dasin (11 mg), mp 235°; UV λ_{max}^{MeOH} nm: 220, 263 and 330; IR ν_{max}^{KBr} cm^{-1}: 1730, 1605 and 1590; ^{1}H NMR ($CDCl_3$): δ 0.99 (*s*, 3H, $C\underline{H}_3$), 1.64 (*bs*, 3H, $C\underline{H}_3$), 1.89–2.76 (*m*, 8H, $4 \times C\underline{H}_2$), 3.47 (*s*, 1H, C-2″$\underline{H}$), 3.79 (*s*, 12H, $4 \times OC\underline{H}_3$), 5.05 (*bs*, 1H, C-3″$\underline{H}$), 5.9 (*d*, 1H, $J = 10$ Hz, C-3′$\underline{H}$), 5.94 (*d*, 1H, $J = 10$ Hz, C-3$\underline{H}$), 6.11 (*s*, 1H, C-6′$\underline{H}$), 6.2 (*s*, 1H, C-6$\underline{H}$), 7.78 (*d*, 1H, $J = 10$ Hz, C-4′$\underline{H}$) and 7.82 (*d*, 1H, $J = 10$ Hz, C-4$\underline{H}$); MS: *m/e* M^+ 546, 273, 272, 257, 241, 233, 219, 189, 161, 159 and 131.

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A NEW NEOLIGNAN AND OTHER PHENOLIC CONSTITUENTS FROM *CEDRUS DEODARA**

P. K. Agrawal, S. K. Agarwal and R. P. Rastogi

Central Drug Research Institute, Lucknow-226001, India

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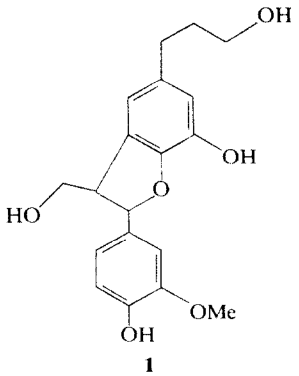
Key Word Index—*Cedrus deodara*; Pinaceae; 2-(3′-methoxy-4′-hydroxyphenyl)-3-hydroxymethyl-2,3-dihydro-7-hydroxybenzofuran-5-*n*-propanol; cedrusin; dihydrobenzofuran neolignans; tetrahydrofuran lignan; phenyl tetralin lignan; dihydroflavonol glucoside.

In a previous communication the characterization of dihydroflavonols from *Cedrus deodara* was described [1]. The present paper reports the identification of a further seven substances from the same plant, including four neolignans; dihydrodehydrodiconiferyl alcohol and its 4′-glucoside, cedrusin **1** and its 4′-glucoside. Cedrusin has not been reported prevously as a natural product, although the 4′-glucoside has been described recently from *Pinus sylvestris* [2] and *P. contorta* [3]. The other known compounds characterized in the present study include the lignans, lariciresinol and isolariciresionol and the dihydroflavonol, taxifolin 3′-glucoside.

Cedrusin, $C_{19}H_{22}O_6$, M^+ *m/e* 346. The UV maxima indicated the presence of a 2-aryl-3,5-dialkyl-7-hydroxybenzofuran chromophore in the molecule. ^{1}H NMR revealed the presence of an arylmethoxyl, a methylol group and an oxymonobenzylic proton (δ5.43, *d*) in addition to 5 aryl protons. Other signals at δ1.85, 2.54 and 3.55 indicated the presence of an *n*-propanol side-chain. The formation of a dimethyl ether sustaining two methol groups was borne out by ^{1}H NMR and MS of the dimethyl diacetyl and tetraacetyl derivatives. Thus, the structure of cedrusin was assigned as **1**, 2-(3′-methoxy-4′-hydroxyphenyl)-3-hydroxymethyl-2,3-dihydro-7-hydroxybenzofuran-5-*n*-propanol.



