column and three were identified by comparison with authentic specimens. From unsaponifiable portion, *Triacontane*, $C_{30}H_{62}$ m.p. 63–65° IR, NMR. *α-Spinasterol*, $C_{29}H_{48}O$ (M^+412) m.p. 166° $[\alpha]_{589}$ −3·0° ($CHCl_3$) UV, IR, NMR, MS fragmentation as expected, peak base 271 *m/e*. co-TLC. Acetate, m.p. [α] IR, NMR, *β-amyrin* $C_{30}H_{50}O$ (M^+426) m.p. 192–195° [α] 79·6° ($CHCl_3$) IR, NMR, MS fragmentation, co-TLC and m.m.p. Acetate $C_{32}H_{32}O_2$ m.p. 240°, [α], IR, NMR and m.m.p.

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Key Word Index—*Conyza filaginoides*; Compositae; triacontane; α-spinasterol; β-amyrin.

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KAURENIC ACIDS IN *ESPELETIA* SPECIES*

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In the course of our investigation on *Espeletia* species from the Venezuelan Andes, we have isolated (—)-kaur-16-en-19-oic (I) and (—)-kaur-15-en-19-oic acid (II) from three different species, *E. floccosa*, *E. figueirasii* and *E. moritziana*.

Aerial parts of the plants were dried and extracted with light petroleum. The acidic extract of the resin thus obtained was chromatographed on SiO_2. The fractions were monitored by TLC and all those containing I and II were pooled and methylated with diazomethane. The methyl esters were separated by elution from a column of SiO_2 plus 10% $AgNO_3$, but a small portion of each mixture of esters was saved for GLC. Light petroleum–Et_2O (3%) eluted methyl kaur-16-en-19oate (III), m.p. 84–85°, $[\alpha]_D^{25}$ −96·5 (EtOH; C, 3·7). The MS of III shows a molecular ion at *m/e* 316 ($C_{21}H_{32}O_2$). IR (KBr pellet): 1720 cm^{-1} (C=O), 1655 and 875 cm^{-1} ($C{=}CH_2$). NMR spectrum (60 MHz, $CDCl_3$): 0·88 δ (s, *t*-Me), 1·09 δ (S, *t*-Me), 2·0 δ (d, *J* = 1·5 Hz, 2H), 2·57 δ (broad, 1H), 3·58 δ (s, OCH_3), 4·70 δ (m, $C{=}CH_2$). The alcohol obtained by reduction of III with $LiAlH_4$ (m.p. 140–141°), shows a characteristic AB quartet centered at 3·57 δ in the NMR spectrum. Such evidence is indicative of a tetracyclic kauren-like diterpenoid with the carbonyl function on C-4 in an axial position.

By increasing the Et_2O concentration to 10% methyl kaur-15-en-19oate (IV) was eluted, m.p. 78–80°. IR spectrum: 1722 cm^{-1} (C=O), 813 cm^{-1} (CH=C). NMR spectrum: 0·85 δ (s, *t*-Me), 1·14 δ (S, *t*-Me, 1·68 δ (d, *J* = 1·5 Hz, 3H), 2·25 δ (broad, 1H), 3·62 δ (S, OCH_3), 5·05 δ (m, CH=C). This compound is identical (m.p. m.m.p., TLC, IR and NMR)

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to the methyl ester obtained from *Espeletia tenore*.[1] Reduction of IV with $LiAlH_4$ affords an alcohol which also shows in the NMR spectrum an AB quartet at 3·56 δ. Hydrogenation of III and IV with PtO_2 as a catalyst renders the same product, m.p. 77–79°. The IR spectra of both hydrogenated compounds are identical.

The relative amounts of (—)-kaur-16-en-19-oic and (—)-kaur-15-en-19-oic acid in each of the three species was determined by GLC[2] (2% XE-60 on silanyzed Chromosorb W, 190°, He at 40 ml/min). The areas under the peaks were measured and showed 25%, 20% and 25% of I in *E. figureirasii*, *E. floccosa*, and *E. moritziana* respectively *E. floccosa* exhibits the highest content of kaurenic acids (0·1 %), *E. figueirasii* is also relatively rich (0·02 %), but *E. moritziana* gave a very poor yield (0·001 %). The life cycle of the plant could be responsible for this wide difference in kaurenic acids content, since *E. floccosa* was harvested at a budding stage while the other two were sterile when gathered.

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Key Word Index—Espeletia spp.; Compositae; kaurenic acids.

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FLAVONOIDS OF *HELENIUM BREVIFOLIUM*

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Plant. Helenium brevifolium (Nutt.) A. Wood. *Source.* Collected by Dr. R. I. Godfrey, West of Tallahassee, Florida, Spring 1958. *Previous work.* Pseudoguaianolides from $CHCl_3$ extract.[1]

Compounds isolated. After prior extraction with $CHCl_3$, vitexin, orientin and small quantities of swertisin and saponaretin were isolated from the methanolic extract of the aerial portion of the plant by the methods described in an earlier paper[2] and identified by direct comparison with authentic materials by m.m.p., co-chromatography (TLC, 3 solvents) and IR analysis.

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Key Word Index—Helenium brevifolium; Compositae; vitexin; orientin; swertisin; saponaretin.