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PHORBIC ACID FROM *ECHEVERIA ELEGANS*

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Key Word Index—*Echeveria elegans*; Crassulaceae; isolation, identification; lactone-forming acids; phorbic acid.

Plant. *Echeveria elegans* Rose (Crassulaceae). *Source.* Fresh plant material was supplied by the Botanical Garden, University of Oslo, and Oslo Municipal Nursery, Oslo, Norway. The identification was carried out by Dr. Per Sunding, director of the Botanical Garden. *Previous work.* Phorbic acid, (1R:3R)-1,3-dihydroxypentane-1,3,5-tricarboxylic acid, was isolated from *Euphorbia resinifera* Berg [1,2] and *Euphorbia palustris* L. [3]. There are indications that the acid might be present also in a few other species [4,5].

Present work. Phorbic acid has now been isolated from *Echeveria elegans* in large quantities (2–4% of dry wt). The isolated acid corresponds in all the investigated properties with phorbic acid isolated from *Euphorbia resinifera* [1]. This is the first time that phorbic acid has been reported outside *Euphorbia* species.

EXPERIMENTAL

Isolation of dilactophorbic acid. Fr. leaves (2·45 kg) were extracted 2× H_2O, 100°, 3 l., 4 hr. The extract was passed through a column of Dowex 50-W × 8 [H^+], 20–50 mesh (600 ml), and then through a column of Dowex 1 × 8 [OH^-], 20–50 mesh (700 ml). The anion exchanger was eluted, first with 0·1 N HCl (7 l.), and then with 2 N HCl (8 l.). HCl was removed from the eluate as described earlier [5]. Upon treatment with activated charcoal, the residue was dried *in vacuo* over P_2O_5 for 2 days. This converted the residue into a crystalline mass, which after recrystallization from dry EtOH gave a white compound (dilactophorbic acid). Yield: 2·21 g.

Identification of dilactophorbic acid. Mp 151–153°; lit. 151–154° [1]. The ethyl ester, prepared by the method described earlier [6], was recrystallized from dry EtOH. Mp 90–92°; lit. 91·5–92° [1], $[\alpha]_D^{20}$ +33·2° (c = 10·18 EtOH); lit. $[\alpha]_D^{18}$ +33 (c = 10·18 EtOH) [1]. (Found: C 52·62, H 5·51. Calc. for $C_{10}H_{12}O_6$: C 52·62, H 5·30%).

The IR spectrum was identical with that of authentic dilactophorbic acid monoethyl ester [7]. The preparation of the methyl ester, the GC–MS analysis of the methyl ester and the conditions for the TLC were the same as those described by Kringstad and Nordal [5]. TLC was carried out with the isolated acid and with the corresponding methyl and ethyl esters. All the obtained data were found identical with those of the reference compounds: dilactophorbic acid, phorbic acid monomethyl ester and phorbic acid monoethyl ester.

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SYNTHESIS OF EUPOMATENOID-7 AND EUPOMATENOID-12

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Key Word Index—*Eupomatia laurina*; Eupomatiaceae; lignans; neolignans; eupomatenoids; biogenetic-type synthesis; dehydrogenation of 5-propenyl-2-aryl-2,3-dihydrobenzofurans.

From the bark, leaves and wood of *Eupomatia laurina* R.Br., Ritchie and Taylor and their coworkers [1–3] have identified 12 closely related products for which the generic name eupomatenoid has been introduced. Although these products do not conform strictly to the time-honoured Haworth definition [4] of lignan (a structure in which two *n*-propylbenzene units are united by the β-