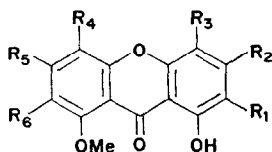


literature values. In addition colourless crystals of a hydroxy triterpene acid, m.p. 288–290° were isolated. This material has not yet been further investigated.



(I) $R_2 = R_4 = R_6 = H$; $R_1 = R_3 = R_5 = OMe$

(II) $R_1 = R_3 = R_5 = H$; $R_2 = R_4 = R_6 = OMe$

(III) $R_1 = R_3 = R_5 = R_6 = H$; $R_4 = OH$; $R_2 = OMe$

EXPERIMENTAL

Aerial portions of *Swertia purpurescens* were collected in August 1970 from Azad Kashmir in West Pakistan. Air dried plant material (2.5 kg) was ground and extracted in a Soxhlet extractor with hexane for 12 hr. After partial removal of hexane the extract was cooled when yellow material deposited. Filtration and crystallization from MeOH gave yellow needles of the new xanthone (18 mg) m.p. 198–200°. UV: (EtOH) λ_{max} 241, 264, 315, 384 nm (ϵ 4.27, 4.41, 3.92, 3.60). IR: (KBr) ν_{max} 1648, 1612, 1590 cm^{-1} . (Found: C, 61.20; H, 4.78; M^+ m/e 332. $C_{17}H_{16}O_7$ requires: C, 61.13; H, 4.85%, MW 332). The filtrate from the above solution yielded sitosterol, m.p. 135–136°, identified by comparison with an authentic specimen.

Further extraction of the plant material with EtOH and concentration of the extract gave a yellow product which on filtration and crystallization from acetone gave bellidifolin (48 mg) m.p. 263° (lit.^{6,7} m.p. 270–271°, 264°). UV: (EtOH): λ_{max} 252, 278, 332, 400 nm (ϵ 4.25, 4.10, 3.9, 3.72). IR: (KBr) ν_{max} 1603, 1620, 1640, 1666, 3420 cm^{-1} . (Found: C, 61.02; H, 3.50; OMe, 11.07; M^+ m/e 274. Calc. for $C_{14}H_{10}O_6$: C, 61.34; H, 3.68; OMe 11.30%, MW 274.) Triacetate m.p. 238° (lit.⁶ m.p. 240°). NMR: (CDCl₃) τ 7.60 (9H, s, 3 $\times$ OAc), 6.15 (3H, s, OMe), 3.47, 3.35 (2H, AB q, J 1.5 Hz) 3.12, 2.67 (2H, AB q, J 9Hz). (Found: C, 60.01; H, 4.89; M^+ m/e 400. Calc. for $C_{20}H_{16}O_9$: C, 59.99; H, 4.93, MW 400).

The filtrate from the above solution yielded colourless material which on crystallization from EtOH gave needles of a hydroxy triterpene acid (0.5 g) m.p. 288–290°. IR: (Nujol) ν_{max} 3350, 1675 cm^{-1} . (Found: C, 76.41; H, 9.99; $C_{30}H_{48}O_3$ requires: C, 76.31; H, 10.20%.) Methyl ester m.p. 167–169°. IR: (Nujol) ν_{max} 3320, 1730 cm^{-1} Acetate m.p. 245–250°.

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⁷ RIVAILLE, P. and RAULAIS, D. (1969) *Compt. Rend.* **269**, 1121.

Phytochemistry, 1973, Vol. 12, pp. 2543 to 2544. Pergamon Press. Printed in England.

OCCURRENCE OF FLAVONES IN *DALBERGIA PANICULATA* FLOWERS

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Key Word Index—*Dalbergia paniculata*; Leguminosae; apigenin; luteolin; caviunin; (+)-pinitol.

Plant. *Dalbergia paniculata* Roxb. **Source.** Tirupati, South India. **Previous work.** On seeds,^{1–3} heartwood,^{4,5} and bark.⁶

¹ ADINARAYANA, D., RADHAKRISHNIAH, M., RAJASEKHARA RAO, J., CAMPBELL, R. and CROMBIE, L. (1971) *J. Chem. Soc. C*, 29.

² ADINARAYANA, D., RADHAKRISHNIAH, M. and RAJASEKHARA RAO, J. (1971) *Current Sci.* **40**, 602.

³ ADINARAYANA, D. and RAJASEKHARA RAO, J. (1972) *Tetrahedron* **28**, 5377.

⁴ NARAYANAN, V. and SESHADRI, T. R. (1970) *Indian Acad. Wood Sci.* **1**, 1.

