Now the location of the tetrasubstituted double bond is placed at the C-5—C-9 position in conjugation with the trisubstituted double bond thus making it α-pyrone moiety. From these data, Structure I is proposed for the new lactone

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Key Word Index—Nepeta cataria, Labiatae, monoterpene, 5,9-dehydronepetalactone.

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CONSTITUENTS OF *ZATARIA MULTIFLORA**

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Plant. Zataria multiflora, Boiss. *Uses.* A reputed drug of the Unani system of medicine used as a stimulant, diaphoretic and diuretic, and for several other purposes [1] *Previous work* None, its essential oil (0 6%) studied in these laboratories consists of 69% phenols containing mainly carvacrol. *p*-Cymene is the main constituent of the non-phenolic portion of the oil [2]

Extraction of the drug The fragrant drug (leaves, stems and flowers) exhaustively extracted successively with light petroleum (60–80°), benzene, EtOH and MeOH and then the extracts repeatedly chromatographed on Silica gel (or alumina), and the products crystallized.

New compounds (Alkanes). Alkanes from earlier fractions of the neutral part of the petrol extract and crystallization (EtOH) (m p , mixed m p., IR, NMR, MS and GLC analysis): *n*-nonacosane (C_{29}), *n*-hentriacontane (C_{31}); *n*-dotriacontane (C_{32}); *n*-tritriacontane (C_{33}), *n*-pentatriacontane (C_{35}).

β-Sitosterol (m p , mixed m p. of the sterol and its acetate, IR, $[\alpha]_D$, and positive L B Test) Elution of the neutral part with benzene and crystallization (MeOH and $CHCl_3$) Benzoate (Found: C, 83 41; H, 9 91%, $C_{36}H_{54}O_2$ required: C, 83·34; H, 10·39%), 3 5-Dinitrobenzoate (Found· C, 71 47, H, 8 89, N, 5·09%, $C_{36}H_{52}O_6N_2$ required C, 71·02, H, 8 61, N, 4·6%)

Betulin (m p , IR, $[\alpha]_D$, *m/e* 442 (M^+), positive L.B and Noller's Tests, co-TLC with authentic specimen) from C_6H_6–$CHCl_3$ (3 1) fractions of the neutral part and crystallization (ethyl-acetate). Its acetate (MeOH + acetone)· m p and IR

* Major part of this work was presented at the "Convention of Chemists 1970" held at Madras (India) in Nov /Dec 1970

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[2a] G S GUPTA and M O FAROOQ, *Perfumery and Essential Oil Record* 45, 287 (1954).
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Fatty acids. Mixture from acidic part of the petrol extract; elution with C_6H_6 (Silica gel), and crystallization (Me_2O + MeOH) (m p , IR, methyl esters, GLC analysis) behenic acid (C_{22}), lignoceric acid (C_{24}), cerotic acid (C_{26}), montanic acid (C_{28}).

Oleanolic acid (m p , $[\alpha]_D$, IR, NMR, and *m/e* 456 (M^+), one COOH gp. and one ethylenic linkage). Acetate, methyl ester, methyl ester-acetate, lactone and ketone (m p and IR) From acidic part of the petrol extract after chromatography (Silica gel), elution with benzene–Et_2O (4 1), and crystallization (MeOH)

Oleanolic acid $\xrightarrow[\text{Jones' reagent}]{\text{oxidation}}$ oleanonic acid (Found· C, 79 45%, H, 10 60, $C_{30}H_{46}O_3$ required C, 79·29, H, 10 14%)

Other products Two triterpenic ketones (M^+, *m/e* 456 and 454), and an acid (M^+456) — (m p , $[\alpha]_D$, IR, UV and NMR) From petrol, C_6H_6 and MeOH extracts, chromatography and crystallization Belong to oleanolic acid series and are under investigation The acid appears to be 3-epi-oleanolic acid Ash of the plant material also has been analysed

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Key Word Index—Zataria multiflora, Labiatae, alkanes, phytosterols, triterpenes, fatty acids

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NEPENTHACEAE

STEROLS AND TRITERPENES OF THE PITCHER PLANT*

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Abstract—By means of column chromatography, TLC, GLC and GLC-mass spectrometry, the following sterols and triterpenes were found in free form in the pitcher plant, (*Nepenthes albomarginata*) cholesterol, campesterol, stigmasterol, sitosterol, isofuctosterol, β-amyrin and α-amyrin No 4α-methyl sterols were found in the free form The following sterols and triterpenes were identified in the esterified form cholesterol, campesterol, stigmasterol, sitosterol, isofucosterol, obtusifoliol, cycloeucalenol, citrostadienol, cycloartenol and 24-methylenecycloartanol Sitosterol was the major 4-desmethyl sterol in both the free and esterified fractions Previous examination of a glycoside fraction of *N sanguinea* yielded sitosterol as the major component

INTRODUCTION

OF THE various known carnivorous plants, those of the genus *Nepenthes* (Nepenthaceae) are the most prominent. To the best of our knowledge the nonsaponifiable constituents of

* Part II of the series, Part I of this series is Ref 1 "Nonsaponifiable constituents of Malaysian Plants". Requests for reprints should be addressed to. Dr H J Nicholas, Institute of Medical Education and Research, 1605 S 14th St St Louis, Missouri 63104, U S A

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