SUPPLEMENTARY MATERIAL

Two New Flavans from the Trunk and Leaves of *Horsfieldia glabra*

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Two New Flavans from the Trunk and Leaves of *Horsfieldia glabra*

Two new flavans, (2*R*, 4*R*)-4'-hydroxy-3',5'-methyl-6,7-methylenedioxy-4-*O*-2'-cycloflavan (**1**), and (2*R*, 4*R*)-4'-hydroxy-3'-methyl-6,7-methylenedioxy-4-*O*-2'-cycloflavan (**2**), along with 6 known compounds were isolated from the trunk and leaves of *Horsfieldia glabra*. Their structures were elucidated by means of extensive spectroscopic analysis. Compounds **1** and **2**, together with **4-7** were assessed for their cytotoxicity against five human cancer cell lines (HL-60, SMMC-7721, A-549, MCF-7 and SW-480), and the result showed that they had no activity.

Keywords: *Horsfieldia glabra*; Myristicaceae; cycloflavan

Supporting information

Figure S1. Selected 2D NMR correlations of **1** and **2**.

Figure S2. Detailed calculated and experimental ECD spectra of compound **1**.

Spectroscopic data of the known compounds **3-8**.

Original spectra of compound **1**.

^1H NMR Spectrum (500 MHz, CDCl_3)

^{13}C NMR Spectrum (125 MHz, CDCl_3)

COSY Spectrum

HSQC Spectrum

HMBC Spectrum

HRESIMS

ESIMS

IR

CD Spectrum

Original spectra of compound **2**.

^1H NMR Spectrum (500 MHz, CDCl_3)

^{13}C NMR Spectrum (125 MHz, CDCl_3)

COSY Spectrum

HSQC Spectrum

HMBC Spectrum

HRESIMS

ESIMS

IR

CD Spectrum

Figure S1. Selected 2D NMR correlations of **1** and **2**.

Figure S2. Detailed calculated and experimental ECD spectra of compound **1***.

* Red line: experimental CD; Blue line: calculated ECD

Calculated ECD data of compound **1***.

Spectroscopic data of the known compounds **3-8**.

(-)-Sesamin (3)

White needles, MF: C₂₀H₁₈O₆, MW: 354; ¹H NMR (CD₃COCD₃, 500 MHz) : δ 6.92 (2H, d, J = 1.5 Hz, H-2', H-2''), 6.87 (2H, dd, J = 8.0, 1.5 Hz, H-6', H-6''), 6.81 (2H, d, J = 8.0 Hz, H-5', H-5''), 5.97 (4H, s, 2 $\times$ OCH₂O), 4.70 (2H, d, J = 4.5 Hz, H-2 β , H-6 β), 4.22 (2H, dd, J = 7.0, 3.5 Hz, H-4 α , H-8 α), 3.84 (2H, dd, J = 7.0, 3.5 Hz, H-4 β , H-8 β), 3.07 (2H, m, H-1 α , H-5 α); ¹³C NMR (CD₃COCD₃, 125 MHz): δ 147.9 (s, C-3', 3''), 147.0 (s, C-4', 4''), 136.0 (s, C-1', 1''), 119.3 (d, C-6', 6''), 107.8 (d, C-5', 5''), 106.4 (d, C-2', 2''), 101.1 (t, 2 $\times$ OCH₂O), 85.5 (d, C-2, 6), 71.4 (t, C-4, 8), 54.5 (q, C-1, 5).

(-)-kobusin (4)

