

The Chemistry of the Natural Order *Cupressales*. XIII*. The Presence of Sugiol in the Wood of *Juniperus communis* L.

JOHAN B-SON BREDENBERG
and JARL GRIPENBERG

Department of Chemistry, Institute of
Technology, Helsingfors, Finland

In continuation of earlier work on the family *Cupressaceae*, an investigation of the wood of the common juniper (*Juniperus communis* L.), the only species of this family endemic to Scandinavia, has been undertaken. The fractionation of the extract was carried out essentially according to Lindstedt¹. From the fractions soluble in sodium hydroxide and from the neutral fraction a substance m.p. 290–292°, $[\alpha]_D^{25} + 22 \pm 2^\circ$ (ethanol), $[\alpha]_D^{25} + 15^\circ \pm 2^\circ$ (acetone) was obtained in low yield (0.006 %). The substance corresponded to the formula $C_{20}H_{28}O_2$ and was difficultly soluble in the common organic solvents. It gave no colour with ferric chloride and failed to react with dinitrophenylhydrazine. The U.V. spectrum of the compound in ethanol showed a sharp maximum at 234 $m\mu$ ($\log \epsilon$ 4.18) and a broader maximum at 286 $m\mu$ ($\log \epsilon$ 4.12). These properties are in agreement with the properties given for sugiol (9-ketoferruginol), which has previously been isolated from the fraction soluble in 1 % sodium hydroxide of the resin from the wood of *Cryptomeria japonica* D. Don (m.p. 283–284°; $[\alpha]_D^{25} + 34.35^\circ$ (pyridine); λ_{\max} 286 $m\mu$)^{2,3} and from the neutral part of the extract of the wood of *Dacrydium cupressinum* Sol. (m.p. 295–297°; $[\alpha]_D^{20} + 20^\circ$ (ethanol); λ_{\max} 233 $m\mu$ ($\log \epsilon$ 4.2), 285 $m\mu$ ($\log \epsilon$ 4.1)^{4,5}.

* The numbering of the three preceding papers: *Chemistry & Industry* 1952 1267, *ibid.* 1954 432 and *Acta Chem. Scand.* 8 (1954) 1073, should be X, XI and XII respectively.

A mixed melting point determination with authentic sugiol, kindly supplied by Dr. B. R. Thomas, showed no depression. The identity of the two compounds was further confirmed by comparison of the IR-spectra, which were indistinguishable.

Experimental. The finely powdered wood (6.5 kg) was extracted with ether in a continuous extractor for 24 hours. The extract was shaken successively with portions of 8 % sodium hydrogen carbonate, 10 % sodium carbonate, 0.2 % sodium hydroxide and 8 % sodium hydroxide solutions.

After acidification, chromatography of the precipitate on aluminium oxide and recrystallisation from benzene, the two last mentioned fractions gave 15 and 55 mg, respectively, of sugiol.

One third of the neutral portion was then steam distilled and from the non-volatile portion of this there was obtained, by careful chromatography, a further amount (100 mg).

The sugiol thus obtained had m.p. 290–292° (dec.) (corr.), $[\alpha]_D^{25} + 22^\circ \pm 2^\circ$ (ethanol, c 0.58), $+ 15 \pm 2^\circ$ (acetone, c 0.52). (Found: C 79.6; H 9.4; Mol.wt. 313 (Rast). Calc. for $C_{20}H_{28}O_2$: C 79.95; H 9.4; Mol.wt. 300.4).

This work has been financially supported by a grant from *Statens Naturvetenskapliga Kommission* which is gratefully acknowledged.

The authors also wish to thank Dr. K. E. Almin, Svenska Träforskningsinstitutet, Stockholm, for determination of the IR-spectra.

1. Lindstedt, G. *Acta Chem. Scand.* 3 (1949) 755.
2. Keimatsu, S., Ishiguro, T. and Fukui, G. *J. Pharm. Soc. Japan* 57 (1937) 92; *Chem. Zentr.* 1937 II 596.
3. Huzii, G. and Tikamori, T. *J. Pharm. Soc. Japan* 59 (1939) 124, *Chem. Abstracts* 33 (1939) 4592.
4. Brandt, C. W. and Thomas, B. R. *New Zealand J. Sci. Technol.* 33 B (1951) No. 1, 30.
5. Brandt, C. W. and Thomas, B. R. *J. Chem. Soc.* 1952 2442.

Received October 5, 1954.