EXPERIMENTAL

Si gel (60–100 mesh) was used for column chromatography and Si gel G for TLC. All analytical samples were dried over P_2O_5 for 24 hr *in vacuo* and were tested for purity by TLC and MS. Molecular formulae are in agreement with elemental analyses. The UV spectra were recorded in 95% EtOH and the IR spectra in KBr discs. Except for the furan derivative, MS data are presented neglecting peaks of relative intensity less than 0.5%. The ^{13}C NMR spectrum was recorded in $CDCl_3$ soln using Varian CFT 20 instrument and the peaks are expressed in δ(ppm) with $\delta_{CDCl_3} = 76.9$ ppm downfield from TMS.

Isolation of **1a**. Air-dried finely ground roots (1 kg) of *Berberis coriaria* Royle ex Lindl. were successively extracted with $CHCl_3$ and EtOH in Soxhlet apparatus for 72 hr. After removal of the solvents, the residues were stirred with 5% aq. citric acid for 6 hr, filtered, and the filtrate extracted several times with $CHCl_3$, the extract washed free of acid and dried. The residue was dissolved in $CHCl_3$, the combined $CHCl_3$ solubles chromatographed using petrol and mixtures of petrol/EtOAc as eluents in order of increasing polarity. The petrol/EtOAc (20·1) eluate on evaporation gave a light brown solid which crystallized from petrol/EtOAc in light pink stout needles (**1**) (0.02 g), mp 185°. MS: *m/e* (% abundance for over 50%) 298 (M^+, 71.4), 280, 234, 219, 177, 164, 163 (98.6), 161, 145, 136, 135 (100), 117, 115, 108, 107, 106, 105, 91, 79, 78, 77 (62.9), 55, 53, 51 and 43.

Acetylation of **1**. In the usual way gave the diacetate mp 141°, λ_{max} 243 and 290 (log ε 4.77 and 3.51) nm; ν_{max} 2900, 1750, 1672, 1225 cm^{-1}; δ(ppm): 2.35 (6H, *s*; Ar–C$\underline{H}_3$), 2 42 (6H, *s*; —O—COC$\underline{H}_3$), 3.32 (4H, *s*; —CO—C$\underline{H}_2$—), 7.01 (2H, *d* *J* 9 Hz, Ar–$\underline{H}$), 7.35 (2H, *dd*; *J* 9 Hz and 2 Hz, Ar–$\underline{H}$); 7.70 (2H, *d*, *J* 2 Hz; Ar–$\underline{H}$); *m/e* (%)· 382 (M^+, < 1), 340, 323, 322, 298, 291, 290, 205, 188, 178, 177 (87.0), 164, 163 δ (98.3), 162, 161, 145, 136, 135 (100), 107, 78, 77, 45 and 43 (59.1).

Methylation of 1 with MeI/K_2CO_3 gave the dimethyl ether, mp 68°; λ_{max} 220, 250 and 320 (log ε 4.14, 4.60 and 3.07) nm; ν_{max} 2940, 2860, 1660 and 1580 cm^{-1}; δ(ppm): 2.31 (6H, *s*; Ar–C$\underline{H}_3$), 3.41 (4H, *s*; —CO—C$\underline{H}_2$—), 3.91 (6H, *s*; Ar—OC$\underline{H}_3$), 6.89 (2H, *d*, *J* 9 Hz; Ar—$\underline{H}$); 7.29 (2H, *dd*, *J* 9 Hz and 2 Hz; Ar—$\underline{H}$), 7.60 (2H, *d*, *J* 2 Hz; Ar—$\underline{H}$); *m/e* (%): 326 (M^+, 35.4), 177, 150, 149 (100), 134, 106, 105, 91 and 78.

Cyclization of the methyl ether was effected in $POCl_3$ under reflux for 6 hr. The product mp 110°; λ_{max} 295 and 330 (log ε 4.01 and 4.44) nm; ν_{max} 2935, 2860, 1607, 1502, 792 and 740 cm^{-1}; δ(ppm): 2.38 (6H, *s*; Ar–C$\underline{H}_3$), 3.89 (6H, *s*; Ar–OC$\underline{H}_3$), 6.84 (2H, *d*, *J* 8 5 Hz; Ar–$\underline{H}$), 7.01 (2H, multiplicity obscured by furan proton signals, Ar–$\underline{H}$), 7.03 (2H, multiplicity obscured by preceding signals; furan protons), 7.79 (2H, *s*; Ar–$\underline{H}$), *m/e* (%): 308 (M^+, 1.5), 307, 292, 266, 265, 249, 235, 159, 154, 149, 146, 145, 133, 125, 116, 115, 105 and 91.

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1-HYDROXY-3,7-DIMETHOXY-6-ACETOXYXANTHONE, A NEW XANTHONE FROM *LAWSONIA INERMIS*

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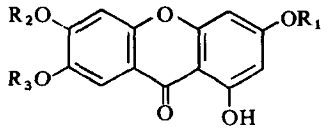
Key Word Index—*Lawsonia inermis* (syn. *L. alba*); Lythraceae; xanthones; laxanthone-III; 1-hydroxy-3,7-dimethoxy-6-acetoxyantone.

