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Cerebrosides and Terpene Glycosides from the Root of *Aster scaber*

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Three cerebrosides **2**, **3**, and **5** and two terpene glycosides **1** and **4** have been isolated from the methanol extract of the root of *Aster scaber*. Their structures were determined as 3-*O*-β-D-glucuronopyranosyl-oleanolic acid methyl ester (**1**), (2*S*, 3*S*, 4*R*, 2'*R*, 8*Z*, 15'*Z*)-*N*-2'-hydroxy-15'-tetracosenoyl-1-*O*-β-D-glucopyranosyl-4-hydroxy-8-sphingenine (**2**), (2*S*, 3*S*, 4*R*, 8*Z*)-*N*-octadecanoyl-1-*O*-β-D-glucopyranosyl-4-hydroxy-8-sphingenine (**3**), 1α-hydroxy-6β-*O*-β-D-glucosyl-eudesm-3-ene (**4**), and (2*S*, 3*S*, 4*R*, 2'*R*, 8*Z*)-*N*-2'-hydroxy-hexadecanoyl-1-*O*-β-D-glucopyranosyl-4-hydroxy-8-sphingenine (**5**) on the basis of spectroscopic methods.

Key words: *Aster scaber*, Cerebroside, Terpene glycoside, Asteraceae

INTRODUCTION

Aster scaber Thunb. (Asteraceae) is widespread and cultivated as culinary vegetables in Korea (Lee, 1989). *Aster* species have been used in traditional Chinese medicine to treat bruises, snakebite, headache and dizziness (Kim *et al.*, 1997). Triterpene glycosides and volitile compounds have been reported from *Aster scaber* (Nagao *et al.*, 1992; Nagao *et al.*, 1993; Chung *et al.*, 1993). In our previous study on this plant, we reported four antiviral quinic acid derivatives (Kwon *et al.*, 2000) and two new monoterpene hydroperoxides (Jung *et al.*, 2001) from the aerial parts. In our continuous study on this plant, three cerebrosides **2**, **3** and **5**, and two terpene glycosides **1** and **4** were isolated from the root of *Aster scaber*. The present paper describes the isolation and structural characterization of these compounds **1**~**5**.

MATERIALS AND METHODS

General

Melting points were determined on Gallenkamp melting point apparatus and are uncorrected. Optical rotations were measured on a Jasco P-1020 Polarimeter. NMR spectra were recorded on either a Bruker AMX or a Varian UNITY INOVA 500 NMR spectrometer. EIMS and FABMS data were obtained on a JEOL JMS700 mass spectrometer and GC-MS data were taken on a Hewlett-Packard 6890 GC (column : HP-5MS 30 m 0.25 mm)/Hewlett-Packard 5973 MSD system. Preparative HPLC used a Knauer instrument with refractive index detector, UV detector and Econosil C_{18} 10 μm column (250 mm×10 mm). Open column chromatography was carried out over silica gel (Merck, 70-230) or Sephadex LH-20 (Pharmacia). Low pressure liquid chromatography was carried out over Merck Lichroprep Lobar-A Si 60 (240×10 mm) or Lichroprep Lobar-A RP-18 (240×10 mm) column with FMI QSY-0 pump (ISCO).

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Materials

The roots of *Aster scaber* were collected in ChukRyung Mt., Kyungi-Do, Korea in September 1997. A voucher specimen (SKK-98-001) is deposited at the College of Pharmacy in SungKyunKwan University.

Extraction and Isolation

The dried and chopped roots of *Aster scaber* were extracted with MeOH two times at room temp and once at 50°C for 5 h. The resultant MeOH extract (200 g) was subjected to successive solvent partitioning to give *n*-hexane (4 g), chloroform (4 g), ethyl acetate (25 g) and *n*-butanol (40 g) soluble fractions. The ethyl acetate extract