1

EXPERIMENTAL

Isolation procedure. The filtrate, obtained on $Pb(OAc)_2$ pptn of the BuOH-soluble fraction of the plant extract was saturated with H_2S, filtered and evapd to a brown viscous mass (43.2 g), which was chromatographed on cellulose and 9 fractions collected (Table 1).

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Table 1. Chromatography of the Pb(OAc)$_2$-purified BuOH fraction (20 g)

Fraction No.	Eluant	Elution volume (1)	Weight (g)	TLC*
1	$CHCl_3$-H_2O	5.00	8.74	0.80, 0.68
2	$CHCl_3$-MeOH-H_2O			
	35:1:2	2.50	0.48	0.80, 0.68
3	35:3:2	3.25	1.42	0.68, 0.65
4	35:5:2	5.25	1.20	0.65, 0.53
5	35:7:2	5.55	0.40	0.53
6	35:8:2	2.25	0.72	0.50, 0.30, 0.29
7	35:9:2	6.00	2.35	0.29, 0.12
8	35:11:2	7.25	1.10	0.10
9	35:15:2	10.00	2.00	

*Solvent: $CHCl_3$-MeOH-H_2O, 35:7:2.

The residue from fraction 2 was rechromatographed on Si gel ($CHCl_3$-$H_2O$$\rightarrow$$CHCl_3$-MeOH-$H_2O$; 35:3:2) to give lariciresinol (0.21 g) and dihydrodehydrodiconiferyl alcohol (0.18 g). Chromatography of fraction 4 on a Si gel column in the same solvent system afforded isolariciresionol (0.56 g) and cedrusin (**1,** 0.26 g). Fractions 5–8 were also individually rechromatographed on Si gel with the same solvents to yield **1** (0.24 g), an unknown (0.08 g), dihydrodehydrodiconiferyl alcohol 4′-glucoside (0.50 g), taxifolin 3′-glucoside (0.22 g) and cedrusin 4′-glucoside (0.55 g).

The identity of known substances was confirmed by mp, UV, ^{1}H NMR and other standard procedures.

Cedrusin **1** Amorphous powder, $[\alpha]_D + 4.39°$ (c 0.91, MeOH) which gave a green colour with $FeCl_3$. λ^{MeOH} nm (log ε): 217, 224, 279 (4.04, 4.24, 3.94). IR(KBr) cm^{-1}: 3330, 2815, 1600, 1508, 1270, 1025, 1023, 800. ^{1}H NMR (Me_2CO-d_6): δ 1.85 (2H, *m*, β-CH_2), 2.54 (2H, *t*, $J = 8$ Hz, γ-CH_2), 3.55 (2H, *t*, $J = 6$ Hz, α-C$\underline{H}_2$OH), 3.75 (C-3′ OMe), 3.70–4.0 (3H, H-3, —C$\underline{H}_2$OH), 5.53 (1H, *d*, $J = 7$ Hz, H-2), 6.54 (2H, *s*, H-4,6), 6.65–7.10 (3H, *m*, H-2′,5′,6′). MS *m/e* (rel. int.): 346 (5), 329 (35), 328 (100), 317 (15), 316 (80), 298 (7), 285 (42), 284 (84), 283 (55), 269 (17), 165 (21), 152 (16), 137 (54).

Pentaacetate (Ac_2O-C_5H_5N) syrup. ^{1}H NMR ($CDCl_3$): 2.05, 2.08 (2 × OCOMe), 2.31 (2 × OCOMe), 3.70 (1H, *m*, H-3), 4.10 (2H, *t*, $J = 7$ Hz, α-C$\underline{H}_2$OAc), 4.13 (1H, *q*, $J = 10$, 8 Hz, C$\underline{H}_2$OAc), 4.48 (1H, *q*, $J = 10$, 6 Hz, C-3 C$\underline{H}_2$OAc). Methylation of **1** with CH_2N_2 gave a viscous oil, ^{1}H NMR: δ 3.83 (6H, C-3′, 4′OMe), 3.84 (C-7 OMe). The dimethyl ether gave a diacetyl derivative as an oil. ^{1}H NMR: δ 2.01, 2.05 (2 × OCOMe).

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