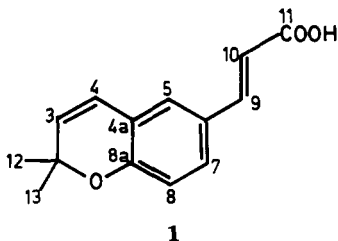


## SECONDARY METABOLITES FROM CHILEAN *BACCHARIS* SPECIES

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In a search for biologically active compounds from Chilean plants, we have studied the composition of extracts from *Baccharis linearis* Ruiz et Pav, *Baccharis rhomboidalis* Remy, and *Baccharis solieri* Remy (Compositae). The ethanolic extracts afforded a novel chromene **1** along with seventeen known compounds (Table 1).



Chromenes are of common occurrence in the Compositae (1), and the methyl ester of compound **1** was recently reported from a *Werneria* species (2). In addition to chromene **1**, oleanolic acid, stigmasterol,  $\beta$ -amyrin, and friedelinol were also present in varying amounts in the three *Baccharis* species (Table 1).

### EXPERIMENTAL

**PLANT MATERIALS.**—The plants were collected at the base of the mountains near Santiago, Chile, in October 1984. Voucher specimens are kept at the Private Herbarium of M. Mahú, Departamento de Ecología, Universidad de Chile, Santiago, Chile.

**EXTRACTION AND ISOLATION.**—Finely

ground stems and leaves (500 g) were defatted with light petroleum ether followed by exhaustive extraction with EtOH at room temperature. Evaporation of the solvent under reduced pressure afforded the ethanolic extract, which was partitioned between  $\text{CHCl}_3$  and  $\text{H}_2\text{O-MeOH}$  (9:1). The  $\text{CHCl}_3$  was then evaporated to dryness and the residue partitioned between equal volumes of  $\text{MeOH-H}_2\text{O}$  (9:1) and petroleum ether (60-80°). The petrol-soluble fractions yielded on evaporation extract A. Evaporation of the alcoholic layer afforded gummy extract B.

Repeated column chromatography of the extracts using silica gel and mixtures of petroleum ether/EtOAc or  $\text{CHCl}_3/\text{MeOH}$  as eluents allowed the separation of the reported compounds. Further purification was achieved by using preparative tlc.

Chromene (**1**) gave mp 191-192°; ir max (KBr)  $\text{cm}^{-1}$  3000 (s), 2800-3100 (br), 1670 (s), 1610 (s), 1410, 1430, 1490, 820;  $^1\text{H}$  nmr (80 MHz,  $\text{CDCl}_3$ )  $\delta$  1.48 (6H, s, Me), 5.58 (1H, d,  $J=10$  Hz, H-3), 6.27 (1H, d,  $J=10$  Hz, H-4), 6.20 (1H, d,  $J=16$  Hz, H-10), 7.61 (1H, d,  $J=16$  Hz, H-9), 6.69 (1H, d,  $J=9$  Hz, H-8), 7.19 (1H, d,  $J=9$  Hz, H-5), 7.23 (1H, dd,  $J=2,9$  Hz, H-7); ms  $m/z$  230 ( $\text{M}^+$ , 63%), 215 (100%), 169 (26.4%), 144 (11.2%), 141 (11.3%), 115 (32%), 77 (11.6%);  $^{13}\text{C}$  nmr (20.15 MHz,  $\text{DMSO-}d_6$ - $\text{CDCl}_3$ )  $\delta$  173.0 (C-11), 155.6 (s, C-8a), 146.9 (d, C-9), 131.4 (d, C-4), 129.9 (d, C-7), 126.8 (s, C-4), 126.5 (d, C-5), 121.7 (C-3), 116.9 (d, C-10), 114.6 (d, C-8), 77.2 (s, C-2), 28.3 (q, C-12, C-13).

The known compounds were identified by direct comparison with authentic samples or comparisons with literature data using the usual techniques (uv, ir,  $^1\text{H}$  nmr,  $^{13}\text{C}$  nmr, ms, mp). Full details of the isolation and identification of the compounds are available on request.

TABLE 1. Compounds Isolated from *Baccharis* Species\*

<i>B. linearis</i> . . . . .	spathulenol (3), lachnophyllum ester (4), chromene (2), erythrodiol (5), axillarin (6-8).
<i>B. rhomboidalis</i> . . . . .	scopoletin (9), hispidulin (10), circimaritin (11), salvigenin (12-13), erythrodiol (5).
<i>B. solieri</i> . . . . .	axillarin (6-8), desmethoxycentaureidin (14), desmethoxy-sudachitin (15), centaureidin (16-17), 5,7,4'-trihydroxy-3,6,8,3'-tetramethoxyflavone (18).

\*Oleanolic acid, stigmasterol,  $\beta$ -amyrin, and friedelinol were also present in all three species.

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