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EBENACEAE, etc.

CHEMICAL CONSTITUENTS OF *DIOSPYROS BUXIFOLIA*, *D. TOMENTOSA*, *D. FERRA*, *D. LOTUS*, *RHUS PARVIFLORA*, *POLYGONUM RECUMBENS*, *BALANITES AEGYPTIACA* AND *PYRUS PASHIA**

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Plant. Diospyros buxifolia (Blume) Hiern (Syn. *D. microphyllia* Bedd).

Occurrence. South India.

Leaves and stem. Light petroleum soluble fraction of EtOH extractive (chromatographed over alumina). Elution with benzene-hexane (1:1) furnished *Friedelin* $C_{30}H_{50}O$ m.p. 256–258° (mixed m.p., $[\alpha]_D$, IR, oxime and 2:4 dinitrophenylhydrazine).† Wolff-Kishner redn. gave a hydrocarbon $C_{30}H_{52}$, m.p. 248–250° $[\alpha]_D + 20^\circ$. $NaBH_4$ redn. yielded an alcohol $C_{30}H_{50}O$, m.p. 278–280°, $[\alpha]_D + 20^\circ$, acetate m.p. 288–290° and $[\alpha]_D + 35^\circ$. Epi-*Friedelinol* $C_{30}H_{52}O$ m.p. 278–280°, $[\alpha]_D + 24^\circ$, acetate m.p. 290–292°, $[\alpha]_D + 45^\circ$; benzoate m.p. 253–255°, $[\alpha]_D + 40^\circ$. Oxidation with Cu powder gave *Friedelin* (mixed m.p.; IR and TLC). β -*Sitosterol* $C_{29}H_{50}O$, m.p. 135–137°, $[\alpha]_D - 35^\circ$; acetate m.p. 134°, $[\alpha]_D - 38^\circ$; benzoate m.p. 145° (mixed m.p., IR and TLC).

Elution with benzene gave *Lupeol* $C_{30}H_{50}O$, m.p. 212–214°, $[\alpha]_D + 27^\circ$; acetate m.p. 218°, $[\alpha]_D + 47^\circ$; benzoate m.p. 272°, $[\alpha]_D + 60^\circ$ (mixed m.p.; IR and TLC). Elution with benzene-ethylacetate (9:1) yielded *Betulin* $C_{30}H_{50}O_2$ m.p. 261–262°, $[\alpha]_D + 20^\circ$; diacetate m.p. 222–223°, $[\alpha]_D + 22^\circ$; dibenzoate m.p. 181°, $[\alpha]_D + 43^\circ$ (mixed m.p., IR and TLC). Subsequent elution with benzene-EtOAc (1:1) gave *Betulinic acid* $C_{30}H_{48}O_3$ m.p. 315–318°, $[\alpha]_D + 12^\circ$; acetate m.p. 295°, $[\alpha]_D + 24^\circ$; Methyl ester acetate m.p. 200° (mixed m.p., IR and TLC).

Plant. Diospyros tomentosa Roxb.

Occurrence. Sub Himalayan tract and Madhya Pradesh.

Stem and leaves. Light petroleum soluble fraction of EtOH extractive (chromatographed over alumina). β -*Sitosterol*, *Lupeol* and *Betulin* (m.p., mixed m.p., $[\alpha]_D$, IR and TLC). Subsequent EtOAc soluble fraction of EtOH extractive (chromatographed over silica). The mixture of triterpene acids was further resolved through the acetate derivatives. *Betulinic acid acetate* $C_{32}H_{50}O_4$ m.p. 295°, $[\alpha]_D + 24^\circ$. Deacetylation with alc.KOH gave *Betulinic acid* (m.p. mixed, m.p., $[\alpha]_D$ and TLC). Methyl ester acetate m.p. 200°. *Oleanolic acid acetate* $C_{32}H_{50}O_4$, m.p. 266–268°, $[\alpha]_D + 74^\circ$. Treatment with alc.KOH yielded *Oleanolic acid* (m.p., mixed m.p., $[\alpha]_D$ and TLC). Methyl ester acetate m.p. 218–220°, $[\alpha]_D + 68^\circ$. *Ursolic acid acetate* $C_{32}H_{50}O_4$ m.p. 296°, $[\alpha]_D + 73^\circ$. Deacetylation gave ursolic acid $C_{30}H_{48}O_3$ m.p. 284–285°, $[\alpha]_D + 67^\circ$ (mixed m.p., IR and TLC). Methyl ester m.p. 200°, $[\alpha]_D + 40^\circ$. Methyl ester acetate m.p. 242–244°.

Plant. Diospyros ferra (Wild) Bakh. (syn. *Maba buxifolia* Pers.).

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† IR determined in KBr and $[\alpha]_D$ in $CHCl_3$.

Occurrence. Orissa and South India.

Stem and leaves. Light petroleum soluble fraction of EtOH extractive (chromatographed over alumina). Elution with hexane-benzene (3:1) gave *Taraxerone* $C_{30}H_{48}O$ m.p. 244–246°, $[\alpha]_D +11.5^\circ$ (mixed m.p., IR and TLC). *Taraxerol* $C_{30}H_{50}O$ m.p. 269–271°, $[\alpha]_D +3.1^\circ$; acetate m.p. 295–297°, $[\alpha]_D +9^\circ$; benzoate m.p. 280–281°, $[\alpha]_D +40^\circ$. Chromic acid oxidation gave *Taraxerone* (m.p., mixed m.p., IR and TLC). Benzene-hexane (1:1) eluate gave β -*Sitosterol*. Ethylacetate soluble fraction of EtOH extractive gave *Betulinic acid* and *Ursolic acid*.

Plant. *Diospyros lotus* L.

Occurrence. North Western Himalayas.