(25 g) was chromatographed on silica gel using EtOAc:MeOH:H_2O (9:2:0.5) to give five subfractions (E1~E5). Fr. E1 (5 g) was chromatographed on Sephadex LH-20 eluted with CH_2Cl_2:MeOH (1:1) to give two fractions (E11 and E12). Fr. E11 (1.5 g) was subjected to silica gel chromatography eluted with EtOAc:MeOH:H_2O (10:2:0.3) to give two subfractions (E111~E112). Fr. E111 (470 mg) was chromatographed on silica gel eluted with CH_2Cl_2:MeOH:H_2O (50:10:1) to give eight subfractions (E1111~E1118). Fr. E1114 (40 mg) was purified by RP-18 prep-HPLC (MeOH) to afford **1** (8 mg) and **2** (7 mg). Fr. E1115 (15 mg) was purified by RP-18 prep-HPLC (MeOH) to afford **3** (7 mg). E112 (277 mg) was subjected to silica gel chromatography eluted with CH_2Cl_2:MeOH:H_2O (50:10:1) to give six subfractions (E1121~ E1126). Fr. E1125 (10 mg) and Fr. E1126 (10 mg) were purified by RP-18 prep-HPLC (60% MeOH) to afford **4** (5 mg) and **5** (5 mg), respectively.

3-*C*-β-D-Glucuronopyranosyl-oleanolic acid methyl ester (1)

White powder, mp. 218°C; FAB-MS m/z : 669 $[M+Na]^+$; ^{1}H-NMR (500 MHz, CD_3OD) : δ 0.77 (3H, s), 0.79 (3H, s), 0.84 (3H, s), 0.91 (3H, s), 0.94 (3H, s), 1.04 (3H, s), 1.16 (3H, s), 3.23 (1H, dd, *J* = 9.0, 8.0 Hz, H-2′), 3.35 (1H, t, *J* = 9.0 Hz, H-3′), 3.51 (1H, t, *J* = 9.0 Hz, H-4′), 3.64 (1H, m, H-3), 3.77 (3H, s, OCH_3), 3.82 (1H, d, *J* = 9.0 Hz, H-5′), 4.38 (1H, d, *J* = 8.0 Hz, H-1′), 5.28 (1H, m, H-12); ^{13}C-NMR (125 MHz, CD_3OD) 15.93 (C-25), 16.92 (C-24), 17.72 (C-26), 17.79 (C-6), 23.96 (C-16), 24.06 (C-30), 24.54 (C-11), 26.32 (C-27), 27.00 (C-23), 28.45 (C-15), 28.86 (C-2), 31.57 (C-20), 33.47 (C-7), 33.97 (C-22), 34.80 (C-29), 34.88 (C-21), 37.88 (C-10), 39.75 (C-1), 40.15 (C-8), 40.72 (C-4), 42.65 (C-14), 42.93 (C-18), 47.20 (C-19), 47.25 (C-17), 48.48 (C-9), 52.75 (OMe), 56.99 (C-5), 73.19 (C-4′), 75.30 (C-2′), 76.64 (C-3′), 77.5 (C-5′), 91.12 (C-3), 107.03 (C-1′), 124.08 (C-12), 144.90 (C-13), 171.40 (C-6′), 172.33 (C-28).

Table I. ^{1}H-NMR data of Compounds **2**, **3** and **5** (500 MHz, CD_3OD, ppm)

Position	2	3	5
1	3.81 dd (10.5, 4.0)	3.71 dd (10.5, 3.5)	3.81dd (10.5, 4.0)
	4.04 dd (10.5, 6.0)	4.12 dd (10.5, 5.5)	4.05dd (10.5, 6.0)
2	4.26 m	3.95 m	4.27 m
3	4.02 dd (7.5, 4.0)	4.03 dd (7.0, 4.0)	4.02 dd (7.5, 4.0)
4	3.52 m	3.65-3.68 m	3.52 m
5	1.58-1.78 m	1.32-1.80 m	1.58-1.80 m
6	1.20-1.40 m	1.20-1.40 m	1.20-1.40 m
7, 10	1.98 m	1.98 m	1.99 m
8, 9	5.42 m	5.40 m	5.42 m
11~17	1.20-1.40 m	1.20-1.40 m	1.20-1.40 m
18	0.90 t (7.5)	0.90 t (7.5)	0.90 t (7.5)
2′	3.60 t (6.0)	1.32-1.80 m	3.60 t (6.0)
3′	1.58-1.78 m	1.20-1.40 m	1.58-1.80 m
4′~13′	1.20-1.40 m	1.20-1.40 m	1.20-1.40 m
14′, 17′	2.03 m	1.20-1.40 m	-
15′~16′	5.34 m	1.20-1.40 m	0.90 t (7.5, H-16)
18′	1.20-1.40 m	0.90 t (7.5)	
19′~23′	1.20-1.40 m		
24′	0.90 t (7.5)		
1″	4.28 d (7.5)	4.27 d (7.5)	4.28 d (7.5)
2″	3.17 dd (9.0, 7.5)	3.18 dd (9.0, 7.5)	3.17 dd (9.0, 7.5)
3″	3.33 m	3.32 - 3.36 m	3.33 - 3.38 m
4″	3.33 m	3.32 - 3.36 m	3.33 - 3.38 m
5″	3.28 m	3.27 m	3.27 m
6″	3.37 dd (11.5, 6.5)	3.65-3.68 m	3.67 dd (11.5, 6.5)
	3.37 dd (11.5, 1.0)	3.87 br.d (11.5)	3.87 dd (11.5, 1.0)

