

Chemical Constituents of *Fissistigma polyanthoides*

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ABSTRACT From the bark of *Fissistigma polyanthoides* 5,8-dihydroxy-6,7-dimethoxyflavone (1), 2',5'-dihydroxy-3',4',6'-trimethoxy dihydrochalcone (2), (-)-6-hydroxy-5,7,8-trimethoxy flavanone (3) and (-)-thaipetaline (4) were isolated. The ¹³C NMR properties of 3 and 4 were extensively studied.

KEYWORDS: *Fissistigma polyanthoides*, Annonaceae, flavonoid, alkaloid, ¹³C NMR.

INTRODUCTION

The genus *Fissistigma* (Annonaceae) consists of about 80 species, widely distributed in Asia and Australia.¹ Previous phytochemical investigations of the genus revealed the presence of flavonoids²⁻³ and isoquinoline alkaloids.⁴⁻⁷ *Fissistigma polyanthoides* (DC) Merr is a climber known in Thai as "Kha-hod" with no information on its chemical constituents so far available. As a continuation of our recent studies on Thai medicinal plants,⁸⁻¹² a phytochemical study of the bark of this plant was carried out, and this resulted in the isolation of three flavonoids, namely 5,8-dihydroxy-6,7-dimethoxyflavone (1), 2',5'-dihydroxy-3',4',6'-trimethoxy dihydro-chalcone (2) and (-)-6-hydroxy-5,7,8-trimethoxy flavanone (3), and one alkaloid viz (-)-thaipetaline (4).

DISCUSSION

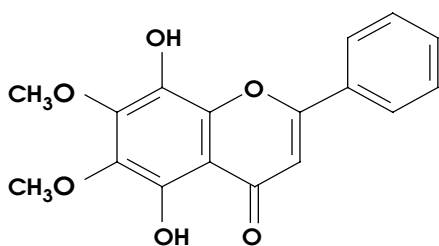
Compounds 1 and 2 were formerly reported from *F. lanuginosum*, with their ¹H and ¹³C NMR data fully examined.² Flavonoid 3 was previously isolated from *Didymocarpus pedicellata* (Gesneriaceae), but it was initially misidentified as (-)-7-hydroxy-5,6,8-trimethoxy flavanone, and given a trivial name "didymocarpin."¹³ In subsequent studies by Gupta and co-workers,¹⁴⁻¹⁶ however, a revision based on the UV, IR and ¹H NMR data was suggested. This issue was further clarified in our study by examination of the HETCOR and COLOC spectra of 3. The results obtained in this work were in agreement with the conclusion of Gupta and co-workers and furthermore provided the first ¹³C NMR report for 3. It should be noted that a compound named isopedicin, which was previously referred to as (-)-6-hydroxy-

5,7,8-trimethoxy flavanone in a review,¹⁷ was actually described in the original papers as a benzofuranone derivative.¹⁸⁻²⁰ With regard to compound 4, this alkaloid was first found in *Polyalthia stenopetala* (Annonaceae), with its structure determined by ¹H NMR analysis.²¹ It belongs to the rare group of 2,3,4-trisubstituted tetrahydroprotoberberines; so far only three alkaloids of this type, including 4, have been identified.²¹⁻²² The ¹³C NMR data of 4 were obtained for first time in this study by interpretation of the HMQC and HMBC correlations.

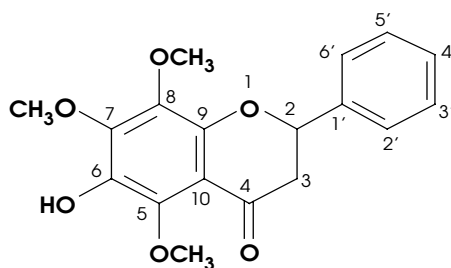
MATERIALS AND METHODS

Plant material: The bark of *F. polyanthoides* was collected from Namnao National Park, Petchaboon province in March 1993. A herbarium sample (VJ 032539) is kept at the Department of Pharmaceutical Botany, Faculty of Pharmaceutical Sciences, Chulalongkorn University.

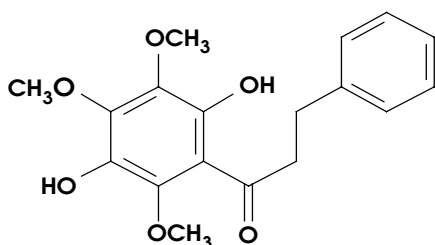
Isolation: The dried powdered stem bark of *F. polyanthoides* (2 kg) was extracted with ethanol. The ethanol extract (600 g) was then chromatographed over a Kieselguhr column, eluted with hexane, CHCl₃ and MeOH, respectively. The hexane fraction (18 g) was further separated by column chromatography on silica gel using hexane-acetone (4:1) as eluent to give five fractions, *ie* fractions A, B, C, D and E. Fraction B was recrystallized from hexane: CHCl₃ (1:1) to yield 230 mg of 2. Fraction C was purified by a Sephadex-LH20 column, eluted with MeOH to give 1 (15 mg). Fraction D, after recrystallization from hexane:chloroform (1:1), gave 60 mg of 3. The CHCl₃ extract was treated with 10% H₂SO₄ solution, and the aqueous layer was filtered. The filtrate was basified with NH₄OH, and



