

FILICINAE

CYATHEACEAE

FLAVONOIDS IN TREE FERNS

R. W. SOEDER and M. S. BABB

Department of Chemistry, Appalachian State University, Boone, NC 28607, U.S.A.

(Received 13 June 1972. Accepted 21 June 1972)

Key Word Index—Cyatheaceae; tree ferns; flavonoids; vitexin; isovitexin.

The constituents of Cyatheaceae are currently under investigation. The occurrence of vitexin (8-C-glucosylapigenin) in Cyatheaceae has previously been reported in *Cyathea faurieri* Copel. by Ueno *et al.*¹ Isovitexin (6-C-glucosylapigenin) is reported for the first time in ferns. Other flavonoids, as yet unidentified, were observed in each species.

TABLE 1. VITEXIN AND ISOVITEXIN IN CYATHEACEAE

| Species | Voucher No. | Vitexin | Isovitexin |
|--|-------------|---------|------------|
| <i>Metaxya rostrata</i> (Hbk.) Presl. | 1971003 | — | — |
| <i>Cyathea tueckheimii</i> Maxon | 1971037 | + | — |
| <i>C. onusta</i> christ. | 1971039 | + | — |
| <i>C. divergens</i> Kze. | 1971041 | — | + |
| <i>Spheropteris brunei</i> (Christ.) Tryon | 1971036 | — | — |
| <i>S. elongata</i> (Hook.) Tryon | 1971016 | — | — |

Samples were collected in Costa Rica in May 1971, and voucher specimens are deposited with R. A. White of Duke University. The procedure of Mabry *et al.*,² was followed with minor modifications.

The dried ground-up fern leaves were extracted with *n*-hexane to remove non-polar materials. The flavonoids were extracted with 50% MeOH and chromatographed two dimensionally on Whatman 3MM paper, first with TBA, then with 15% HOAc. Spots were eluted with MeOH.

Vitexin (*C. Tueckheimii*), R_f TBA, 0.43; 15% HOAc, 0.33; *C. onusta*, R_f : TBA, 0.43; 15% HOAc, 0.29; Color appearance: UV, dark purple; UV/NH₃, yellow-green; λ_{\max} in nm, MeOH: 271, 302 sh, 336; NaOMe: 280, 332, 398; AlCl₃: 277, 305, 347, 388; AlCl₃-HCl: 279, 304, 340, 381; NaOAc: 279, 305, 382; NaOAc-H₃BO₃: 270, 345.

¹ A. UENO, N. OGURI, Y. SAIKI and T. HARADA, *Yakugaku Zasshi* **83**, 420 (1963).

² T. MABRY, K. MARKHAM and M. THOMAS, *Systematic Identification of Flavonoids*, Springer, New York (1970).

Isovitexin (*C. divergens*), R_f : TBA, 0.61; 15% HOAc, 0.49; Color appearance: UV, dark purple; UV/NH₃, yellow-green. λ_{\max} in nm, MeOH: 271, 336; NaOMe: 279, 330, 400; AlCl₃: 265 sh, 305, 352, 382 sh; AlCl₃-HCl: 260 sh, 280, 301, 345, 375; NaOAc: 279, 305, 396; NaOAc-H₃BO₃: 272, 348, 403 sh.

Acknowledgements—We would like to thank Dr. R. A. White of Duke University for his helpful discussions, Dr. R. Tryon of Harvard University for the identification of plant materials, and Dr. H. Ito of Temple University for technical translations.

Phytochemistry, 1972, Vol. 11, pp. 3080 to 3081. Pergamon Press. Printed in England.

GYMNOSPERMAE

PINACEAE

ω -HYDROXY FATTY ACIDS AND FATTY ALCOHOLS FROM *PSEUDOTSUGA MENZIESII* BARK*

PATRICIA M. LOVELAND and M. L. LAVER

Department of Forest Products, Oregon State University, Corvallis, OR 97331, U.S.A.

(Received 1 June 1972. Accepted 5 June 1972)

Key Word Index—*Pseudotsuga menziesii*; Pinaceae; Douglas-fir; bark; fatty alcohols; ω -hydroxy acids.

Plant. Douglas-fir [*Pseudotsuga menziesii* (Mirb.) Franco]. *Source.* From the George T. Gerlinger State Experimental Forest, located near Blackrock, Oregon, U.S.A. and operated by the School of Forestry, Oregon State University, in cooperation with the State Forestry Department of Oregon. *Uses.* Wood—lumber, pulp. Bark—garden mulch, fuel.

Previous work. On benzene-soluble, hexane-insoluble extract of whole bark,¹⁻⁴ of the cork fraction,⁵ of the bast fibers,⁶ on hexane-soluble extracts.³⁻⁷

Part examined. Bark—the benzene-soluble, hexane-insoluble extract.

Extraction of the bark and isolation by TLC of the hydroxy methyl esters and of the fatty alcohols from the saponified benzene-soluble, hexane-insoluble extract was described earlier.¹

Alcohols. 1-Hexadecanol (trace), 1-octadecanol (4%), 1-eicosanol (4%), 1-docosanol (45%), and 1-tetracosanol (48%). (Relative abundances were calculated from peak areas.)

* Part III in the series "Douglas-fir Bark Extractives". For Part II see P. M. LOVELAND and M. L. LAVER, *Phytochem.* **11**, 430 (1972).

¹ P. M. LOVELAND and M. L. LAVER, *Phytochem.* **11**, 430 (1972).

² E. F. KURTH, *Tappi* **50**, 253 (1967).

³ E. F. KURTH and H. J. KIEFER, *Tappi* **33**, 183 (1950).

⁴ E. F. KURTH, *J. Am. Chem. Soc.* **72**, 1685 (1950).

⁵ H. L. HERGERT and E. F. KURTH, *Tappi* **35**, 59 (1952).

⁶ H. J. KIEFER and E. F. KURTH, *Tappi* **36**, 14 (1953).

⁷ M. L. LAVER, H. H. FANG and H. AFT, *Phytochem.* **10**, 3292 (1971).