

COMMUNICATIONS TO THE EDITOR

SILICICOLIN, A NEW COMPOUND ISOLATED FROM *JUNIPERUS SILICICOLA*

Sir:

The finding¹ that an aqueous suspension of the pulverized dried needles of *Juniperus silicicola* (Small) Bailey² (Fam. *Pinaceae*) produced damage to Sarcoma 37 in mice, prompted a search for the active agent or agents. After a process involving successive extractions with different organic solvents and chromatography with activated alumina, similar to that described for other junipers,³ a pure crystalline compound was obtained in 0.11% yield which was highly active against the tumor.

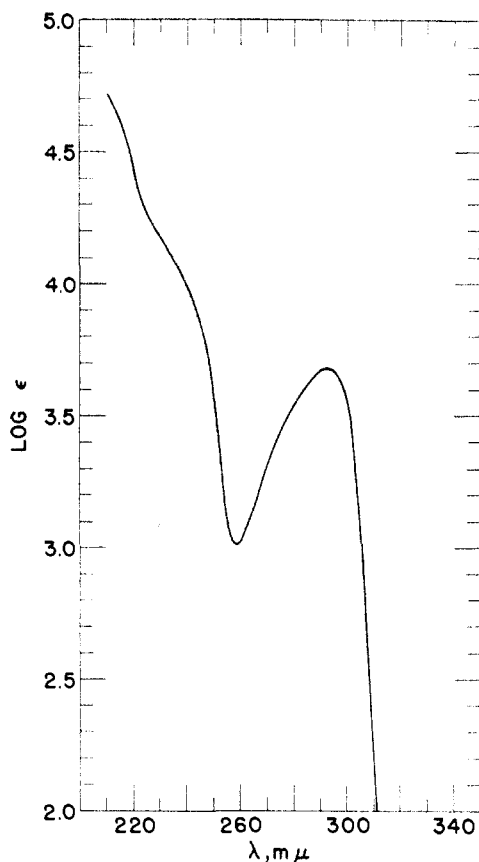


Fig. 1.—Ultraviolet absorption spectrum of silicicolin in 95% ethanol.

The new compound, for which we propose the name silicicolin, crystallizes from absolute ethanol in large, colorless, transparent prisms, m.p. 173.9–175.5° (cor.); $[\alpha]_D^{25} -119^\circ$ (c, 0.40, chloroform). *Anal.* Calcd. for $C_{22}H_{22}O_7$: C, 66.32; H, 5.57; 3-OCH₃, 23.37; mol. wt., 398.4. Found: C, 66.34; H,

(1) D. B. Fitzgerald, M. Belkin, M. D. Felix and M. K. Carroll, to be published in *J. Nat. Cancer Inst.*

(2) Provided through the courtesy of Mr. R. A. Bonninghausen, Florida Board of Forestry, Tallahassee, Fla.

(3) J. L. Hartwell, J. M. Johnson, D. B. Fitzgerald and M. Belkin, *THIS JOURNAL*, in press.

5.52; OCH₃, 23.25; mol. wt. (Rast, camphor), 395. The Gaebel test⁴ for the methylenedioxy group was positive.

The insolubility of silicicolin in water and cold 5% sodium hydroxide solution indicates the absence of acidic function such as carboxylic acid and phenolic hydroxyl groups. The slow solubility of the compound in boiling 5% sodium hydroxide solution, with separation of a white gelatinous precipitate on acidification, is strong evidence of a lactone group.

The ultraviolet spectrum (Fig. 1), showing λ_{\max}^{EtOH} 293.5 mμ (log ε 3.68) and λ_{\min}^{EtOH} 258.5 mμ (log ε 3.01), is similar to that of podophyllotoxin⁵ [λ_{\max}^{EtOH} 292 mμ (log ε 3.65) and λ_{\min}^{EtOH} 260 (log ε 3.07)]. Bands in the infrared (Fig. 2) at 1780 cm^{-1} (γ -lactone) and 1593 cm^{-1} (aromatic ring) approximate closely the corresponding ones in podophyllotoxin (1785 cm^{-1} and 1595 cm^{-1}).⁵ Hydroxyl group absorption around 3450 cm^{-1} is negligible.

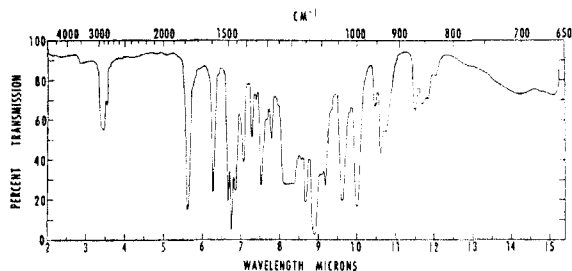


Fig. 2.—Infrared absorption spectrum of silicicolin in chloroform.

The available evidence is consistent with the assumption that silicicolin is a lignan, perhaps the previously unknown desoxypodophyllotoxin.⁶

Structural and biological studies are in progress.

(4) G. O. Gaebel, *Arch. pharm.*, **248**, 225 (1910).

(5) A. W. Schrecker and J. L. Hartwell, *THIS JOURNAL*, in press (1952). Podophyllotoxin itself was first suspected because of its isolation from other species of juniper.³

(6) Compounds of the same empirical formula, possibly structurally similar, have been isolated from plants of the family *Umbelliferae*, by K. Noguchi and M. Kawanami, *J. Pharm. Soc. Japan*, **60**, 629 (1940), and by I. Marion, *Can. J. Research*, **20B**, 157 (1942).

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11 α -HYDROXYSTERIODS. SYNTHESIS OF Δ^4 -PREGNEN-11 α ,17 α ,21-TRIOL-3,20-DIONE 11,21-DIACETATE (11-EPI-COMPOUND F DIACETATE)

Sir:

We wish to report a general method for the reduction of the 11-carbonyl group in steroids to the