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ALLERGENIC 5-ALKYL- AND 5-ALKENYLRESORCINOLS FROM *PHILODENDRON* SPECIES

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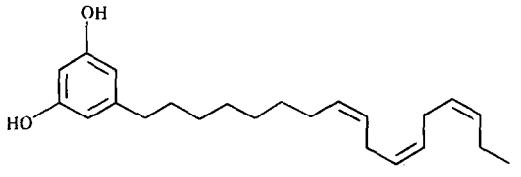
Key Word Index—*Philodendron* spp.; Araceae; alkyl- and alkenylresorcinols; allergic contact dermatitis.

Abstract—Leaves and stems of nine *Philodendron* species were examined for content of allergenic alkyl- and alkenylresorcinols. *Philodendron angustifolium* was found to contain heptadecenylresorcinol, *P. erubescens* and one source of *P. scandens* subsp. *oxycardium* pentadecenyl- and heptadecenylresorcinol, *P. radiatum* 5-tridecylresorcinol, pentadecenyl-, heptadecadienyl- and heptadecenylresorcinol, and another source of *P. scandens* subsp. *oxycardium* 5-pentadecylresorcinol, 5-heptadecatri-8(*Z*),11(*Z*),14(*Z*)-enylresorcinol, heptadecadienyl- and heptadecenylresorcinol. The following five species were devoid of resorcinols and catechols: *P. bipennifolium*, *P. fenzlii*, *P. sagittifolium*, *P. squamiferum* and *P. tuxlanum*.

INTRODUCTION

Philodendron species (Araceae) and here especially *Philodendron scandens* Koch et Sello subsp. *oxycardium* have been reported to cause allergic contact dermatitis [1–5]. Recently the major allergen of the latter plant, 5-heptadecatri-8(*Z*),11(*Z*),14(*Z*)-enylresorcinol (**1**), has been isolated together with a possible biosynthetic precursor, 6-heptadecatri-8(*Z*),11(*Z*),14(*Z*)-enyl-2-hydroxybenzoic acid, and 5-pentadecylresorcinol (**2**) [6].

Outside tropical regions *Philodendron* species are grown in nurseries for use as ornamental plants and occupational allergic contact dermatitis is becoming a problem of growing importance in the greenhouse industry. Therefore it is of interest to determine the possible distribution and abundance of allergenic resorcinols in *Philodendron*. The present paper deals with the result of examining nine *Philodendron* species.



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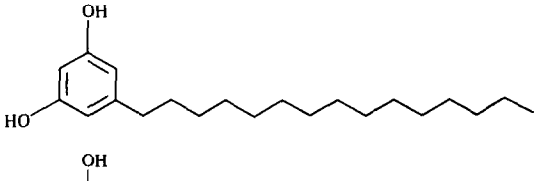

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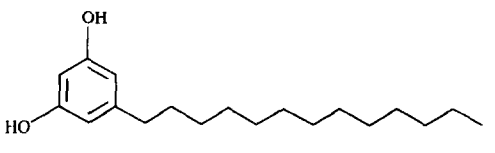

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RESULTS AND DISCUSSION

The results of the investigation are given in Table 1. From this can be seen that four of the examined *Philodendron* species contain alkyl- and alkenylresorcinols and the remaining five are all devoid of resorcinols and catechols. It is also characteristic that three species contain a mixture of resorcinols possessing C_{15}- as well as C_{17}-side chains, and one, *P. radiatum*, contains additionally a tridecylresorcinol (**2**).

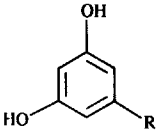
It is known from poison oak (*Toxicodendron toxicarium* and *T. diversilobum*), poison ivy (*T. radicans* and *T. rydbergii*) and 'raw' cashew nuts (*Anacardium occidentale*), which for the first two contain a mixture of saturated and unsaturated pentadecyl- and heptadecylcatechols [7] and for the latter a mixture of saturated and unsaturated pentadecylresorcinols [8] that the allergenic effect increases with the degree of unsaturation in the side chain [9]. This may explain why *P. scandens* subsp. *oxycardium* is reported as the *Philodendron* species most often causing allergic contact dermatitis. The fact that five *Philodendron* species lack alkylresorcinols is significant, since it is now apparent that *Philodendron* species should be screened for resorcinols before considering them as ornamentals.

EXPERIMENTAL

Material was obtained from plants being cultivated in the Botanical Garden of the University of Copenhagen and by Mr. Karsten F. Nielsen, Højrupvej 1, Hillerslev, DK-5700 Ringe (*P. scandens* subsp. *oxycardium*).

The fresh leaves and stems of each species were extracted with petrol and the evaporated extract was chromatographed on HPLC (Waters Prep LC/System 500 A, porasil a, gradient elution with petrol (bp 60–80°)–EtOAc; flow 25 ml/min; start with 2000 ml petrol in the reservoir followed by 25 ml portions EtOAc for each fraction of 50 ml collected). The fractions were

Table 1. 5-Alkyl- and 5-alkenylresorcinol composition of fresh leaves and stems of *Philodendron* species



	Fresh leaves and stems (g)	Total petrol extract (g)	Total content of resorcinols (mg)	No. of double bonds	R = $C_{13}H_{27}$	$C_{15}H_{29}$	$C_{15}H_{31}$	$C_{17}H_{29}$	$C_{17}H_{31}$	$C_{17}H_{33}$
					0	1	0	3	2	1
Philodendron angustisectum Engl.	475	1.70	170							+
P. erubescens K. Koch et August	616	7.53	188			+*				+*
P. radiatum Schott	1076	1.72	127		+(3)	+†			+	+
P. scandens Koch et Sello subsp. *oxycardium* (Schott) Bunting Source:										
Botanical Garden, U. of Copenhagen.	450	1.3	85				+(2)	+†(1)	+	+
K. F. Nielsen, Hillerslev, DK-5750 Ringe	525	3.86	115			+				+†
P. bipennifolium Schott *P. fenzlii* Engl. *P. sagittifolium* Liebm. *P. squamiferum* Poepp *P. tuxlanum* Bunting ('*P. tuxla*')	Neither alkyl- or alkenylresorcinols nor the corresponding catechols could be detected									

*Relative proportion 1:1.
†Major component.

monitored for alkylresorcinols by TLC (SiO_2; $CHCl_3$–EtOAc, 19:1) with spraying with 1% vanillin in conc. H_2SO_4 and heating. Red spots indicated the presence of alkylresorcinols. Fractions containing alkylresorcinols were further analysed by ^1H NMR, MS and GC-MS. The latter analyses were performed on trimethylsilylated samples and provide the M_r of the alkylresorcinols on the assumption of correct structure type. This method did not reveal the presence of catechols since they are in MS characterized by a characteristic loss of $SiMe_4$ [10] and such a loss could not be detected. Application of the very sensitive electron paramagnetic (EPR) technique to freshly prepared extracts of the different species confirmed that catechols and hydroquinones are not present [Pedersen, J. A., personal communication; cf. 11].

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