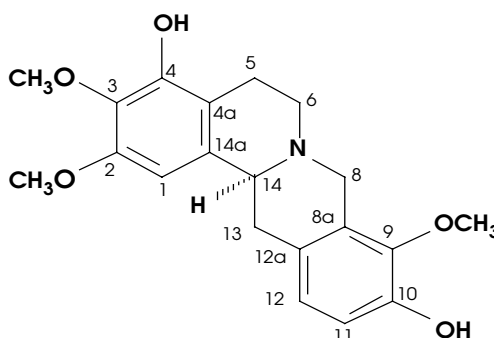
1



3



2



4

then extracted with CHCl_3 . The CHCl_3 fraction was dried over anhydrous Na_2SO_4 and evaporated to dryness to give a residue (1 g). This residue was separated by Silica gel column chromatography, and then purified by preparative Silica gel thin layer chromatography to give 4 (30 mg).

Instrumentation: UV spectra were determined on a Milton Roy spectronic 3000 Array spectrometer. IR spectra were measured on a Perkin Elmer FT-IR 1760x spectrometer. Optical rotations were recorded on a Perkin Elmer 341 polarimeter. EI mass spectra were obtained on a JEOL JMS-AM20 spectrometer. ^1H (500 MHz) and ^{13}C NMR (125 MHz) experiments, including the HETCOR, COLOC, HMQC and HMBC techniques, were carried out on a JEOL JMN-A 500 spectrometer.

5,8-Dihydroxy-6,7-dimethoxyflavone, 1. M.p., UV, IR, ^1H and ^{13}C NMR, and MS: see ref 2.

2',5'-Dihydroxy-3',4',6'-trimethoxy dihydrochalcone, 2. M.p., UV, IR, ^1H and ^{13}C NMR, and MS: see ref 2.

(-)-6-Hydroxy-5,7,8-trimethoxyflavanone, 3. M.p. 104 - 106°C; $[\alpha]_{\text{D}}^{25}$ -10.3° (*c* 0.3, MeOH); UV (MeOH) λ_{max} (log ϵ) 280 (4.5), 358 (4.0) nm; IR (KBr) ν_{max} 3402, 2966, 2943, 2838, 1680, 1595,

1488, 1461, 1426 cm^{-1} ; EIMS m/z (% relative intensity) 330 (23), 227 (9), 226 (100), 211 (99), 183 (27), 127 (13), 104 (10), 103 (17), 91 (4), 77 (16), 69 (31); ^1H NMR (500 MHz, CDCl_3) δ 2.87 (1H, dd, J = 16.8, 3.1 Hz, H-3a), 3.02 (1H, dd, J = 16.8, 13.1 Hz, H-3b), 3.86 (3H, s, 8-OCH₃), 3.92 and 4.10 (3H each, 5-OCH₃ and 7-OCH₃), 5.43 (1H, dd, J = 13.1, 3.1 Hz, H-2), 5.59 (1H, s, 6-OH), 7.38 (1H, ddd, J = 7.3, 1.5, 1.5 Hz, H-4'), 7.43 (2H, dd, J = 7.3, 7.3 Hz, H-3' and H-5'), 7.48 (2H, dd, J = 7.3, 1.5 Hz, H-2' and H-6'); ^{13}C NMR (125 MHz, CDCl_3): δ 45.8 (C-3), 61.3 and 61.8 (5-OCH₃ and 7-OCH₃), 61.4 (8-OCH₃), 79.3 (C-2), 110.9 (C-10), 125.9 (C-2' and C-6'), 128.6 (C-4'), 128.7 (C-3' and C-5'), 136.9 (C-6), 137.6 (C-8), 138.7 (C-1'), 142.3 (C-7), 147.3 (C-5), 149.6 (C-9), 189.9 (C-4).

(-)-Thaipetaline, 4. $[\alpha]_{\text{D}}$, UV, IR, MS, ^1H NMR: see ref 21; ^{13}C NMR (125 MHz, CDCl_3): δ 23.0 (C-5), 36.1 (C-13), 51.0 (C-6), 53.9 (C-8), 55.9 (2-OCH₃), 59.6 (C-14), 60.7 (3-OCH₃), 61.0 (9-OCH₃), 100.6 (C-1), 114.0 (C-11), 114.7 (C-4a), 124.9 (C-12), 127.0 (C-12a), 127.9 (C-8a), 133.6 (C-14a), 133.7 (C-3), 143.2 (C-9), 146.4 (C-4), 146.5 (C-10), 150.5 (C-2).

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