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SHORT COMMUNICATION

EXTRACTIVES OF ELM WOOD

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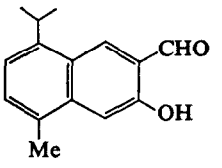
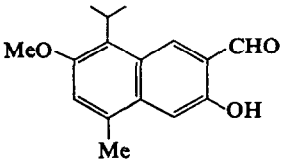
Abstract—3-Hydroxy-8-isopropyl-5-methyl-2-naphthaldehyde and its 7-methoxy and 5,6,7,8-tetrahydro derivatives were isolated from the wood of *Ulmus glabra* Huds. 7-Hydroxycadalene was also shown to be present.

IN CONNEXION with a study of extractives from some deciduous trees (aspen,[1] birch[2,3] and linden[4]) we have investigated the light petroleum soluble extract of elm wood. The extract (0·17% of the dry wood) was separated into a neutral fraction (54% of the extract) and an acid fraction (46%).[5] From the acid fraction two coloured crystalline compounds were isolated. One was yellow (I, m.p. 135–137°, $C_{15}H_{16}O_2$; 4% of the original extract) and the other orange (II, m.p. 80–82°, $C_{16}H_{18}O_3$; 0·6%). They were identified as 3-hydroxy-8-isopropyl-5-methyl-2-naphthaldehyde and 3-hydroxy-8-isopropyl-7-methoxy-5-methyl-2-naphthaldehyde by comparison with authentic samples from *Ulmus rubra*[6] Muhl. kindly supplied by Dr. J. W. Rowe.



(I)



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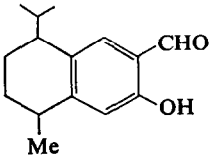

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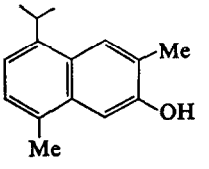

(IV)

[1] B. O. LINDGREN and C. M. SVAHN, *Acta Chem. Scand.* **20**, 1763 (1966).
[2] B. O. LINDGREN, *Acta Chem. Scand.* **19**, 1317 (1965).
[3] J. BERGMAN, B. O. LINDGREN and C. M. SVAHN, *Acta Chem. Scand.* **19**, 1661 (1965).
[4] B. O. LINDGREN and C. M. SVAHN, *Phytochem.* **7**, 669 (1968).
[5] D. F. ZINKEL and J. W. ROWE, *Anal. Chem.* **36**, 1160 (1964).
[6] During the course of this investigation it became known that Dr. J. W. ROWE at Forest Products Laboratory, Madison, U.S.A., had isolated and characterized these naphthols from *U. rubra* Muhl. This is to be published in *Forest Products Journal* **18**, 37 (1968).

A colourless naphthaldehyde, 3-hydroxy-8-isopropyl-5-methyl-5,6,7,8-tetrahydro-2-naphthaldehyde (III) was also isolated from *U. glabra* (1·5%) and identified by comparison of its spectra (i.r., NMR) with those reported by Rowe.[6] Thin-layer chromatography and gas–liquid chromatography showed that *U. glabra* further contains 5-isopropyl-3,8-dimethyl-2-naphthol (7-hydroxycadalene) (IV). The two latter compounds (III, IV) are also present in *U. rubra*.[6] The main constituents in the neutral fraction were β-sitosterol and its esters. Small amounts of free and esterified 24-methylenecycloartanol, cycloartenol and citrostadienol (gas–liquid chromatography), as well as triglycerides and fatty alcohols were also present.

The genus *Ulmus* is divided into five sections. The above-mentioned *U. rubra* and *U. glabra* belong to the section *Madocarpus* Dum. *U. carpinifolia* Gled. of this section also contains all four of the above-mentioned naphthols (I–IV), whereas these compounds have neither been detected in wood of *U. thomasii* Sarg. of section *Chaetoptelea*[6] Schneid. nor in *U. laevis* Pall. of section *Blepharocarpus* Dum. This suggests that there may be some chemical differences between the various sections of the genus.

EXPERIMENTAL

The extraction of the wood of *Ulmus glabra* (trunkwood, several samples), *U. carpinifolia* (branchwood, one sample) and *U. laevis* (branchwood, one sample) was carried out as described for birch wood.[2] The separation of the neutral and the acid material in the light petroleum soluble extract was performed as described by Zinkel and Rowe.[5] The neutral fraction of the extract of *U. glabra* was analysed largely as described for the corresponding extractives from birch and aspen wood.[1–3] Thin-layer and column chromatography of the naphthols was carried out on silica gel (Merck) and silicic acid (Mallincrodt) respectively, using isopropyl ether–petrol ether mixtures. Gas–liquid chromatography was performed on 1 per cent XE-60 at 170°.

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