

FOUQUIERIACEAE

EXTRACTIVES FROM THE FLOWERS OF *FOUQUIERIA SPLENDENS**

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(Received 18 April 1972)

Key Word Index—*Fouquieria splendens*, Fouquieriaceae; tetraeicosane; eicosene; sitosterol; quercetin.

Plant. *Fouquieria splendens*, Engelm. *Uses.* In medicine.¹ *Previous work.* On bark² and the bark of related species.³

Flowers. Extracted successively with light petroleum and then with EtOH. Each extract was chromatographed on silica gel. From light petroleum, *tetraeicosane*, C₂₄H₅₀, m.p., m.m.p. *eicosene*, C₂₀H₄₀ (M⁺ 280), m.p. 60–62°, not optical active, positive tetranitromethane test, *sitosterol*, C₂₉H₅₀O, m.p., m.m.p. [α] IR, co-TLC of sterol and its acetate with authentic specimens. On TLC, no ocotillol could be found. From EtOH, *quercetin*, m.p. 312–315°, m.m.p. IR, NMR, UV, co-TLC, *pentaacetate*, m.p. 192–194° m.m.p. co-TLC, IR, NMR and UV.

Acknowledgements—The authors thank the sympathy of Ing. F. García Roel, to Forge of New York for financial help, and to ICETEX for a scholarship to one of us J.V.O.

* Part XXIV in the series "Studies on Mexican Medicinal Plants". For Part XXIII see *Phytochem.* **11**, 2895 (1972).

¹ M. MARTÍNEZ, *Las Plantas Medicinales de México* 4a Ediciones Botas, p. 462, Mexico (1959).

² C. M. M. HALLS and E. W. WARNHOFF, *Chem. & Ind.* 2373 (1963).

³ F. GERAL and L. RODRÍGUEZ HAHN, *J. Chem. Soc.* 2373 (1960).

FUMARIACEAE, etc.

CONSTITUENTS OF INDIAN AND OTHER PLANTS*

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(Received 25 April 1972)

Key Word Index—*Fumaria indica*; Fumariaceae; protopine; *Croton sparsiflorus*; Euphorbiaceae; vomifoliol; *Buxus wallichiana*; Buxaceae; betulinic acid; *Urginea indica*; Liliaceae; sitosterol.

Plant. *Fumaria indica* Pugsley, Fumariaceae. *Occurrence.* Throughout the greater-part of India. *Previous work.* *Fumaria vaillantii*^{1,2} *Source.* Mirzapur. U.P., India.

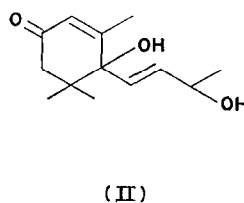
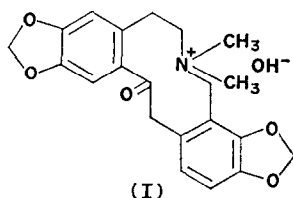
* Communication No. 1727 from Central Drug Research Institute, Lucknow.

¹ I. A. N. ISRAILOV, M. S. YUNUSOV and S. YUNUSOV, *Khim. Prir. Soedin* **3**, 194 (1968); *Chem. Abs.* **69**, 57449 (1968).

² S. SUSPLUGAS, G. PRIVAT, J. BERLAN and J. P. SARDA, *Trav. Soc. Pharm.* **28**, 157 (1968); *Chem. Abs.* **70**, 65127 (1969).

Leaves and stem. Basic fraction of EtOH extractive (chromatographed, Al_2O_3 , grade III). Elution with $\text{CHCl}_3\text{-C}_6\text{H}_6$ (1:1) gave *compound A*, $\text{C}_{20}\text{H}_{19}\text{NO}_5$, m.p. 200–202°. UV (EtOH) λ_{max} 215, 240, 290 nm. IR (KBr) 1675 (C=O), 1490, 1250, 1270 and 1140 cm^{-1} . NMR (CDCl_3) 60 MHz τ 8.15 (s, N-Me), 4.08 (s, O-CH₂-O), 4.12 (s, O-CH₂-O), four aromatic protons at 3.28 (s, 1 H), 3.48 (s, 2 H) and 3.65 (s, 1 H), four methylene protons, at 5.7–7.1 (m, 8 H). M^+ , 353. Treatment of the compound with MeI gave a methiodide m.p. 215°. The *compound A* was identified as *protopine* (m.p., m.m.p., IR and TLC).

