

## FLACOURTIACEAE

MANGOSTIN FROM THE BARKS OF *HYDNOCARPUS* SPECIES

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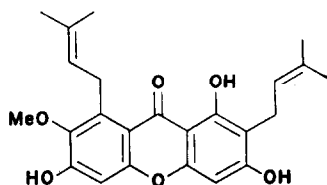
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**Key Word Index**—*Hydnocarpus octandra*; *H. venenata*; Flacourtiaceae; mangostin.

The benzene extract of *Hydnocarpus octandra* Thw. (Sinhala: Wal divul) gave by initial silica gel chromatography and subsequent preparative TLC on silica gel, a yellow compound m.p. 182° in about 0.001% yield. Its IR ( $1645\text{ cm}^{-1}$ ) and UV spectra indicated a tetra-oxygenated xanthene. The MW 410 (MS) and NMR signals for two aromatic protons, two isopentenyl groups, a methoxy group, a chelated hydroxy group, pointed to mangostin.<sup>1-3</sup>



The structure was confirmed by m.m.p., IR, TLC, NMR, and MS comparison with an authentic sample, and by the properties of its dimethyl ether<sup>2</sup> (m.p., m.m.p., IR and TLC).

The benzene extract of the bark of *Hydnocarpus venenata* Gaertn. (Sinhala: Makulu) also gave mangostin in about 0.001% yield (characterised as above). This is the first report of the presence of mangostin in a family other than that of the Guttiferae and could have taxonomic value. Up to date the only xanthone type of compound reported from the Flacourtiaceae is mangiferrin which has been isolated from *Flacourtia indica*, *Aphloia theaeformis* and *A. madagascariensis*.<sup>4</sup>

## EXPERIMENTAL

*Isolation of mangostin from H. octandra* Thw. Dried powdered bark (9.0 kg) of *H. octandra* Thw. (from Kanneliya Forest Reserve) was exhaustively extracted with hot benzene. Concentration of the extract yielded a black tarry solid (35.2 g) which was dissolved in excess benzene, concentrated to about 200 ml, left overnight, filtered, and the filtrate concentrated to a semi-solid (23.0 g). This was separated on a column of

<sup>1</sup> W. SCHMIDT, *Annalen* **93**, 83 (1855).

<sup>2</sup> P. YATES and G. H. STOUT, *J. Am. Chem. Soc.* **80**, 1691 (1958).

<sup>3</sup> S. S. SELLIAH and M. U. S. SULTANBAWA, *Proc. Ceylon Assoc. Adv. Sci.* **27**, 76 (1970).

<sup>4</sup> I. CARPENTER, H. D. LOCKSLEY and F. SCHEINMANN, *Phytochem.* **8**, 2013 (1969).

silica gel (Merck, 500 g, 30–70 mesh) and the 50% benzene-CHCl<sub>3</sub> fraction gave a greyish yellow solid (300 mg), containing mangostin. The mixture was separated on a silica gel G (Merck) plate (150 mg × 2) with 4% MeOH-CHCl<sub>3</sub> × 2 the UV fluorescent band being extracted with acetone. Recrystallisation of the product from EtOH-H<sub>2</sub>O yielded pure mangostin as needles m.p. 182° (lit.,<sup>2</sup> 182–183°), *R<sub>f</sub>* 0.20 in CHCl<sub>3</sub>, *M*(MS) 410; λ<sub>max</sub> (EtOH) 244 (log ε 4.54), 259 (4.44), 318 (4.38), 355 (3.80) nm; ν<sub>max</sub> (KBr) 1580, 1606, 1645, 3250, and 3407 cm<sup>-1</sup>; τ in CDCl<sub>3</sub> (100 MHz) —3.65 (1H, *s*, 1-OH), 3.20 (1H, *s*, 5-H), 3.73 (1H, *s*, 4-H), 4.62 (2H, *t*, *J* 8 Hz, 2,8 side chains-vinyl H), 5.92 (2H, *d*, *J* 8 Hz, 8-methylene-H), 6.21 (3H, *s*, 7-OMe), 6.58 (2H, *d*, *J* 8 Hz, 2-methylene-H), 8.18 (6H, *s*, 8- = C(CH<sub>3</sub>)<sub>3</sub>), 8.24 and 8.32 (6H, *s*, 2- = C(CH<sub>3</sub>)<sub>2</sub>).

*Dimethyl mangostin*. (Me<sub>2</sub>SO<sub>4</sub>-K<sub>2</sub>CO<sub>3</sub>) had m.p. 122° (lit.,<sup>2</sup> 123–124°).

*Isolation of mangostin from H. venenata* Gaertn. Dried powdered bark (4.6 kg) of *H. venenata* Gaertn. (from Naula, Matala District) was extracted with hot light petrol. (60–80°) and the extract, processed as above gave mangostin m.p. 182°.

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## LAURACEAE

### TERPENES OF *LINDERA ERYTHROCARPA*

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**Key Word Index**—*Lindera erythrocampa*; Lauraceae; linderone; methyllinderone; lucidone; methylucidone; sitosterol-D-glucoside.

**Plant.** *Lindera erythrocampa* Makino. **Source.** Gifu prefecture, Japan. **Uses.** Folk medicine of Gifu prefecture for a stomach-ache and neuralgia. **Previous work.** Tannin of bark,<sup>1</sup> alkaloids of root<sup>2</sup> and essential oil of leaves.<sup>3</sup>

**Fruits.** Linderone(I),<sup>4</sup> C<sub>16</sub>H<sub>14</sub>O<sub>5</sub>, m.p. 92–93.5°, methyllinderone(II),<sup>4</sup> C<sub>17</sub>H<sub>16</sub>O<sub>5</sub>, m.p. 84–85°, lucidone(III),<sup>5</sup> C<sub>15</sub>H<sub>12</sub>O<sub>4</sub>, m.p. 166.5–168.5°, methyllucidone(IV),<sup>5</sup> C<sub>16</sub>H<sub>14</sub>O<sub>4</sub>, m.p. 126–128° and sitosterol-D-glucoside were isolated from the etherial extract of dry fruits. They were separated by silica-gel column chromatography and identified by IR, UV, NMR, m.m.p. and TLC, color reagents: iodine and Ehrlich reagent (5% diethylaminobenzaldehyde in EtOH + dil. HCl).

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<sup>1</sup> Y. SHIGEMATSU and M. KAWASAKI, *Ringaku* 21, 1 (1938).

<sup>2</sup> M. KOTSUKA, M. YOSHIKAWA, K. MIYAJI and T. SAWADA, *Abstract of Papers, Shizuoka, Annual Meeting of Pharmacognostical Society of Japan*, p. 49, Pharmacognostical Society of Japan, Kyoto (1971).

<sup>3</sup> H. KOMAE and N. HAYASHI, *Phytochem.* 11, 853 (1972).

<sup>4</sup> A. K. KIANG, H. H. LEE and K. Y. SIM, *J. Chem. Soc.* 4338 (1962).

<sup>5</sup> H. H. LEE, *Tetrahedron Letters* 40, 4243 (1968).