Previous work. Fruit pulp,¹ leaves^{2,3} and root.⁴

Stem and leaves. Light petroleum soluble fraction of EtOH extractive (chromatographed alumina). *Hentriacontanol* $C_{31}H_{64}O$ m.p. 81–82°, acetate m.p. 75°. β -*Sitosterol*. $CHCl_3$ soluble fraction gave, *Betulinic acid*, *Oxy-allobetulin* and *Taraxerol*.

Plant. *Balanites aegyptiaca* (Linn) Delile (Zygo phyllaceae).

Occurrence. Drier parts of India.

Previous work. Seed Kernels.^{5,6}

Stem bark. EtOH extractive gave a steroidal glucoside. Hydrolysis with 5% H_2SO_4 furnished *Nitogenin* $C_{27}H_{44}O_3$ m.p. 196° $[\alpha]_D -126^\circ$, acetate $C_{29}H_{46}O_4$ m.p. 185°, $[\alpha]_D -152^\circ$, benzoate $C_{34}H_{48}O_4$ m.p. 225°, $[\alpha]_D -84^\circ$. The sugar moiety was glucose (paper chromatography).

Plant. *Rhus parviflora* Roxb (Anacardiaceae).

Occurrence. N.W. Himalayas.

Stem and leaves. Benzene soluble fraction of EtOH extractive (chromatographed over alumina). *Hentriacontane* $C_{31}H_{64}$ m.p. 68° (IR and mixed m.p.), *Hentriacontanol*, β -*Sitosterol* and *Lignoceric acid* $C_{24}H_{48}O_2$ m.p. 81°, methyl ester $C_{25}H_{50}O_2$ m.p. 58°. *n*-BuOH fraction of EtOH extractive (chromatographed over silica gel). *Quercetin* $C_{15}H_{10}O_7$ m.p. 315°, λ_{max} 257 and 371 nm (IR, m.p. and mixed m.p.); pentacetate $C_{25}H_{20}O_{12}$ m.p. 199°.

Isorhamnetin-3- α -L-arabinoside $C_{21}H_{20}O_{11}$. 1/2 H_2O m.p. 262°, λ_{max} 259, 266 and 357 nm. Hydrolysis with acid gave *isorhamnetin* $C_{16}H_{12}O_7$ m.p. 305°, λ_{max} 254, 306 and 369 nm; acetate $C_{24}H_{20}O_{11}$ m.p. 205° and sugar moiety was arabinose (paper chromatography).

Plant. *Polygonum recumbens* Royle (Polygonaceae).

Occurrence. Western Himalayas.

Stem and leaves. Benzene soluble fraction of EtOH extractive (chromatographed over alumina). *Hentriacontane*, *Hexacosanol* $C_{26}H_{54}O$ m.p. 75°; acetate $C_{28}H_{56}O_2$ m.p. 65° (IR and mixed m.p.) and β -*Sitosterol*.

Plant. *Pyrus pashia* Ham (Rosaceae).

Occurrence. Temperate Himalayas.

Previous work. Bark, leaves⁷ and stem.⁸

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³ L. I. DZHAPARIDZE and E. G. MIKELADZE, *Soobsch. Akad. Nauk. Gruz.* **52**, 479 (1968).

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⁶ R. E. MARKER *et al.*, *J. Amer. Chem. Soc.* **65**, 1248 (1943).

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Stem. Benzene soluble fraction of EtOH extractive (chromatographed over alumina) gave a wax m.p. 55°. Alkaline hydrolysis afforded *Hexacosanol*. *n*-BuOH soluble fraction of EtOH extractive (chromatographed over silica gel). *Hydroquinone* C₆H₆O₂ m.p. 168°, M⁺110, acetate m.p. 121°. *β-Sitosterol-β-D-glucoside* C₃₅H₆₀O₆ m.p. 290°, [α]_D -45° (pyridine) (IR and mixed m.p.). Acid hydrolysis furnished *β-Sitosterol* and glucose. *Luteolin glycoside*. Hydrolysis with 5% H₂SO₄ gave luteolin C₁₅H₁₀O₆ m.p. 325°, λ_{max} 256, 267, 349 nm, and glucose and rhamnose.

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FAGACEAE

CHEMICAL CONSTITUENTS OF *QUERCUS LANCEAEFOLIA**

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Abstract—The isolation and identification of friedelin, lignoceryl alcohol, ferulic acid, lignoceryl ferulate, canophyllal, canophyllol and an unusual 2α, 3β dihydroxy triterpene, maslinic acid, have been described.

Plant. *Quercus lanceaefolia* Roxb.

Occurrence. Eastern Himalayas at an altitude of 2000 ft.

Source. Darjeeling, India.

Biological activity. The benzene-soluble portion of the alcoholic extract of its stem bark possessed hypoglycemic activity.¹

Stem bark. The concentrated aqueous alcoholic extract of the bark was fractionated by shaking with C₆H₆, CHCl₃ and *n*-butanol. The *n*-butanol fraction contained 80% tannins as indicated by Pb (OAc)₂ precipitation.

The C₆H₆ and CHCl₃ fractions showed nine identical spots on TLC. Both fractions were, therefore, combined and subjected to separation on a silica gel column. The C₆H₆ eluates, containing six substances, on rechromatography on neutral alumina yielded friedelin, canophyllal, canophyllol and lignoceryl ferulate. The C₆H₆:MeOH (1%) eluate yielded lignoceryl alcohol on further chromatography on silica gel.

The C₆H₆—MeOH (10%) eluate was separated into acidic and neutral components by extraction with 10% aq. Na₂CO₃ solution. Chromatography of the acidic fraction on silica gel gave ferulic acid and maslinic acid.

* Communication No. 1570 from Central Drug Research Institute, Lucknow, India.

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