(2*S*, 3*S*, 4*R*, 2′*R*, 8*Z*, 15′*Z*)-*N*-2′-Hydroxy-15′-tetracosenoyl-1-*O*-β-D-glucopyranosyl-4-hydroxy-8-sphingenine (2)

White powder, mp. 159°C; $[\alpha]_D$ +23.4° (c 0.05, CH_3OH); FAB-CID-MS m/z (rel. int.) : 864 ($[M+Na]^+$, 100), 500 ($[476+Na+H]^+$, 10); ^{1}H-NMR (500 MHz, CD_3OD) : Table I, ^{13}C-NMR (125 MHz, CD_3OD) : Table II.

Table II. ^{13}C-NMR data of Compounds **2**, **3** and **5** (125 MHz, CD_3OD, ppm)

Position	2	3	5
1	69.93	69.92	69.86
2	51.65	54.70	51.56
3	75.57	71.64	75.50
4	72.98	72.98	72.90
5, 6	*	*	*
7, 10	33.69, 33.79	33.61, 33.67	33.61, 33.73
8	131.35	131.57	131.28
9	131.55	131.35	131.49
11~16	*	*	*
17	23.73	23.74	23.65
18	14.44	14.43	14.37
1′	177.20	177.16	177.12
2′	72.88	*	72.80
3′	35.73	35.73	35.65
4′~13′	*	*	*
15′,	130.85	*	23.65
16′	130.85	*	14.37
14′, 17′	33.69, 33.79	23.74 (C-17′)	
18′	*	14.43	
19′~22′	*		
23′	23.73		
24′	14.44		
1″	104.69	104.67	104.61
2″	75.01	74.99	74.95
3″	78.02	77.91	77.94
4″	71.57	71.58	71.50
5″	77.90	77.97	77.82
6″	62.66	62.65	62.59

[a, b, c, d]These values can be interchanged

*Can not be assigned

(2*S*, 3*S*, 4*R*, 8*Z*)-*N*-Octadecanoyl-1-*O*-β-D-glucopyranosyl-4-hydroxy-8-sphingenine (3)

White powder, mp. 134°C; $[\alpha]_D$ 1.9° (c 0.05, CH_3OH); FAB-CID-MS m/z (rel. int) : 766 ([M+Na]$^+$, 100), 554 ([532+Na-H]$^+$, 15); ^{1}H-NMR (500 MHz, CD_3OD) : Table I, ^{13}C-NMR (125 MHz, CD_3OD) : Table II.

1α-Hydroxy-6β-*O*-β-D-glucosyl-eudesm-3-ene (4)

