

## RUTACEAE

CONSTITUENTS OF THE LEAF AND PEEL OILS OF *CITRUS HYSTRIX*, D.C.

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(Received 8 May 1970, in revised form 15 July 1970)

*Plant.* *Citrus hystrix* D.C.*Source.* Thailand (local name 'makrud').*Uses.* As a perfume for hair dressings and shampoos.<sup>1,2</sup>*Previous Work.* The presence of citronellal (84%) and terpene alcohols (leaf oil)<sup>3</sup> and citronellal (26%) and terpene hydrocarbons (peel oil)<sup>4</sup> have been previously reported.*Leaf.* The fresh leaves were steam distilled yielding a volatile oil which had the following properties: spec. grav. 0.8580; r.i., 1,4500 and specific rotation  $-10^{\circ}44'$  (all at 20°). The oil was analysed by a combination of fractional distillation, alumina-column chromatography and GLC. Compounds isolated by preparative GLC were characterized by i.r. spectroscopy and retention time comparison.<sup>5,6</sup> The oil was found to contain:  $\alpha$ -pinene (0.2%), camphene (trace),  $\beta$ -pinene and sabinene (4.9), myrcene (0.6), limonene (0.6), *trans*-ocimene (0.3),  $\gamma$ -terpinene (0.2), *p*-cymene (0.1), terpinolene (0.2), citronellal (65.4), copaene (0.1), linalool (2.9),  $\beta$ -cubebene (0.1), isopulegol (4.9), caryophyllene (0.4), citronellyl acetate (5.1), citronellol, geranyl acetate and  $\delta$ -cadiene (6.4). All percentages were calculated from disc integration measurements using a flame ionization detection of a pressure and temperature programmed capillary gas chromatographic analysis using a column of Carbowax 6000.*Peel.* The oil, obtained from a cold press of the peel of fresh fruit which had the following properties: spec. grav. 0.8680; r.i., 1,4729; specific rotation  $+26^{\circ}17'$ , was analysed as described above. The following compounds were found to be present:  $\alpha$ -pinene (2.5%), camphene (0.2),  $\beta$ -pinene (30.6), sabinene (22.6), myrcene (1.4), limonene (29.2), 1,8 cineol (1.3),  $\gamma$ -terpinene (0.1), *p*-cymene (0.1), terpinolene (0.1), *trans*-sabinene hydrate (0.6), citronellal (4.2), copaene (0.6), linalool (0.5),  $\beta$ -cubebene (0.5), terpinen-4-ol and  $\beta$ -elemene (0.2), caryophyllene (0.3), citronellyl acetate (0.2),  $\alpha$ -terpineol (0.7), geranial<sup>1</sup> I. H. BURKHILL, *A Dictionary of the Economic Products of the Malay Peninsula*, 2nd Ed., Vol. 1, p. 574, Ministry of Agriculture and Co-operatives, Kuala Lumpur, Malaysia (1966).<sup>2</sup> W. H. BROWN, *Useful Plants of the Philippines*, Technical Bull., Vol. 2, p. 200, No. 10, Department of Agriculture and Natural Resources, Manila, Philippines (1964).<sup>3</sup> M. IGOLEN, *Parfum Cosmet Savons* 1, 51 (1958).<sup>4</sup> S. S. TANCHICO and A. P. WEST, *Philipp J Sci* 52, 263 (1933).<sup>5</sup> B. M. LAWRENCE, J. W. HOGG and S. J. TERHUNE, *Perfume. Essent. Oil Rec.* 60, 88 (1969).<sup>6</sup> B. M. LAWRENCE, J. W. HOGG and S. J. TERHUNE, *J. Chromatog.* 50, 59 (1970).

(0.1), geranyl acetate and citronellol (0.4),  $\delta$ -cadinene (0.3), geraniol (0.1), nerolidol (0.1) and elemol (0.3).

*Acknowledgements*—The authors acknowledge the financial assistance of the National Research Council via an Industrial Research Assistantship grant coded 'Spices 807', and the interest of Stange Canada Ltd. One of the authors (V.P.) also acknowledges the financial support of the Applied Scientific Research Corporation of Thailand coded 'Research Program No. 11, National Perfume and Flavour Materials'.

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Phytochemistry, 1971, Vol. 10, p 1405. Pergamon Press Printed in England.

## TROCHODENDRACEAE

### CONSTITUENTS OF THE WOOD OF *TROCHODENDRON ARALIOIDES*

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(Received 17 July 1970)

*Plant.* *Trochodendron aralioides* Sieb. et Zucc.—Trochodendraceae

*Uses.* Not known.

*Previous work.* Resin.<sup>1</sup>

*Wood.* Extracted with MeOH. Chromatographed using SiO<sub>2</sub>.

*Acetyloleanolic aldehyde.* C<sub>32</sub>H<sub>50</sub>O<sub>3</sub>, m.p. 226–227°. Reduction with LiAlH<sub>4</sub> followed by acetylation to erythrodiol diacetate, m.p., mixed m.p., superposable i.r. spectra.

*Betulin.* M.p., mixed m.p., i.r.

*Unidentified compounds.* A: m.p. 198–204°, i.r.  $\nu^{KBr}$  3400, 1700, 1660 cm<sup>-1</sup>. B: m.p. 128–130°, u.v.  $\lambda_{max}$  251 nm ( $\epsilon$  10000). i.r.  $\nu^{KBr}$  1732, 1652 cm<sup>-1</sup>. C: m.p. 134–135°, i.r.  $\nu^{KBr}$  3400 cm<sup>-1</sup>.

*Acknowledgements*—Thanks are due to Dr. H. Hikino, Tohoku University, for identification of erythrodiol diacetate.

<sup>1</sup> K. YAGISHITA, *Bull. Agri. Chem. Soc. Japan* **21**, 77 (1957).