Colorless gum, MF: C₂₁H₂₂O₆, MW: 370; ¹H NMR (CDCl₃, 500 MHz) : δ 6.92 (1H, d, J = 1.6 Hz, H-2''), 6.89 (1H, d, J = 1.5 Hz, H-2'), 6.88 (1H, d, J = 2.5 Hz, H-6''), 6.83 (1H, d, J = 1.5 Hz, H-6'), 6.80 (1H, d, J = 1.6 Hz, H-5''), 6.79 (1H, d, J = 1.5 Hz, H-5'), 5.97 (2H, s, OCH₂O), 4.76 (2H, dd, J = 11.0, 5.5 Hz, H-2, H-6), 4.28 (2H, dd, J = 9.0, 4.0 Hz, H-4b, H-8b), 4.26 (2H, m, H-4a, H-8a), 3.92 (3H, s, 3'-OCH₃), 3.90 (3H, s, 4'-OCH₃), 3.11 (2H, m, H-1, H-5); ¹³C NMR (CDCl₃, 125 MHz): δ 149.2 (s, C-3'), 148.7 (s, C-4'), 148.0 (s, C-3''), 147.1 (s, C-4''), 135.1 (s, C-1''), 133.5 (s, C-1'), 119.4 (d, C-6''), 118.3 (d, C-6'), 111.1 (d, C-5'), 109.2 (d, C-2'), 108.2 (d, C-5''), 106.5 (d, C-2''), 101.1 (t, OCH₂O), 85.8 (d, C-2), 85.7 (d, C-6), 71.8 (t, C-4), 71.7 (t, C-8), 56.0 (q, 3'-OCH₃), 56.0 (q, 4'-OCH₃), 54.3 (d, C-5), 54.2 (d, C-1).

virolane (5)

Red oil, MF: C₁₇H₁₈O₄, MW: 286; ¹H NMR (CDCl₃, 500 MHz) : δ 6.96 (1H, d, J = 8.0 Hz, H-6'), 6.75 (1H, d, J = 2.0 Hz, H-3'), 6.74 (1H, dd, J = 8.0, 2.0 Hz, H-5'), 6.66 (1H, d, J = 8.0 Hz, H-3''), 6.42 (1H, d, J = 2.0 Hz, H-6''), 6.36 (1H, dd, J = 8.0, 2.0 Hz, H-2''), 5.94 (2H, s, OCH₂O), 3.80 (3H, s, 4'-OMe), 2.57 (4H, m, H-1, H-3), 1.84

(2H, m, H-2); ^{13}C NMR (CDCl_3 , 125 MHz): δ 158.5 (s, C-4'), 154.9 (s, C-2'), 147.4 (s, C-5''), 145.4 (s, C-4''), 136.6 (s, C-1''), 130.1 (d, C-6'), 122.9 (s, C-1'), 121.1 (d, C-2''), 108.9 (d, C-3''), 108.0 (d, C-6''), 106.4 (d, C-5'), 100.7 (t, OCH_2O), 98.8 (d, C-3'), 55.3 (q, 4'-OMe), 35.4 (t, C-3), 31.8 (t, C-1), 29.1 (t, C-2).

betulinic acid (6)

White powder, MF: $\text{C}_{30}\text{H}_{48}\text{O}_3$, MW: 456; ^1H NMR (CDCl_3 , 500 MHz) : δ 4.77 (1H, dq, $J = 2.0$ Hz, H-29 α), 4.64 (1H, dq, $J = 2.0, 1.4$ Hz, H-29 β), 3.22 (1H, dd, $J = 11.5, 5.0$ Hz, H-3 α), 3.02 (1H, ddd, $J = 11.0, 10.0, 5.5$ Hz, H-19 β), 2.32 (1H, ddd, $J = 12.5, 3.5, 3.5$ Hz, H-16 β), 2.23 (1H, ddd, $J = 15.0, 11.5, 3.5$ Hz, H-13 β), 2.00 (1H, dd, $J = 11.5, 9.5$ Hz, H-22 β), 1.99 (1H, m, H-21 β), 1.72 (1H, m, H-12 β), 1.71 (1H, m, H-1 β), 1.70 (3H, s, H-30), 1.65 (1H, dd, $J = 11.0, 11.0$ Hz, H-18 α), 1.62 (1H, m, Ha-2), 1.56 (1H, m, Hb-2), 1.54 (1H, ddd, $J = 14.0, 13.6, 3.2$ Hz, H-15 β), 1.52 (1H, m, H-6 α), 1.50 (1H, ddd, $J = 11.5, 10.6, 6.0$ Hz, H-22 α), 1.45 (1H, m, H-11 α), 1.43 (1H, ddd, $J = 13.4, 12.6, 3.6$ Hz, H-16 α), 1.42 (1H, ddd, $J = 10.8, 10.6, 5.0$ Hz, H-21 α), 1.40 (1H, m, H-6 β), 1.40 (1H, m, H-7 α), 1.39 (1H, m, H-7 β), 1.29 (1H, dd, $J = 13.0, 5.2$ Hz, H-9 α), 1.28 (1H, m, H-11 β), 1.21 (1H, ddd, $J = 14.0, 3.4, 3.0$ Hz, H-15 α), 1.02 (1H, m, H-12 α), 1.00 (3H, s, H-27 α), 0.98 (3H, s, H-23 α), 0.96 (3H, s, H-26 β), 0.92 (1H, ddd, $J = 13.2, 13.0, 5.2$ Hz, H-1 α), 0.85 (3H, s, H-25 β), 0.78 (3H, s, H-24 β), 0.71 (1H, dd, $J = 9.5, 3.0$ Hz, H-5 α); ^{13}C NMR (CDCl_3 , 125 MHz): δ 180.4 (s, C-28), 150.4 (s, C-20), 109.7 (d, C-29), 79.0 (d, C-3), 56.3 (s, C-17), 55.4 (d, C-5), 50.5 (d, C-9), 49.3 (d, C-19), 46.9 (d, C-18), 42.5 (s, C-14), 40.7 (s, C-8), 38.9 (s, C-4), 38.7 (t, C-1), 38.4 (d, C-13), 37.2 (s, C-10), 37.0 (t, C-22), 34.3 (t, C-7), 32.2 (t, C-16), 30.6 (t, C-15), 29.7 (t, C-21), 28.0 (q, C-23), 27.4 (t, C-2), 25.5 (t, C-12), 20.9 (t, C-11), 19.4 (q, C-30), 18.3 (t, C-6), 16.1 (q, C-26), 16.0 (q, C-25), 15.3 (q, C-24), 14.7 (q, C-27).