Lawsonia inermis (syn. *L. alba*), well-known as a source of an orange dye [1] and for its medicinal uses [2], has been examined extensively for its chemical components [3–12]. The present communication describes the characterisation of a new xanthone, laxanthone-III. A solvent-free ethanolic extract of the whole plant (3 kg) was chromatographed over a Si gel column using a number of solvent systems. Elutions with petrol–C_6H_6 (7:3) gave laxanthone-III (**1**) whereas other fractions yielded compounds reported earlier. Colour reactions and spectral data for **1** indicated a chelated OH. On acetylation **1** gave a monoacetate (**1a**) but remained unchanged on methylation with CH_2N_2 in ether indicating that it had only one chelated OH. Hydrolysis of **1** yielded a dihydroxydimethoxy compound (**1b**) which underwent monoethylation to yield a monoethyl ether (**1c**), and also, methylation with CH_2N_2 in ether to give a monomethyl ether identical with 1-hydroxy-3,6,7-trimethoxyxanthone (**1d**) [13] showing that **1** like laxanthone-I (**2**) and II (**3**) was also a 1,3,6,7-tetraoxygenated xanthone. The NMR spectrum of **1** showed signals for two methoxyls, one acetoxyl, a pair of *m*-coupled and two other aromatic



1, $R_1 = R_3 = Me$; $R_2 = Ac$
1d, $R_1 = R_2 = R_3 = Me$
2, $R_1 = H$; $R_2 = R_3 = Me$
3, $R_1 = R_2 = Ac_3$; $R_3 = Me$
4, $R_3 = H$; $R_1 = R_2 = Me$
5, $R_1 = R_3 = H$; $R_2 = Me$

protons. **1** could, thus, be a 1-hydroxy-3,6,7-acetoxydimethoxyxanthone. The positions of the two methoxyls and one acetoxyl substituents were fixed at C-3, C-6 and C-7 based on the following considerations. The hydrolysis product (**1b**) gave a Gibbs test characteristic for an unsubstituted position *para* to a hydroxyl [14, 15] but did not give a Quastel test indicating the absence of an *o*-dihydroxy system [16]. Moreover, **1b** on direct comparisons was found to be different from both 1,3-dihydroxy-6,7-dimethoxyxanthone (**2**) [13] and 1,7-dihydroxy-3,6-dimethoxyxanthone (**4**) (obtained by the selective methylation of **5** [13] but identical with 1,6-dihydroxy-3,7-dimethoxyanthone (**1b**) [17] thereby locating the two methoxyls at C-3 and C-7 positions in **1** and its derivatives. The structural assignments were further substantiated by the identity of the acetate of **1** with the synthetic diacetate (**1a**) but not with the isomeric diacetates, **2a** and **4a** [17]. Hence, laxanthone-III and the monoethyl ether of its hydrolysis were considered to be 6-*O*-acetyl (**1**) and 6-*O*-ethyl (**1c**) derivatives of **1b**. The structure of laxanthone-III is thus 1-hydroxy-3,7-dimethoxy-6-acetoxyxanthone.

EXPERIMENTAL

1. Light yellow needles from $CHCl_3$–petrol: mp 210–211°. (Found: C, 61.3; H, 4.6. $C_{17}H_{14}O_7$ requires: C, 61.32; H, 4.27%); ν_{max}^{KBr} 3100 (OH), 1775, 1650 (conj. CO) cm^{-1}; λ_{max}^{MeOH} 260, 305, 360 nm; + $AlCl_3$ 265, 330, 405 nm; PMR (δ; $CDCl_3$): 2.37 (3H, *s*, —OCOMe), 3.87 (3H, *s*, —OMe), 3.94 (3H, *s*, OMe), 6.37 (1H, *d*, $J = 2.5$ Hz, C-2-H), 6.42 (1H, *d*, $J = 2.5$ Hz, C-4-H), 7.19 (1H, *s*, C-5-H), 7.70 (1H, *s*, C-8-H) and 12.78 (—OH).

1a. Acetylation (Ac_2O/Py) of **1** gave **1a** colourless needles from $CHCl_3$–petrol, mp 216–217° (Found: C, 61.4; H, 4.7. $C_{19}H_{16}O_8$ requires: C, 61.29; H, 4.33%); PMR (δ, $CDCl_3$): 2.34 (3H, *s*, C-6-OCOMe), 2.46 (3H, *s*, C-1-OCOMe), 3.91 (6H, *s*, 2 × OMe), 6.61 (1H, *d*, $J = 2.5$ Hz, C-2-H), 6.80 (1H, *d*, $J = 2.5$ Hz, C-4-H), 7.19 (1H, *s*, C-5-H), 7.78 (1H, *s*, C-8-H).

1b. Hydrolysis (EtOH/HCl) of **1** gave **1b**, light-yellow needles from EtOH, mp 264–265° (Found: C, 62.2; H, 4.4. $C_{15}H_{12}O_6$ requires: C, 62.5; H, 4.2%); treatment of **1b** in Et_2O with CH_2N_2 gave a methyl ether identical with 1-hydroxy-3,6,7-trimethoxyxanthone (**1d**) [13].

1c. Ethylation of **1b** with Et_2SO_4 (1 mole) $KHCO_3$ in Me_2CO gave **1c**, light-yellow needles from MeOH, mp 221–222° (Found: C, 64.5; H, 5.3. $C_{17}H_{16}O_6$ requires: C, 64.55; H, 5.1%).

4. Methylation of **5** [13] with Me_2SO_4 (1 mole)/K_2CO_3 in Me_2CO gave **4**, mp 220–221° (Found: C, 62.8; H, 4.8. $C_{15}H_{12}O_6$ requires: C, 62.5; H, 4.2%).

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A NEW ISOFLAVONE FROM *IRIS KUMAONENSIS*

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Key Word Index—*Iris kumaonensis*; Iridaceae; iridin; iriskumaonin; veratric acid.

Iris kumaonensis Wall was found to contain, in addition to iridin [1], a crystalline product which upon close examination by TLC was a mixture of two glycosides. All attempts to separate the mixture failed; however, acid hydrolysis followed by column chromatography over Si gel gave crystalline iriskumaonin, a new isoflavone, as one of the products. Elemental and MS analysis established the molecular formula $C_{18}H_{14}O_7$.