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*Phytochemistry*, 1975, Vol. 14, pp. 287–288. Pergamon Press. Printed in England.

# XANTHONES IN THE FERN *CTENITIS DECOMPOSITA**

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(*Received* 24 *May* 1974)

**Key Word Index**—*Ctenitis decomposita*; Aspidiaceae; Filicopsida; xanthones; mangiferin; isomangiferin; polyphenols.

*Plant. Ctenitis decomposita* (R. Br.) Copeland. Leaves were taken from plants which have been maintained in our collection for several years. A voucher specimen has also been deposited in our herbarium.

*Previous work.* On *C. decomposita*, none, on other *Ctenitis* species [1,2].

*Present work.* In our continuing study of polyphenolic compounds in ferns an unhydrolyzed extract of *Ctenitis decomposita* leaves was examined. Two prominent golden-yellow fluorescent spots were observed along with lesser amounts of what appeared to be flavonoids. The prominent compounds were isolated by paper chromatography using 15% HOAc and BAW (4:1:5). Both compounds were resistant to acid hydrolysis under conditions known to cleave *O*-glycosides. Their UV spectra were identical to that of mangiferin (1,3,6,7-tetrahydroxy-2-*C*-glucosylxanthone) discussed by Harborne [3]. $R_f$ values were identical to those reported for mangiferin and isomangiferin (the 4-*C*-glucosyl isomer) which were isolated from *Asplenium montanum* [4]. An authentic sample of mangiferin was isolated from leaves of *Mangifera indica* for comparison purposes. NMR of the trimethylsilyl ethers of the unknowns confirmed their identification as mangiferin and isomangiferin.

Herbarium material from six additional species of *Ctenitis* was examined chromatographically for the xanthones. None was found in *C. crinalis*, *C. dissecta*, *C. eatonii*, *C. maximowicziana*, *C. sinii* and *C. velutina* although flavonoid spots were seen in several extracts. Negative results of this sort can be misleading especially since several of the specimens were quite old. Some recent acquisitions, however, were also negative. One of these was a sample of *C. decomposita* from a New Zealand collection. The variation in the appearance of xanthones in this species can not be explained at this time, but it may represent another example of geographic variation in biosynthetic capacity.

In addition to the observation of xanthones in *Asplenium montanum* referred to above [4] manigiferin and other xanthones have been observed in *Athyrium mesosorum* by Ueno [5]. It is of interest to note that *Athyrium* and *Ctenitis* were placed in Aspidiaceae by Copeland [6]. Further searches for xanthones in this family might prove interesting.

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* Part VII in the series "Phenolic Compounds in Ferns". For Part VI see *Phytochemistry* **9,** 2197.

*Acknowledgements*—This research was supported by an operating grant from the National Research Council of Canada. Thanks are also due to Dr Bob Bose, Environment Canada, for the NMR spectra.

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*Phytochemistry*, 1975, Vol. 14, pp. 288–289. Pergamon Press. Printed in England.

# ANTHRAQUINONE PIGMENTS FROM THE PHYTOPATHOGEN *PHOMOPSIS JUNIPEROVORA* HAHN

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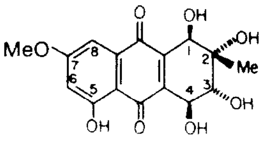
(*Revised Received* 19 *May* 1974)

**Key Word Index**—*Phomopsis juniperovora*; *Alternaria solani*; fungi; *Juniperus virginiana*; Cupressaceae; 7-methoxy-2-methyl-1,2,3,4,5-pentahydroxy-1,2,3,4-tetrahydroanthraquinone; altersolanol A; macrosporin.

*Phomopsis juniperovora* Hahn causes the most damaging disease of eastern red cedar (*Juniperus virginiana* L.) in forest nurseries in the Great Plains of the U.S., and is also a destructive pathogen of many other Cupressaceae [1]. When the fungus is cultured on a variety of agar media a deep yellow or orange coloration is produced, usually accompanied by the appearance of bright orange–red crystals on the surface of the agar; the coloration has been reported as diagnostic for *P. juniperovora* [2]. No chemical work has been reported on the fungus.

We have extracted the orange–red material from the culture, and, using mainly spectroscopic methods, find that the major constituent is 7-methoxy-2-methyl-1,2,3,4,5-pentahydroxy-1,2,3,4-tetrahydroanthraquinone (**1**). The identity was confirmed by comparison with an authentic sample of (**1**), previously isolated by Stoessl from *Alternaria solani* and named by him altersolanol A [3a].

We also isolated small amounts of anthraquinones from the *Phomopsis* cultures. We identified macrosporin (**2**) definitely, by its UV and MS and by conversion to its diacetate [3b]. We have tentatively identified 6-methylxanthopurpurin-3-methyl ether (**3**) and macrosporin-3-methyl ether from UV and MS. Compounds (**2**) and (**3**) were previously isolated from *A. solani* [3b] and *Alternaria bataticola* [4]. *Phomopsis* and *Alternaria* are not regarded as related fungi and so the isolation of similar anthraquinones from these fungi, particularly the same tetrahydroanthraquinone (one of a rare group of compounds [5,6]), is of interest.



(1)