Colorless gum, $[\alpha]_D$ +32.6° (c 0.05, CH_3OH); EIMS m/z (rel. int.) : 220 (56), 202 (6), 177 (100), 159 (29), 145 (14), 119 (21), 107 (29); ^{1}H-NMR (500 MHz, CD_3OD) : 0.83 (3H, s, H-14), 0.93 (3H, d, *J* = 6.5 Hz, H-13), 1.01 (3H, d, *J* = 6.5 Hz, H-12), 1.63 (1H, ddd, *J* = 15.5, 10.0, 2.0 Hz, H-7), 1.85 (3H, br.s, H-15), 2.25-2.33 (2H, m, H-5 and H-11), 3.14-3.23 (2H, m, H-2′, H-5′), 3.32-3.34 (2H, m, H-3′, 4′), 3.68 (1H, dd, *J* = 12.0, 5.0 Hz, H-6′a), 3.79 (1H, dd, *J* = 12.0, 2.5 Hz, H-6′b), 3.93 (1H, br.d, *J* = 6.0 Hz, H-1), 4.07 (1H, dd, *J* = 9.0, 2.0 Hz, H-6), 4.43 (1H, d, *J* = 7.5 Hz, H-1'), 5.27 (1H, br.s, H-3); ^{13}C-NMR (125 MHz, CD_3OD) 12.66 (C-14), 21.63 (C-8), 22.07 (C-15), 22.58 (C-12, C-13), 30.17 (C-11), 32.38 (C-2), 33.94 (C-9), 36.11 (C-10), 43.67 (C-7), 46.64 (C-5), 62.67 (C-6′), 70.36 (C-6), 71.47 (C-4′), 75.58 (C-2′), 77.85 (C-5′), 78.19 (C-3′), 78.37 (C-1), 104.87 (C-1′), 121.60 (C-3), 136.12 (C-4).

(2*S*, 3*S*, 4*R*, 2′*R*, 8*Z*)-*N*-2′-Hydroxy-hexadecanoyl-1-*O*-β-D-glucopyranosyl-4-hydroxy-8-sphingenine (5)

White powder, mp. 165°C; $[\alpha]_D$ +27.8° (c. 0.05, CH_3OH); FAB-CID-MS m/z (rel. int.) : 754 ([M+Na]$^+$, 100), 500 ([476 +Na+H]$^+$, 12); ^{1}H-NMR (500 MHz, CD_3OD): Table I, ^{13}C-NMR (125 MHz, CD_3OD): Table II.

