

EBENACEAE

NAPHTHOQUINONES OF *EUCLEA* AND *DIOSPYROS* SPECIES

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The family Ebenaceae is mainly found in the tropics and subtropics, occasionally extending into temperate areas. According to Hegnauer,¹ the family comprises seven genera, but White concluded that the genera *Maba*² and *Royena*³ should be united with the genus *Diospyros*. Thus five genera belong to the Ebenaceae (*Diospyros*, *Euclea*, *Oncotheca*, *Rhaphidanthe*, *Tetracelis*). *Diospyros* species have been subjected to phytochemical research, several mono-, di-, tri- and tetra-mer naphthoquinones,⁴ naphthols and triterpenes having been isolated from various parts of these plants.

As far as we are aware, only one publication has appeared on the phytochemistry of *Euclea* species in which triterpenoids were isolated from branches and leaves.⁵ Certain *Diospyros* and *Euclea* species are located in the temperate areas of southern Africa⁶ and a number of these were the subject of this investigation.

TABLE 1. NAPHTHOQUINONES OF SOME SPECIES OF EBENACEAE

Plant	Roots	Stems	Fruit
<i>Euclea crispa</i> (Thunb.) Guerke	7-Me-juglone,	—	Diospyrin*
var. <i>crispa</i> DeWinter	diospyrin		
<i>Euclea undulata</i> Thunb.	7-Me-juglone,	—	Isodiospyrin*
var. <i>myrtina</i> (Burch.) Hiern	diospyrin		
<i>Diospyros lycioides</i> Desf.			
subsp. <i>lycioides</i> DeWinter	Isodiospyrin	Isodiospyrin	
subsp. <i>guerkei</i> (Kuntze) DeWinter	Isodiospyrin	Isodiospyrin	
subsp. <i>sericea</i> (Bernh.) DeWinter	7-Me-juglone*	Isodiospyrin*	

7-Methyljuglone was identified by UV, MS and NMR spectrum, diospyrin (the 2,6'-dimer) by UV, IR, MS and NMR, and isodiospyrin (the 8,6'-dimer) by IR, MS and NMR. Identification of plant material by the National Herbarium, Pretoria, South Africa. Voucher specimens are deposited in the herbarium of the Dept. of Pharmacology, University, Potchefstroom, South Africa.

* Due to limited material, these naphthoquinones were identified in extracts by co-TLC with authentic samples.

¹ R. HEGNAUER, *Chemotaxonomie der Pflanzen*, Vol. 4, p. 45, Birkhäuser, Basel (1966).

² F. WHITE, *Bull. Jard. Bot. Brux.* **26**, 237 (1956).

³ F. WHITE, *Oxford Univ. Forest Soc. J.* **4**, 33 (1958).

⁴ R. H. THOMSON, *Naturally Occurring Quinones*, 2nd Edn, Academic Press, London (1971).

⁵ G. ORZALESI, T. MEZZETTI, C. ROSSI and V. BELLAVITA, *Planta Med.* **19**, 30 (1970/71).

⁶ B. DEWINTER, in *Flora of Southern Africa* (edited by R. A. DYER, L. E. CODD and H. B. RYCROFT), Vol. 26, pp. 54-99, Government Printer, Pretoria, Republic of South Africa (1963).

From the *Euclea* species, naphthoquinones were found in roots and fruit but none was detected in stem-extracts (Table 1), whilst the roots and stems of the *Diospyros* species yielded naphthoquinones (fruit unavailable). Naphthoquinones were absent from leaf extracts of all the species investigated. As some naphthoquinones are known to be light-sensitive,^{7,8} experiments were performed in semi-darkness.

EXPERIMENTAL

Fresh plants were separated into roots, stems, leaves and fruit. CHCl_3 extraction of constituents was started as soon as possible after collection of the plant material. CHCl_3 extracts were concentrated under reduced pressure and subjected to selective extraction and crystallization of naphthoquinone derivatives from dil. EtOH. The experimental procedures and purity of the isolated substances were controlled with the aid of TLC (silica gel, three solvents).

⁷ G. O. SCHENCK and G. KOLTZENBURG, *Naturwissenschaften* **41**, 452 (1954).

⁸ H. WERBIN and E. T. STROM, *J. Am. Chem. Soc.* **90**, 7296 (1968).

Phytochemistry, 1973, Vol. 12, p. 231. Pergamon Press. Printed in England.

EUPHORBACEAE

CYCLOARTENOL AND LUPEOL FROM *EUPHORBIA ESULA*

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Plant. *Euphorbia esula* L. *Source.* Collected during October 1968 at Picton, Ontario. *Previous work.* On aerial parts.¹⁻⁴ 24-Methylenecycloartanol is the only triterpene to have been identified.¹

Present work. Leaves and stems. Triterpene alcohols were isolated and acetylated.⁴ The acetates were chromatographed over alumina and then separated further on kieselgel and AgNO_3 -impregnated kieselgel plates. The acetates of 24-methylenecycloartanol (major component), cycloartenol and lupeol were obtained and identified (m.p., m.m.p., TLC, IR, NMR and GLC) by comparison with authentic samples.

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¹ N. R. FARNSWORTH, H. WAGNER, L. HÖRHAMMER, H. P. HÖRHAMMER and H. H. S. FONG, *J. Pharm. Sci.* **57**, 933 (1968).

² H. WAGNER, H. DANNINGER, O. SELIGMANN, M. NOGRADI, L. FARKAS and N. FARNSWORTH, *Chem. Ber.* **103**, 3678 (1970).

³ A. N. STARRATT and P. HARRIS, *Phytochem.* **10**, 1855 (1971).

⁴ A. N. STARRATT, *Phytochem.* **11**, 293 (1972).