dodecanoylphloroglucinol (7)

White amorphous solid, MF: $\text{C}_{18}\text{H}_{28}\text{O}_4$, MW: 308; ^1H NMR (CDCl_3 , 500 MHz) : δ 5.83 (2H, br s, aromatic H), 3.04 (2H, dd, $J = 15.0, 7.5$ Hz, H-2'), 1.32 (18H, br s, H-3' to H-11'), 0.91 (3H, br s, H-12'); ^{13}C NMR (CDCl_3 , 125 MHz): δ 206.2 (s, C-1'),

164.6 (s, C-4), 164.4 (s, C-2, C-6), 104.0 (s, C-1), 94.4 (d, C-3, C-5), 43.5 (t, C-2'), 31.7 (t, C-10'), 29.4 (t, C-7' to C-9'), 29.3 (t, C-6'), 29.1 (t, C-4', C-5'), 24.9 (t, C-3'), 22.4 (t, C-11'), 13.1 (q, C-12').

β -sitosterol (8)

Colorless needles, identified by co-TLC and comparison of ^1H NMR, ^{13}C NMR and EIMS with those of authentic samples.

Original spectra of compound 1.

^1H NMR:

^{13}C NMR:

H-H COSY:

FCN-4 C

Current Data Parameters
NAME FCN-4
EXPNO 5
PROCNO 1

F2 - Acquisition Parameters
Date_ 20150322
Time 4.49
INSTRUM spect
PROBHD 5 mm QNP1H1
PULPROG zgpg30
TD 32768
SOLVENT cdc13
NS 8
DS 8
SWH 4237.289 Hz
FIDRES 2.049889 Hz
AQ 0.2417140 sec
RG 197.02
DE 114.000 usec
DE 4.50 usec
TE 298.7 K
D0 0.0000000 sec
D1 1.9115059 sec
D12 0.0000000 sec
D14 0.0000000 sec
D16 0.0000000 sec
D18 0.0000000 sec

----- CHANNEL f1 -----
NUC1 1H
P1 12.84 usec
PL1 16.000000 dB
RF1 500.130494 MHz

----- GRADIENT CHANNEL -----
GPMAG1 SMC15.100
GPMAG2 SMC15.100
GPMAG3 SMC15.100
GPE1 14.00 %
GPE2 12.00 %
GPE3 10.00 %
F14 1000.00 usec

F1 - Acquisition Parameters
TD 32768
SFO1 500.132 MHz
FIDRES 21.103613 Hz
SW 16.000000 MHz
F2 500.130494 MHz
F2RES 0.000000 Hz
PC 1.40

F1 - Processing parameters
SI 32768
SF 500.130494 MHz
WDW 1
SSB 0
LA 0 Hz
GB 0

F2 - Processing parameters
SI 32768
SF 500.130494 MHz
WDW 1
SSB 0
LA 0 Hz
GB 0

HSQC:

FCN-4 HSQC

HMBC:

FCN-4 HMBC

HRESIMS:

Qualitative Analysis Report

Data Filename	NFcn-4.d	Sample Name	NFcn-4
Sample Type	Sample	Position	P1-B5
Instrument Name	Instrument 1	User Name	
Acq Method	SIBU.m	Acquired Time	3/31/2015 8:32:25 AM
IRM Calibration Status	Success	DA Method	Default.m
Comment			
Sample Group	Info.		
Acquisition SW	6200 series TOF/6500 series		
Version	Q-TOF B.05.01 (B5125.2)		

User Spectra

Peak List

m/z	z	Abund	Formula	Ion
83.9993		2053.63		
187.1273		1583.85		
274.2741		1301.13		
313.1072	1	34651.14	C18 H16 O5	(M+H)+
314.1103	1	7790.64	C18 H16 O5	(M+H)+
347.2224		995.8		
620.4358	1	1032.25		
664.4605	1	1076.32		

Formula Calculator Element Limits

Element	Min	Max
C	3	30
H	0	60
O	0	10
N	0	5
S	0	5

Formula Calculator Results

Formula	CalculatedMass	CalculatedMz	Mz	Diff. (mDa)	Diff. (ppm)	DBE
C18 H16 O5	312.0998	313.1071	313.1072	-0.1	-0.2	11.0000

ESIMS:

Sample Name	NFen-4	Position	P1-B5	Instrument Name	Instrument 1	User Name	
Inj Vol	0.1	InjPosition		SampleType	Sample	IRM Calibration Status	Success
Data Filename	NFen-4.d	ACQ Method	SIBU.m	Comment		Acquired Time	3/31/2015 8:32:25 AM

IR:

Sample : NFCN-4		Frequency Range : 399.246 - 3996.32		Measured on : 22/04/2015	
Technique : KBr压片	Resolution : 4	Instrument : Tensor27		Sample Scans : 16	
Customer : 150422IR8	Zerofilling : 2	Acquisition : Double Sided,For			

Circular Dichroism:

FCN-4⁺

2

Original spectra of compound **2**.

^1H NMR:

^{13}C NMR:

H-H COSY:

HSQC:

HMBC:

FCN-4+ BC

HRESIMS:

Qualitative Analysis Report

Data Filename	NFCN-4+.d	Sample Name	NFCN-4+
Sample Type	Sample	Position	PI-F3
Instrument Name	Instrument 1	User Name	
Acq Method	SIBU.m	Acquired Time	5/14/2015 2:07:37 PM
IRM Calibration Status	Success	DA Method	Default.m
Comment			
Sample Group	Info.		
Acquisition SW	6200 series TOF/6500 series		
Version	Q-TOF B.05.01 (B5125.2)		

User Spectra

Peak List				
m/z	z	Abund	Formula	Ion
269.0369		7577.84		
293.0784	2	7782.23		
299.0915	1	8313.61	C17 H14 O5	(M+H)+
455.1547	1	24782.14		
572.1767	1	17106.7		
588.1502	1	9637.49		

Formula Calculator Element Limits

Element	Min	Max
C	2	60
H	0	120
O	0	10

Formula Calculator Results

Formula	CalculatedMass	CalculatedMz	Mz	Diff. (mDa)	Diff. (ppm)	DBE
C17 H14 O5	298.0841	299.0914	299.0915	0.1	0.4	11.0000

-- End Of Report --

ESIMS:

Sample Name	NFCN-4+	Position	P1-F3	Instrument Name	Instrument 1	User Name	
Inj Vol	0.1	InjPosition		SampleType	Sample	IRM Calibration Status	Success
Data Filename	NFCN-4+.d	ACQ Method	SIBU.m	Comment		Acquired Time	5/14/2015 2:07:37 PM

IR:

Sample : NFCN-4		Frequency Range : 399.246 - 3996.32		Measured on : 22/04/2015	
Technique : KBr压片		Resolution : 4		Instrument : Tensor27	
Customer : 150422IR8		Zerofilling : 2		Sample Scans : 16	
				Acquisition : Double Sided,Forw	

Circular Dichroism:

FCN-4

+