Elution of Al_2O_3 column with $\text{CHCl}_3\text{-MeOH}$ (1:3) yielded a crystalline *compound B*, m.p. 231–233°. UV (EtOH) λ_{max} 217, 233, 295 nm. IR (KBr) 3350, 1688 (C=O), 1575, 1490, 1375, 1250, 1040, 930, 785 cm^{-1} . (Found: C, 61.65; H, 5.47; N, 3.17. Calc. for $\text{C}_{21}\text{H}_{23}\text{NO}_6 \cdot \text{H}_2\text{O}$: C, 62.53; H, 6.20; N, 3.44 %.) NMR (TFA) 60 MHz gave signals at τ 7.32 (s, N⁺-Me), 7.27 (s, N⁺-Me), 4.40 (s, O-CH₂-O), 4.16 (s, O-CH₂-O). Eight methylene protons at 6.2–7.2 (m, 8 H). Four aromatic protons at 3.68 (s, 1 H), 3.53 (s, 1 H), 3.21 (d, 1 H, $J = 9$ Hz) and 2.92 (d, 1 H, $J = 9$ Hz). *Compound B* appeared to be a quaternary salt (I) of *protopine* (IR, UV and NMR). The petroleum soluble fraction of EtOH extractive (chromatographed, Al_2O_3) gave, *nonacosanol* (m.p., m.m.p., IR and TLC) and *sitosterol* (m.p., m.m.p., IR and TLC of the alcohol and acetate).



Plant. *Croton sparsiflorus* Morong (Syn. *C. bonplandium* Baill), Euphorbiaceae. *Occurrence.* Common weed throughout the plains of India. *Source.* Lucknow, U.P., India. *Medicinal uses.* Hypotensive.³ *Previous work.* Leaves, roots, plant, stem and seeds.⁴

Leaves and stem. Neutral fraction of EtOH extractive (chromatographed on silica gel). Elution with $\text{EtOAc-C}_6\text{H}_6$ (1:9) yielded an alcohol $\text{C}_{13}\text{H}_{20}\text{O}_3$, m.p. 113°; $[\alpha]_{\text{D}} +256.5^\circ$ (C, 0.15 CHCl_3). UV (EtOH) λ_{max} 237 nm. IR (KBr) 3360 (OH), 1665 (enone) cm^{-1} . NMR (CDCl_3) 60 MHz gave signals for gem. dimethyl at τ 8.92 (s, 3 H), 8.98 (s, 3 H), a secondary methyl at τ 8.72 (d, 3 H, $J = 6.5$ Hz) a vinylic methyl at 8.09 (d, 3 H, $J = 1$ Hz), two methylene protons, α -to (C=O) at 7.70 (s, 1 H) and 7.64 (s, 1 H), two exchangeable protons at 6.72 and 6.98, a proton at 5.6 (m, -CH-OH) and three olefinic protons between 4.10–4.20. M^+ , 224. (Found: C, 68.95; H, 8.34. Calc. for $\text{C}_{13}\text{H}_{20}\text{O}_3$: C, 69.6; H, 8.9 %.) Treatment of the alcohol with pyridine- Ac_2O yielded a monoacetate $\text{C}_{15}\text{H}_{22}\text{O}_4$,

³ M. P. DUBEY, R. C. SRIMAL and B. N. DHAWAN, *Indian J. Pharmac.* **1**, 73 (1969).