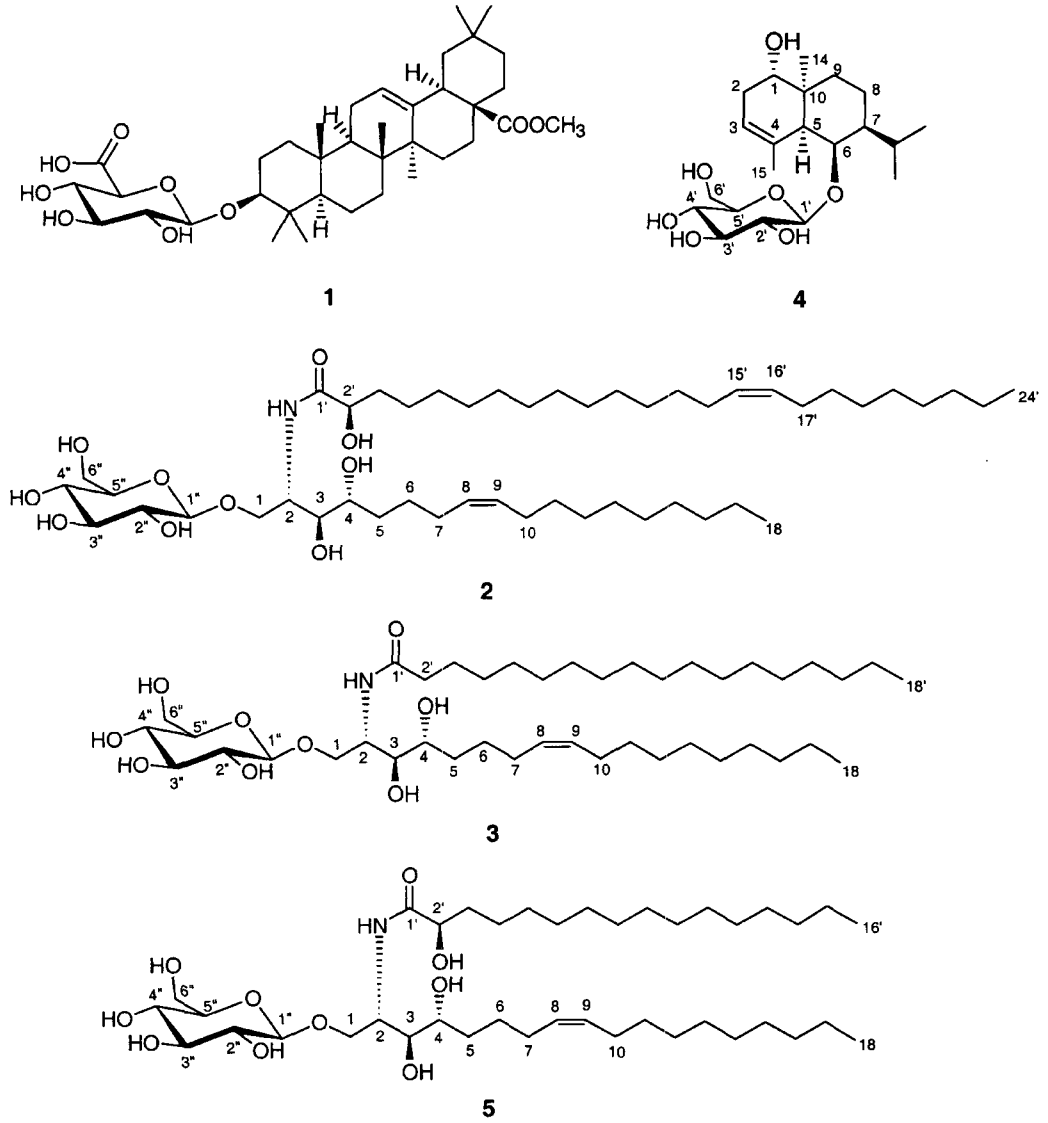

Fig. 1. The structures of compounds **1~5**

RESULTS AND DISCUSSION

Compound **1** was obtained as amorphous powder and its quasimolecular ion peak appeared at m/z 669 ([M+Na]$^+$) in FAB-MS spectrum. The molecular formula was assigned as $C_{37}H_{58}O_9$ based on ^{13}C-NMR data (C×37) and the quasimolecular ion peak [M+Na]$^+$ of the FAB-MS spectrum. The ^{1}H- and ^{13}C-NMR spectra showed the presence of a glucuronic acid moiety. The signals from the glucuronic acid unit appeared at δ_H 3.23 (1H, dd, J = 9.0, 8.0 Hz), 3.35 (1H, t, J = 9.5 Hz), 3.51 (1H, t, J = 9.5 Hz), 3.82 (1H, d, J = 9.5 Hz), and 4.38 (1H, d, J = 8.0 Hz), and at δ_C 73.19, 75.30, 76.64, 77.50, 107.03, and 172.33 in the ^{1}H- and ^{13}C-NMR spectra, respectively (Ahmad *et al.* 2000). In addition, the ^{1}H-NMR spectrum showed signals for seven tertiary methyl groups at δ 0.77 (3H, s), 0.79 (3H, s), 0.84 (3H, s), 0.91 (3H, s), 0.94 (3H, s), 1.04 (3H, s), and 1.16 (3H, s), a methoxyl group at δ 3.77 (3H, s), a carbinol proton at δ 3.64 (1H, m), and an olefinic proton at δ 5.28 (1H, m). In the ^{13}C-NMR spectrum, two olefinic carbon signals appeared at δ 124.08 and 144.90, a carbinol carbon signal at δ 91.12, and a carbonyl carbon signal at δ 171.40, respectively. The NMR data of aglycon were very similar to those of oleanolic acid (Mahato *et al.*, 1994) but major differences were the downfield shift of H-3 in the ^{1}H-NMR spectrum and the upfield shift of C-28 in the ^{13}C-NMR spectrum of **1**, indicated the sugar unit was bonded at C-3 and C-28 carbonyl carbon was to be methyl ester group. On the basis of the above evidences and the comparison of data with those of literature (Ahmad *et al.* 2000) the structure of **1** was determined as 3-*O*-β-D-glucuronopyranosyl-oleanolic acid methyl ester.