⁵ SESHADRI, T. R. (1972) *Phytochemistry* **11**, 881.

⁶ NARAYANAN, V. and SESHADRI, T. R. (1971) *Indian J. Chem.* **9**, 14.

Present work. Shade dried flowers were extracted successively with light petrol., C_6H_6 , Et_2O , acetone and $EtOH$. The light petrol. extract yielded an aliphatic alcohol (0.244%), m.p. 80–81°, ν_{max} (KBr): 3400 (OH), 1737 (CO), 1472, 1462, 723, 712 cm^{-1} . The C_6H_6 extract yielded caviunin⁷ (0.0028%), $C_{15}H_{14}O_2(OH)_2(OCH_3)_4$. M.p., m.m.p., co-chromatography, UV, IR, NMR and MS measurements corroborated the identification. The Et_2O extract by column chromatography (silica gel) followed by preparative TLC (kieselgel G) gave two flavones apigenin (0.0028%) and luteolin (0.0022%) which were identified by m.p., m.m.p., co-chromatography (3 solvents), UV and IR spectral measurements. The acetone extract yielded (+)-pinitol (0.22%), $C_6H_6(OH)_5(OCH_3)_3$, m.p. 185–186°, $[\alpha]_D^{25} +67^\circ$ (c 1.0, H_2O); [lit.⁸ m.p. 185–186°, $[\alpha]_D^{25} +66.8^\circ$ (c 2.5, H_2O)]. The ethanol extract yielded dalpanin⁹ (0.47%) which has been characterized as an isoflavanone-*C*-glucoside.

Comment. The present investigation shows for the first time the presence of flavones in a *Dalbergia* species, co-occurring with isoflavonoids.

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⁷ GOTTLIEB, O. R. and MAGALHAES, M. T. (1961) *J. Org. Chem.* **26**, 2449.

⁸ ANDERSON, A. B., MACDONALD, D. L. and FISCHER, H. O. L. (1952) *J. Am. Chem. Soc.* **74**, 1479.

⁹ ADINARAYANA, D. and RAJASEKHARA RAO, J. (1972) *8th Intern. Symp. Chem. Natural Prod.*, p. 96, I.U.P.A.C., New Delhi.

Phytochemistry, 1973, Vol. 12, pp. 2544 to 2545. Pergamon Press. Printed in England.

CONSTITUENTS OF *MACHAERIUM PEDICELLATUM* HEARTWOOD

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Key Word Index—*Machaerium pedicellatum*; Leguminosae; triterpene; dalbergione; dalbergiquinol; 4-phenylchromene; 4-phenylcoumarins; isoflavans.

Plant. *Machaerium pedicellatum* Vog., Leguminosae. *Source.* Imported to Japan from Bolivia. *Uses.* Fancy plywood. *Previous work.* On the heartwood of sister species *Machaerium*.^{1–7}

¹ KUROSAWA, K., OLLIS, W. D., REDMAN, B. T., SUTHERLAND, I. O., BRAGA DE OLIVEIRA, A., GOTTLIEB, O. R. and MAGALHÃES ALVES, H. (1968) *Chem. Commun.* 1263.

² KUROSAWA, K., OLLIS, W. D., REDMAN, B. T., SUTHERLAND, I. O., GOTTLIEB, O. R. and MAGALHÃES ALVES, H. (1968) *Chem. Commun.* 1265.

³ GREGSON, M., KUROSAWA, K., OLLIS, W. D., REDMAN, B. T., ROBERTS, R. J., SUTHERLAND, I. O., BRAGA DE OLIVEIRA, A., EYTON, W. B. and GOTTLIEB, O. R. (1968) *Chem. Commun.* 1390.

⁴ OLLIS, W. D., REDMAN, B. T., ROBERTS, R. J., SUTHERLAND, I. O. and GOTTLIEB, O. R. (1968) *Chem. Commun.* 1392.

⁵ OLLIS, W. D. and GOTTLIEB, O. R. (1968) *Chem. Commun.* 1396.

⁶ EYTON, W. B., OLLIS, W. D., FINEBERG, M., GOTTLIEB, O. R., SALIGNAC DE SOUZA GUIMARÃES, I. and TAVERIRA MAGALHÃES, M. (1965) *Tetrahedron* **21**, 2697.

⁷ BRAGA DE OLIVEIRA, A., GOTTLIEB, O. R., OLLIS, W. D. and RIZZINI, C. T. *Phytochemistry* (1971) **10**, 1863.