⁴ D. S. BHAKUNI, N. C. GUPTA, S. SATISH, S. C. SHARMA, Y. N. SHUKLA and J. S. TANDON, *Phytochem.* **10**, 2247 (1971).

m.p. 101–102°, $[\alpha]_D +271^\circ$ (C, 0.88, CHCl_3), IR (KBr) 3400 (OH), 1750 (acetate) and 1650 (enone) cm^{-1} , NMR (CDCl_3) 60 MHz gave signals at τ 8.99 (s, 3 H), 8.92 (s, 3 H), 8.68 (d, 3 H, $J = 6.5$ Hz), 8.00 (d, 3 H, $J = 1$ Hz), 8.12 (s, 3H, acetate), 7.72 (s, 1 H), 7.65 (s, 1 H) 4.60 (m, 1 H) 4.08–4.20 (3H) and an exchangeable proton at 7.32. On the basis of these data and biogenetic consideration, the alcohol was assigned structure (II). While this work was in progress Dr. R. S. Kapil drew our attention to the structure of vomifoliol, an alcohol from *Rauwolfia vomitoria*⁵ and suggested that the *Croton* alcohol and vomifoliol could be identical. Direct comparison of the authentic samples (m.p., m.m.p., IR, UV and NMR) established their identity. Benzene extract of EtOH extractive (chromatographed, Al_2O_3) gave *ursolic acid* (m.p., m.m.p., IR and TLC of the acid and methyl ester acetate).

Plant. *Buxus wallichiana* Baill (Syn. *B. semipervirens* L.). Buxaceae. *Occurrence.* Western and Central Himalayas. *Source.* Dalhousie, H.P., India. *Previous work.* On basic fraction.⁶

Leaves and stem. Petroleum soluble fraction of EtOH extractive (chromatographed, Al_2O_3) gave *hentriacontanol* (m.p., m.m.p., IR and TLC of the alcohol and acetate). β -*Amyrin* (m.p., m.m.p. $[\alpha]_D$; IR and TLC of the alcohol, acetate and benzoate). *Betulinic acid* (m.p., $[\alpha]_D$; IR and TLC of the acid and methyl ester).

Plant. *Urginea indica* Kunth, Liliaceae. *Occurrence.* Western Himalayas. *Source.* Almora, U.P., India. *Previous work.* Bulbs.⁷ *Biological activity.* Anticancer.⁸

Bulbs. Petrol soluble fraction of EtOH extractive (chromatographed, Al_2O_3) gave *hetriacontanol*, *sitosterol* and *octacosanoic acid*.

Acknowledgement—We are grateful to Professor J. L. Pousset for a generous sample of vomifoliol.

⁵ J. L. POUSSET and J. POISSON, *Tetrahedron Letters*, 1173 (1969).

⁶ J. L. BEAL, *Pharmazie* **25**, 363 (1970).

⁷ S. RANGASWAMI and S. S. SUBRAMANIAN, *J. Sci. Industrial Res.* **15C**, 80 (1956).

⁸ M. L. DHAR, M. M. DHAR, B. N. DHAWAN, B. N. MEHROTRA and C. RAY, *Indian J. Exptl. Biol.* **6**, 232 (1968).

Phytochemistry, 1972, Vol. 11, pp. 2890 to 2891. Pergamon Press. Printed in England.

LYTHRACEAE

3,4,3'-TRI-O-METHYLELLAGIC ACID FROM *LAGERSTROEMIA INDICA*

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(Received 24 April 1972)

Key Word Index—*Lagerstroemia indica*; Lythraceae; sitosterol; 3,4,3'-tri-O-methylellagic acid.

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Plant. *Lagerstroemia indica* (Herbarium No. 3699). *Occurrence.* Throughout Pakistan. *Uses.* Medicinal.¹ *Previous work.* Alkaloids reported from flowers.²

¹ R. N. CHOPRA, S. L. NAYAR and I. C. CHOPRA, *Glossary of Indian Medicinal Plants*, p. 148, CSIR, New Delhi (1956).

² J. P. FERRIS, R. C. BRINER and C. B. BOYCE, *J. Am. Chem. Soc.* **93**, 2958 (1971).