Compound **2** was obtained as amorphous powder and its quasimolecular ion peak appeared at m/z 864 ([M+Na]$^+$) in FAB-MS spectrum. The characteristic signals of 2-amino-1,3,4-triol in hydrocarbon chain were observed at δ_H 3.52 (1H, m), 3.81 (1H, dd, J = 10.5, 4.0 Hz), 4.02 (1H, dd, J = 7.5, 4.0 Hz), 4.04 (1H, dd, J = 10.5, 6.0 Hz) and 4.26 (1H, m) in the ^{1}H-NMR spectrum and at δ_C 51.65, 69.93, 72.98 and 75.57 in the ^{13}C-NMR spectrum (Kang *et al.*, 2001; Yaoita *et al.*, 2000). The ^{1}H-NMR spectrum showed the signals corresponding to a sugar moiety at δ 3.17 (1H, dd, J = 9.0, 7.5 Hz), 3.28 (1H, m), 3.33 (2H, m), 3.67 (1H, dd, J = 11.5, 6.5 Hz), 3.87 (1H, dd, J = 11.5, 1.0 Hz) and 4.28 (1H, d, J = 7.5 Hz). The ^{13}C-NMR spectrum showed the signals for a sugar moiety at δ 62.66, 71.57, 75.01, 77.90, 78.02 and 104.69. In addition, the ^{1}H-NMR spectrum showed the signals for aliphatic hydrocarbons at δ 0.90 (6H, t, J = 7.0 Hz), 1.20-1.40 (48H, m), 1.58-1.78 (4H, m), 1.98 (4H, m) and 2.03 (4H, m), and four olefinic protons in aliphatic chains at δ 5.42 (2H, m), 5.34 (2H, m), and an oxygenated proton at δ 3.60 (1H, t, J = 6.0 Hz). The ^{13}C-NMR spectrum also showed the signals for two terminal methyl groups in aliphatic hydrocarbon chains at δ 14.44, four olefinic carbons at δ 130.85 (×2), 131.35 and 131.55, an oxygenated carbons at δ 72.88, and an amide carbon at δ 177.20. The coupling constant of the anomeric proton (7.5 Hz) in a sugar group indicated to be β-configuration. The acid hydrolysis of **2** with 1N-HCl yielded a glucose, which was identified by cellulose TLC with an authentic glucose. The methanolysis with HCl in MeOH of 2 yielded 2-hydroxy-15-tetracosenoic acid methyl ester, which was identified by the GC-MS analysis (Higuchi *et al.* 1996), and the major fragment ion appeared at m/z 500 [476+Na+H]$^+$ in the FAB-CIDMS spectrum indicated the presence of C_{18} 2-amino-1,3,4-triol glycoside and 2-hydroxy fatty acid (Isobe *et al.* 1997). The position and geometry of double bonds were confirmed by the analysis of ^{1}H-^{1}H COSY and the coupling constants of olefinic proton signals in the ^{1}H-NMR spectrum. The coupling constants of H-1 ($J_{1a,2}$ = 4.0 Hz and $J_{1b,2}$ = 6.0 Hz) and H-3 (7.5 and 4.0 Hz) in the ^{1}H-NMR spectrum, and the chemical shift of C-1 (δ 69.93), C-2 (δ 51.65), C-3 (δ 75.57), C-4 (δ 72.98), C-1′ (δ 177.20) and C-2′ (δ 72.88) were very similar to those of (2*S*, 3*S*, 4*R*, 2′*R*)-*N*-2′-hydroxy-fatty acid-1-*O*-β-D-glucopyranosyl-4-hydroxy-8-sphingenine (Kang *et al.*, 2001; Yasunori *et al.*, 2000). The optical rotation of **2** (+23.4°) was also in good agreement with that of (2*S*, 3*S*, 4*R*, 2′*R*)-*N*-2′-hydroxy-fatty acid-1-*O*-β-D-glucopyranosyl-4-hydroxy-8-sphingenine (Kang *et al.*, 2001). These evidences showed that the absolute configuration at C-2, C-3, C-4 and C-2′ in **2** was 2*S*, 3*S*, 4*R* and 2′*R*, respectively. On the basis of the above evidences and the comparison of data with those in the literatures (Falsone *et al.*, 1994a; Falsone *et al.*, 1994b), the structure of **2** was determined to (2*S*, 3*S*, 4*R*, 2′*R*, 8*Z*, 15′*Z*)-*N*-2′-hydroxy-15′-tetracosenoyl-1-*O*-β-D-glucopyranosyl-4-hydroxy-8-sphingenine.

