1}. The purity of the compound was evaluated by GLC (SE-30 Scot, 50 × 0·02), $T = 230°$; 18 min (solvent $CHCl_3$).

An NMR spectrum in $CDCl_3$, using TMS as internal standard, showed signals at 4·64 δ (*d*, 2 protons), 3·15 δ (*s*, 1 proton), 1·30–1·78 δ ($-CH_2-$ and methine protons, 26), 0·74–1·05 δ (overlapping 7 $C-CH_3$ protons), the MS showed a molecular ion at *m/e* 426, which was also the base peak. Other major ions were M–CH_3 (23%) *m/e* 218 (78%), *m/e* 207 (75%) and *m/e* 189 (80%).

Finally, the compound was acetylated (Ac_2O and pyridine), and the acetate had m.p 214–215°. The IR lacked bands at 3340 and 1104 cm^{-1}, which were replaced by bands at 1740 and 1245 cm^{-1}, indicative of the ester function.

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[11] A. KJAER and H. THOMSEN, *Acta Chem. Scand.* **16,** 783 (1962).
[12] R. N. CHAKRAVARTI, *Indian Med. Gaz.* **86,** 152 (1951).

Phytochemistry, 1972, Vol. 11, pp. 2886 to 2887. Pergamon Press. Printed in England.

COMPOSITAE

7,24(28)-STIGMASTADIEN-3β-OL FROM *VERNONIA AMYGDALINA*

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Key Word Index—*Vernonia amygdalina*; Compositae; 7,24(28)-stigmastadien-3β-ol.

Vernonia amygdalina (H) (Ibo name—Onugbu) is a valuable shrub wide spread in Nigeria. It is more commonly known as 'bitter leaf' because the leaves and the stem have a bitter taste when chewed, though there is a report of a 'sweet' variety.[1] The leaves of 'bitter leaf' are eaten after macerating with water to remove the bitter components and are believed to help digestion. It is not certain if other species like *Vernonia anthelmintica* and *Vernonia colorata* which are found elsewhere are eaten, but chemical investigations have been carried out.[2a,b,3]

[1] B. OKIGBO, Agricultural Dept., University of Nigeria, Nsukka, personal communication.
[2] (a) D. J. FROST and J. P. WARD, *Tetrahedron Letters* 3779 (1968); (b) W. SUCROW, *Tetrahedron Letters* 2443 (1968).
[3] TOUBIANA and RAOUL, *Compt. Rend.* **268C,** 82 (1969).

Unlike *V. anthelmintica* and possibly *V. colorata*, *V. amygdalina* does not produce seeds and in Nigeria, it is propagated by cuttings. Work on *V. anthelmintica* seeds[2a] revealed that 7,24(28)-stigmastadien-3β-ol was present along with other compounds; while *V. colorata*[3] showed the presence of a sesquiterpene ester–hydroxy vernolide.

Light petroleum (b.p. 60–80°) extraction of the pulverized dry stem of *V. amygdalina*[4] gave a brown oil. This oil was chromatographed on silica gel (Merck: Kieselgel, 0·2–0·5 mm, 30–70 mesh ASTM). Light petroleum and benzene fractions eluted oily materials that did not crystallize; 20% $CHCl_3$–benzene eluted a solid which was recrystallized from MeOH to give light green crystals (leaflets) m.p. 148–151° ($C_{29}H_{48}O$ MW (MS) of 412). IR showed it to be a steroidal alcohol. It gave an acetate (Ac_2O–HOAc using *p*-toluene sulphonic acid as catalyst), m.p. and m.m.p., with an authentic sample[2a] of acetate of 7,24(28)-stigmastadien-3β-ol, 150–152°. The compounds were identical by TLC.

EXPERIMENTAL

Extraction of stem. The dried powdered stem of *V. amygdalina* (1·5 kg), extracted with light petroleum, gave an oil (4·5 g).

Isolation of 7,24(28)-*stigmastadien*-3β-ol. The oil (4·5 g) was dissolved in light petroleum and chromatographed on silica gel (135 g). The column was eluted progressively and 20% $CHCl_3$–benzene eluted solids which crystallized from MeOH or benzene. Repeated crystallization yielded 7,24(28)-stigmastadien-3β-ol as light green crystals (leaflets) (97 mg) m.p. 148–151° (Calc. C, 84·40; H, 11·72. Found: C, 84·31; H, 11·67%) with M^+ as 412, $C_{29}H_{48}O$ has M^+ as 412·67); ν_{max} 3300 cm^{-1} (broad) in Nujol. (Acetate m.p. 150–152°.)

Acknowledgement—I thank Dr. J. P. Ward of Unilever Research Vlaardigen, Nederland, for a generous supply of an authentic specimen of 7, (*Z*)-24(28)-stigmastadienyl acetate.

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[4] Samples of *V. amygdalina* stem supplied by Mrs. V. N. ARENE and Mrs. C. EKUNDAYO of College of Education, University of Lagos.

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EUPHORBIACEAE

CONSTITUENTS OF *EUPHORBIA TINCTORIA*

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(*Received* 18 *April* 1972)

Key Word Index—*Euphorbia tinctoria*; Euphorbiaceae; nonacosane; octacosanol; γ-euphorbol.

Plant. Euphorbia tinctoria L. *Source.* Central parts of Iran plateau. *Use.* Plant is used as purgative. *Previous work.* None.

Roots, stem, leaves and flowers were extracted with light petroleum (40–60°). The residue was dissolved in petroleum and chromatographed on Kieselgel S. *Nonacosane.* $C_{29}H_{60}$ (Found, C, 84·90; H, 14·60. Reqd: C, 85·20; H, 14·80% m.p., m.m.p., IR and NMR). Earlier petroleum fractions and crystallization (MeOH–petroleum). *Unidentified ketone.* (m.p. 77°. IR 1720 cm^{-1}). From petroleum–benzene fractions (80–20) crystallized with MeOH. γ-*Euphorbol.* (m.p. 71–96°, IR 3400 cm^{-1}. Acetate, benzoate m.p., m.m.p. and IR 1740 cm^{-1} and NMR). From benzene fractions. Crystallized from MeOH. *Octacosanol.* $C_{28}H_{58}O$ (Found: C, 81·56; H, 14·08. Reqd: C, 81·67; H, 14·23%, IR 3418 cm^{-1}, m.p., m.m.p. Acetate, benzoate, m.p., m.m.p., IR 1740 cm^{-1}). From benzene–$CHCl_3$ (95–5) fractions: crystallized from MeOH–acetone (80–20).

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