further separated and purified by paper chromatography. All chromatograms were developed by downward migration of the solvent. Whatman No. 3 paper sheets were used for preparative work; for all other purposes Whatman No. 1 chromatography paper was employed.

Solvent systems. BFW (*n*-BuOH–HCO_2H–H_2O, 20:5:12, upper phase). BAW (*n*-BuOH–HOAc–H_2O, 4:1:5:, upper phase), BEW (*n*-BuOH–EtOH–H_2O, 4:1:2:2), BBPW (*n*-BuOH–C_6H_6–pyridine–H_2O, 5:1:3:3) 15% HOAc, HOAc–HCl (HOAc–conc HCl–H_2O, 15:3:82), 1% HCl, Formic (HCO_2H–conc HCl–H_2O, 5:2:3), Forestal (HOAc conc HCl–H_2O, 30:3:10), Phenol (PhOH–H_2O, 4:1), MAW (MeOH–HOAc–H_2O, 18:1:1).

Isolation of pigment. The pigment used in this study was obtained by collecting the fastest moving band in 15% HOAc of *V. trilobum* L. The use of 1% HCl or other HCl containing solvents were avoided to minimize the occurrence of arabinose as an artifact. The collected pigment band contained Cy-3-xylosylrutinoside as the major anthocyanin and was rechromatographed in BFW for 5 days after elution with MAW. The pigment band appearing on top of the major Cy-3-xylosylrutinoside was collected, pooled, re-run in BFW and finally in 15% HOAc.

Identification of pigments. The identification of pigment followed in general the chromatographic and spectroscopic procedure described by Harborne.[4] All pigments and hydrolyzed products were compared with authentic markers on the same chromatograms in several solvent systems. For R_f determinations, the MAW eluate of each pigment was evaporated to dryness, redissolved in 0·5% HCl/MeOH and spotted along with authentic anthocyanins (Cy-3-glucoside from raspberry, Cy-3-sambubioside from red currants, Cy-3-arabinosylglucoside from *V. trilobum* L.[2] and Cy from reductive acetylation[5] of commercial quercetin). Reference trioside, xylosylrutinoside, was obtained from Cy-3-xylosylrutinoside of red currants by hydrogen peroxide hydrolysis.

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TRITERPENE ACIDS OF INDIAN CLOVE BUDS

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Key Word Index—*Syzgium aromaticum* (L) Merr.; Caryophyllaceae; triterpene; maslinic acid; naphthalene.

Previous work. Isolation of products from the oil of cloves of unspecified origin; the yield of the products are not given.[1–9]

Present work. Clove buds (dry, Indian origin) (*Syzygium aromaticum* (L.) Merr., *Eugenia caryophyllata* Thumb.) on steam distillation gave, from the phenolic fraction, eugenol,[1,4] (*ca* 16%) and from the neutral fraction, carryophyllene[2] (*ca* 1·6%) and naphthalene (*ca* 0·1%). As there is only one reference in the literature regarding the isolation of naphthalene

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from clove oil,[3] its presence was verified by isolating 0·1% of naphthalene from each of 3 different samples. The content of the steam distillation flask was filtered (the filtrate gave glucose and xylose with smaller amounts of arabinose) and the residue treated with 10% alcoholic NaOH and re-filtered. The filtrate was acidified and the residue obtained was worked up to give oleanolic acid[5,6] (*ca* 1%), sitosterol (*ca* 0·1%) and maslinic acid (2α-hydroxyoleanolic acid) (*ca* 0·15%): m.p. 262°, $[\alpha]_D$ + 50°, methyl ester, m.p. 227° $[\alpha]_D$ + 60°, methyl ester diacetate m.p. 170°, $[\alpha]_D$ + 34°. The constants are in agreement with literature values.[7–9] The NMR spectra of the last two derivatives show that the two hydroxyl substituents at C_2 and C_3 are equatorial in a chair ring: methyl ester 3α-H (δ 3·0, *d*, *J* 10 Hz), $C_2\beta$-H (δ 2·63, b.m.), methyl ester diacetate, $C_3\alpha$-H (δ 4·72, *d*, *J* 10 Hz) and $C_2\beta$-H (δ 4·45, b.m.).

The residue left after the extraction with alcoholic NaOH was analysed and showed Al, Fe, CO_3'' and oxalate as major and Mg, Si, Cl' and SO_4'' as minor ions.

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TERPENOIDS AND HYDROCARBONS OF *ACROPTILON PICRIS*

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Key Word Index—*Acroptilon picris*; Compositae; triterpenes; behenicacid octacosyl ester; α-euphorpol.

Plant. Acroptilon picris Pall. (Voucher specimen No. APC 97, Department of Pharmacognosy, School of Pharmacy, University of Tehran, Iran). *Source.* Central part of Iran plateau. *Previous work.* None.

Results. Roots, stems, leaves and flowers were air dried, milled, and exhaustively extracted with petrol. (40–60°). The residue was dissolved in petrol. and chromatographed on neutral aluminum oxide (E. Merck). *n*-Nonacosane $C_{29}H_{60}$ m.p. 62–64° (Found, C, 84·88, H, 14·60. Reqd. C, 85·20, H, 14·80%, m.m.p., TlC, IR and NMR) was found in the earlier petrol fraction and crystallized from MeOH–petrol. The petrol.–C_6H_6 fractions (80–20) gave behenic acid octacosyl ester (from MeOH) $C_{50}H_{100}O_2$[1] m.p. 78–80° [(Found, C, 82·06, H, 13·60. Reqd. C, 81·96, H, 13·66%. IR 1730 and 1140 cm^{-1}, NMR($CDCl_3$) δ4·05 ppm (*t*, *J*6 Hz, 2H, $-CH_2-O-$), 2·26 ppm (*t*, *J*6 Hz, 2H, $-CH_2-CO-$), 1·25 ppm (*s*, 90 H), 0·90 ppm (*s*, 3H, –Me), and 0·65 ppm (*s*, 3H, –Me)]. Hydrolysis gave, octacosanol (m.p., m.m.p., TlC, IR and NMR), and behenic acid (m.p., m.m.p., TlC, IR and NMR). Octacosanol. $C_{28}H_{58}O$[2] m.p. 81–83° (Found, C, 81·55, H, 14·12. Reqd. C, 81·67, H, 14·23%. IR, 3418 cm^{-1}, m.m.p., TlC, NMR. Acetate and benzoate m.p., m.m.p., IR 1740 cm^{-1}) was found in the benzene–$CHCl_3$ fractions (95–95) and was crystallized from MeOH–acetone

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