Compound **3** was obtained as amorphous powder and its quasimolecular ion peak appeared at m/z 766 ([M+Na]$^+$) in the FAB-MS spectrum. The characteristic signals of 2-amino-1,3, 4-triol in hydrocarbon chain were observed at δ_H 3.65-3.68 (1H, m), 3.71 (1H, dd, J = 10.5, 3.5 Hz), 3.95 (1H, m), 4.03 (1H, dd, J = 7.5, 4.0 Hz), and 4.12 (1H, dd, J = 10.5, 5.5 Hz) in the ^{1}H-NMR spectrum and at δ_C 54.70, 69.92, 71.64 and 72.98 in the ^{13}C-NMR spectrum (Kang *et al.*, 2001; Yaoita *et al.*, 2000). ^{1}H- and ^{13}C-NMR data of **3** was very similar to those of compound **2**, but the major differences were the absence of a signal for 2′-hydroxyl group and downfield shift of signals for H-2 and C-2 in **3**. The major fragment ion appeared at m/z 554 [532+Na-H]$^+$ in the FAB-CIDMS spectrum indicated the presence of a C_{18} 2-amino-1,3, 4-triol glycoside with a saturated octadecanoyl group (Isobe *et al.*, 1997). The optical rotation of **3** (-1.9°) was in good agreement with that of (2*S*, 3S, 4*R*)-*N*-fatty acid-1-*O*-β-D-glucopyranosyl-

4-hydroxy-8-sphingenine (Kang *et al.*, 2001). On the basis of the above data, the structure of **3** was assigned as (2*S*, 3*S*, 4*R*, 8*Z*)-*N*-octadecanoyl-1-*O*-β-D-glucopyranosyl-4-hydroxy-8-sphingenine. This compound has ever been analyzed from rye leaf (Cahoon *et al.*, 1991) but the NMR data have not been reported.

Compound **4** was obtained as colorless gum. The molecular formula was assigned as $C_{21}H_{36}O_7$ based on ^{13}C-NMR data (C×21) and the quasimolecular ion peak $[M+H]^+$ appeared at *m/z* 400 in the FABMS. The ^{1}H- and ^{13}C-NMR spectra showed the presence of a sugar moiety. The signals from the sugar unit appeared at δ_H 3.14-3.23 (2H, m), 3.32-3.34 (2H, m), 3.68 (1H, dd, *J* = 12.0, 5.0 Hz), 3.79 (1H, dd, *J* = 12.0, 2.5 Hz), and 4.43 (1H, d, *J* = 7.5 Hz) and δ_C 62.67, 71.47, 75.58, 77.85, 78.19, and 104.87 in the ^{1}H- and ^{13}C-NMR spectra, respectively. In addition, the ^{1}H-NMR spectrum showed signals for a tertiary methyl group at δ 0.83 (3H, s), two secondary methyl groups at δ 0.93 (3H, d, *J* = 6.5 Hz) and 1.01 (3H, d, *J* = 6.5 Hz), an allylic methyl group at δ 1.85 (3H, br.s), two oxygenated protons at δ 3.93 (1H, br.d, *J* = 6.0 Hz) and 4.07 (1H, dd, *J* = 9.0, 2.0 Hz), and an olefinic proton at 5.27 (1H, br.s). In the ^{13}C-NMR spectrum, 15 carbon signals appeared besides those of the sugar unit, which included two olefinic carbons at δ 121.60 and 136.12, and two oxygenated carbons at δ 70.36 and 78.37. The ^{1}H- and ^{13}C-NMR spectra of aglycon were very similar with 1,6-dihydroxy-7-eudesm-3-ene (Mahmoud, 1997). The NMR data of **4** were same with the reported values of 1α-hydroxy-6β-*O*-β-D-glucosyl-eudesm-3-ene (Jakupovic *et al.*, 1988).

Compound **5** was obtained as amorphous powder and its quasimolecular ion peak appeared at m/z 754 ($[M+Na]^+$) in the FAB-MS spectrum. ^{1}H- and ^{13}C-NMR spectra of **5** were in good agreement with those of **2** except for the integral value of signal at δ 1.20-1.40 (36H, m). The FAB-CID MS spectrum of **5** showed a major fragment ion at m/z 500 (476+Na+H). This implied that the structure of **5** was a C_{18} 2-amino-1,3,4-triol glycoside with a 2-hydroxy-hexadecanoyl group (Isobe *et al.*, 1997). On the basis of the above evidences and the comparison of data with those of literature (Kang *et al.*, 2001), the structure of **5** was assigned as (2*S*, 3*S*, 4*R*, 2'*R*, 8*Z*)-*N*-2'-hydroxy-hexadecanoyl-1-*O*-β-D-glucopyranosyl-4-hydroxy-8-sphingenine.

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