

β -nor-Conidendrin *

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Following the discovery of the antioxidant *nor*-dihydro-guaiaretic acid¹ in *Larrea divaricata*, Fisher, Kyame and Bickford converted conidendrin (sulphite liquors lactone) by demethylation with hydrobromic acid, to a product called *nor*-conidendrin². This product appears to possess promising antioxidising properties. Conidendrin (α -conidendrin) occurs in the wood of several conifers, e. g. *Podocarpus spicatus*³, several species of the spruce genus⁴ and most hemlocks (*Tsuga*)⁵. Large amounts of conidendrin are available from the waste liquors from the sulphite digestion of western hemlock (*Tsuga heterophylla*) and a convenient process of isolation from these liquors has been worked out⁶. This makes conidendrin, previously an 'academic curiosity', a substance of potential technical importance.

The yield of pure *nor*-conidendrin obtained with hydrogen bromide is unsatisfactory. Consequently experiments were instituted to increase the yield by employing milder processes of demethylation. It was found that α -conidendrin could be smoothly demethylated by pyridinium chloride⁷ to yield a pure crystalline product of at least 85 per cent yield**. The high melting, dextrorotatory substance had a composition corresponding to the formula $C_{18}H_{16}O_6$. It contained no methoxyl groups but four hydroxyl groups as shown by the formation of a tetra acetyl derivate, which is also dextrorotatory. On methylation with methyl sulphate, a tetramethyl derivative was obtained which showed a zero rotation. This substance is identical with the β -dimethyl sulphite liquors lactone obtained by Holmberg⁸ by the isomerisation of the normal methylation product of conidendrin (α -dimethyl sulphite liquors lactone) with sodium ethoxide in ethanol. It follows that the

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** Patent pending.

formation of our *nor*-conidendrin is due to the demethylation of α -conidendrin with simultaneous isomerisation under the influence of the demethylating agent. It is therefore β -*nor*-conidendrin. It is possible that α -*nor*-conidendrin occurs in the mother liquors. The dextrorotatory acetate obviously belongs to the same series of β -conidendrin derivatives. Dr. Moyer⁶ suggests that the crystalline demethylation products of conidendrin should be termed conidendrols. Thus, β -*nor*-conidendrin would be termed β -conidendrol.

EXPERIMENTAL PART

 β -nor-Conidendrin

Conidendrin (5.2 g) and pyridinium chloride (11 g) were heated to 180° for two hours on a salt bath. The hot reaction mixture was poured into 2 *N* hydrochloric acid (80 ml) and the solution extracted continuously with ether over night. After evaporation the residue was dissolved in acetone (250 ml) and filtered through a column of aluminium oxide (5 × 2 cm) to remove some coloured impurities. The acetone was evaporated and the residue (4.7 g. Calc. 4.8 g) recrystallised from water (100 ml). Yield 4.0 g m. p. 245–246°. From the mother liquor a second crop (0.1 g) was obtained by partial evaporation. Total yield 4.1 g or 85 %. The residue is an oil probably containing α -*nor*-conidendrin. Repeated recrystallisations yielded pure substance. M. p. 248–249° (uncorr.)

$[\alpha]_D^{20} + 13^\circ$ (Acetone $c = 2$)			
$C_{18}H_{16}O_6$	Calc.	C 65.8	H 4.92
	Found	» 65.7	» 4.92

β -nor-Conidendrin tetraacetate. This substance was obtained in a quantitative yield by acetylation with acetic anhydride in pyridine. From ethanol crystals of m. p. 174–175°.

$[\alpha]_D^{20} + 11^\circ$ (Acetone $c = 2$)			
$C_{26}H_{24}O_{27}$	Calc.	CH ₃ CO 34.7	Found CH ₃ CO 34.7

β -nor-Conidendrin tetramethyl ether. This substance was prepared by methylation of β -*nor*-conidendrin with methyl sulphate and alkali in an inert atmosphere essentially according to the method described by Holmberg⁷ for the methylation of β -conidendrin. The crystalline product melted at 139–140°, solidified and melted again at 153°. It showed no optical rotation and was identical with a specimen prepared by Holmberg. (Mix. m. p.)

SUMMARY

α -Conidendrin has been demethylated with a good yield by means of pyridinium chloride. The demethylation is accompanied by an optical inversion and the *nor*-conidendrin obtained belongs to the β -series of conidendrin deriv-

atives as proved by its methylation to a product identical with β -conidendrin dimethyl ether.

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