

nervosa [3], the polysaccharide of *R. verruculosa* contains both neocarrabiose and neocarrabiose sulphate residues.

EXPERIMENTAL

Algal material. Samples of *R. verruculosa* were harvested from April to July at Banyuls-sur-Mer on the Mediterranean French coast.

Extraction. The alga (6 g) was extracted with 600 ml boiling H₂O (NT) or 200 ml 8% Ca(OH)₂ [Société Anonyme de Traitement Industriel des Algues, personal communication] soln at 90° (HMR). The polysaccharide was recovered (3 g) by isoPrOH pptn (1500 ml).

Hydrolysis of the polysaccharide and sugar analysis. The polysaccharide (1 g) in 0.5 M H₂SO₄ (5 ml) was totally hydrolysed during 16 hr at 95°. After neutralization with BaCO₃, inositol was added as int. standard (200 mg). Sugars were separated by HPLC on Lichrosorb NH₂ (10 µm; 250 × 4 mm) eluted with MeCN-H₂O (4:1, 2 ml/min). Galactose, xylose, mannose and glucose were identified by comparison with authentic samples. Reduction of the sugars with NaBF₄, followed by neutralization with HOAc and subsequent acetylation yielded alditol acetates which were analysed by GC on 3% SP 2340 (2 m × 3 mm column at 225°) with a N₂ flow of 18 ml/min. Authentic alditol acetates were used for identification and the different amounts were determined by int. standardization.

The 3,6-anhydrogalactose residues were analysed by the

colorimetric resorcinol method using fructose for the standardization [4]. The total sugar content was measured by the colorimetric H₂SO₄-PhOH method [5].

IR spectra were recorded from a film prepared by slow evaporation of a 0.4% H₂O soln at 60° on an Afcodur plate. ¹³C NMR spectra were recorded in D₂O (50 mg/ml) at 95° (62.9 MHz); chemical shifts were measured relative to int. DSS and converted to external TMS.

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LIPIDS FROM THE GLANDULAR TRICHOME OF *AILANTHUS ALTISSIMA*

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Key Word Index—*Ailanthus altissima*; Simaroubaceae; secretory hairs; lipids; fatty acids.

Abstract—The secretion from the glandular trichomes of *Ailanthus altissima* was found to contain bound lipid (mainly monogalactosyldiacylglycerol) as well as oleic, palmitic and linoleic acids in the free state.

In *Ailanthus altissima* (Mill.) Swingle, when buds open, the cataphylls and the stem are covered with different types of stalked secretory hairs: filiform hairs, trumpet-shaped hairs or massive column-shaped hairs [1]. All these correspond to oil glands.

From the secretion the lipid classes were separated by TLC and their fatty acid composition analysed by GC (Table 1). Of total lipids 53.7% consisted of free fatty acids. Monoacylglycerol (MG) and triacylglycerol (TG) were found to be present in low amount. Of the polar lipids, phospholipids were absent and monogalactosyldiacylglycerol (MGDG) represented the major component of glycolipid. The main fatty acids were 18:1

(oleic), 16:0 (palmitic) and 18:2 (linoleic). Oleic acid alone accounted for 51.8% and 73.2% of total fatty acid and free acid, respectively. The literature referring to studies of lipids produced by secretory hairs is scanty; nevertheless, lipids from floral glands of *Krameria* [2] were found to be composed almost entirely of free fatty acids.

EXPERIMENTAL

In spring, cataphylls and stems were collected in opening buds. The material was fixed in boiling H₂O and washed in CHCl₃ to extract lipids of the secretion. Total lipids were fractionated into neutral lipids plus glycolipids and phospholipids by TLC [3–4].

Table 1. Fatty acid composition of lipids (percentage in each class) from the secretion of glandular trichomes

Lipid classes	Total lipids (%)	Fatty acids						
		12:0	14:0	16:0	16:1	18:0	18:1	18:2
Total lipids	—	1.5	1.2	21.7	1.6	3.9	51.8	18.3
Free fatty acids	53.7	2.5	1.4	18.0	tr.	2.4	73.2	2.8
Pigments	23.8	tr.	1.1	43.2	3.7	5.2	34.5	12.3
MG	0.8	10.1	tr.	13.2	tr.	—	67.2	9.5
TG	1.6	—	7.9	19.5	4.3	—	54.3	1.4
MGDG	16.2	—	—	1.8	tr.	6.4	17.5	74.3
DGDG	3.3	—	—	29.5	1.5	14.2	tr.	54.8

tr., Trace.

REFERENCES

The fatty acid components of the total lipids extract and that of each of the lipid classes were determined by converting an aliquot of each fraction into methyl esters [5]. Qualitative and quantitative analysis of the fatty acid methyl esters were performed isothermally at 165° on a Varian aerograph 1400 (connected with a calculator CDS 111) using 3 m × 3 mm columns of 4% DEGS on Chromosorb with a N₂ flow rate of 20 ml/min. The internal standard was heptadecanoic acid, which is not present in lipids of *Ailanthus altissima*.

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p-HYDROXYACETOPHENONE DERIVATIVES FROM *SENECIO GRAVEOLENS*

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Key Word Index—*Senecio graveolens*; Compositae; *p*-hydroxyacetophenone derivatives; dihydroeuparin.

Abstract—5-Acetylsalicylaldehyde and 4-hydroxy-3(3'-hydroxyisopentyl) acetophenone were isolated from *Senecio graveolens* in addition to the already known compounds dihydroeuparin, 4-hydroxy-3-(isopenten-2-yl)acetophenone and 3-hydroxy-2,2-dimethyl-6-acetylchromane.

INTRODUCTION

Senecio (tribe Senecioneae) comprises ca 1300 species, of which 208 are represented in Chile [1]. *Senecio graveolens*, 'chachacoma' an endemic species found in northern Chile at altitudes above 3000 m, is a shrub widely employed as a remedy for altitude sickness ('puna' or 'soroche'). In this paper we report the isolation and structural elucidation of five aromatic compounds present in *S. graveolens*, namely,

dihydroeuparin [2], 4-hydroxy-3-(isopenten-2-yl)acetophenone [3], 3-hydroxy-2,2-dimethyl-6-acetylchromane [4] and two new *p*-hydroxyacetophenone derivatives, 5-acetylsalicylaldehyde (1) and 4-hydroxy-3-(3'-hydroxyisopentyl)acetophenone (2).

In connection with the popular medicinal use of this plant it is of interest to note that dihydroeuparin was recently shown [5] to exhibit a strong hypotensive activity