New Pentacyclic Triterpenoids from *Centella asiatica*

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Three new pentacyclic triterpenoids, named centellasaponins G, H, and F (**1**–**3**, resp.), together with four known compounds, **4**–**7**, were isolated from the whole plants of *Centella asiatica*. Their structures were elucidated on the basis of chemical and spectral analysis, including 1D- and 2D-NMR and HR-MS experiments, and by comparison with literature data.

Introduction. – *Centella asiatica* (L.) URBAN is a traditional herbal medicine used in Asia and Africa. The medicinal preparation obtained from the plant is widely used for wound healing and to treat hypertrophic scars [1][2]. Previous chemical studies showed that pentacyclic triterpenes were the main constituents of this plant [3]. As a part of our continuing search for bioactive components from *Centella asiatica*, our investigation now revealed the presence of three new pentacyclic triterpenoids named centellasaponins G, H, and F (**1**–**3**, resp.), along with four known triterpenes, **4**–**7** (*Fig. 1*) [4][5]. Centellasaponin G (**1**) is isomeric with centellasaponin H (**2**). They are the first two pentacyclic triterpenes with four sugar units. Centellasaponin F (**3**) is a new pentacyclic triterpene which bears two $HOCH_2$ groups at C(4) of the aglycon.

Results and Discussion. – The crude extract of *C. asiatica* was repeatedly subjected to column chromatography (silica gel) and preparative HPLC to afford seven compounds. Compounds **1**–**3** were new, and their structures were elucidated on the basis of 1D- and 2D-NMR data in combination with MS studies. The other four compounds were identified as asiaticoside B (**4**) [6], madecassoside (**5**) [7], scheffoleoside A (**6**) [8], and centellasaponin A (**7**) [9] by comparison of their spectroscopic data with those reported in the literature.

Compound **1** was isolated as white amorphous powder. The HR mass spectrum exhibited a *quasi*-molecular-ion peak at *m*/*z* 1159.5516 ($[M+Na]^+$; calc. 1159.5512) consistent with the molecular formula $C_{54}H_{88}O_{25}$. The IR spectrum displayed characteristic absorptions for OH (3442 cm^{-1}), C=O (1735 cm^{-1}), and olefin moieties (1637 cm^{-1}). The ^{13}C-NMR data (*Table*) of **1** showed two olefinic signals at δ(C) 126.3 and 138.0. The HMBCs CH_2(11) (δ(H) 2.08–2.15, 2.23–2.27)/δ(C) 126.3, CH_2(11)/C(13) (δ(C) 138.0); H–C(18) (δ(H) 2.50)/C(12) (δ(C) 126.3); H–C(18)/C(13) (δ(C) 138.0), and Me(27) (δ(H) 1.11)/C(13) established the presence of the C(12)=C(13)

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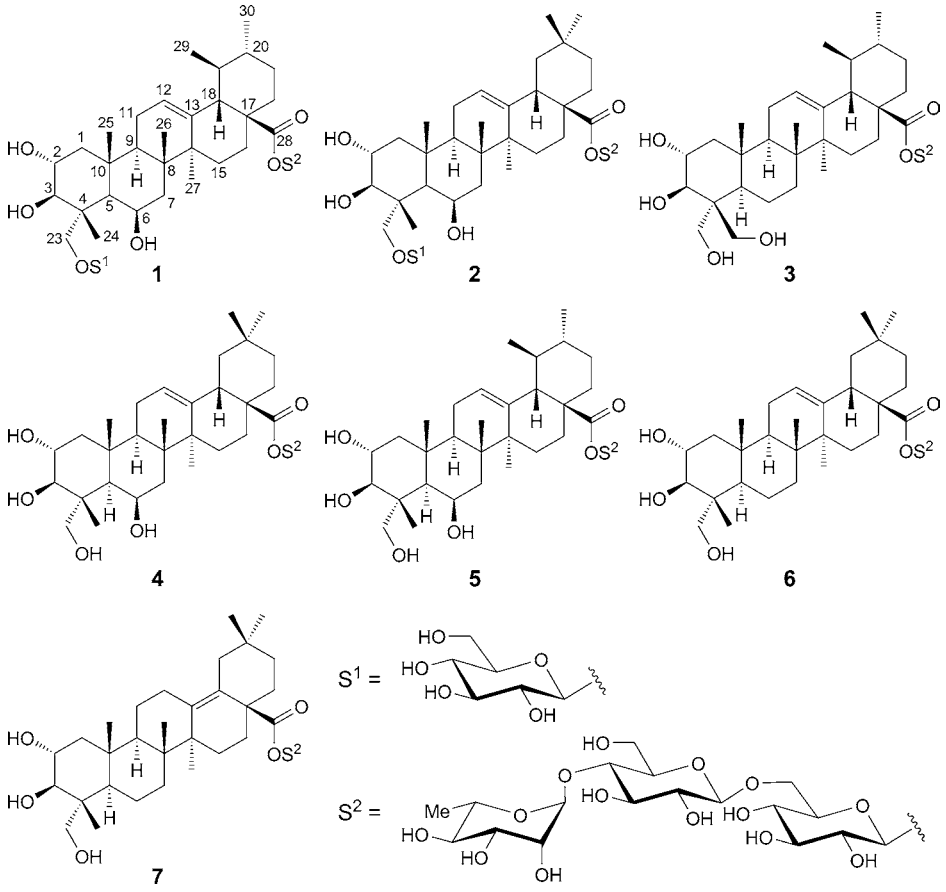

Fig. 1. *Compounds* **1**–**7**, *isolated from* Centella asiatica

bond (*Fig. 2*). The long-range correlations Me(29) (δ(H) 0.90)/C(18) (δ(C) 53.4), Me(29) (δ(H) 0.90)/C(20) (δ(C) 39.1); Me(30) (δ(H) 0.86)/C(21) (δ(C) 30.0); and Me(30) (δ(H) 0.86)/C(22) (δ(C) 35.8) showed that compound **1** possessed an ursane-type skeleton. The long-range correlations H–C(1″) (δ(H) 6.13)/C(28) (δ(C) 176.3); H–C(1‴) (δ(H) 4.92–4.94)/C(6″) (δ(C) 69.5), and H–C(1⁗) (δ(H) 5.84)/C(4‴) (δ(C) 77.9) revealed the linkage sequence of the sugar units. The *quasi*-molecular-ion peak established that compound **1** had 162 mass units more than madecassoside (**5**). Moreover, the signals of a sugar unit were observed in the ^{1}H- and ^{13}C-NMR spectra of **1** (*Table*), which were absent in the spectra of madecassoside (**5**). In the HMBC experiment, the long-range correlation H–C(1′) (δ(H) 5.29)/C(23) (δ(C) 73.3) was observed, revealing that the single sugar unit was linked to C(23) of the skeleton. From the above evidences, the structure of compound **1**, named centellasaponin G, was elucidated as depicted in *Fig. 1*.

Compound **2** was isolated as white amorphous powder. The HR-ESI mass spectrum exhibited a *quasi*-molecular-ion peak at *m*/*z* 1159.5519 ($[M+\mathrm{Na}]^+$; calc. 1159.5512)

Table. *^{1}H- and ^{13}C-NMR Data of* **1**, **2**, *and* **3** (in (D_5)pyridine, at 600 and 150 MHz, resp.). δ in ppm, J in Hz.

Position	Centellasaponin G (**1**)		Centellasaponin H (**2**)		Centellasaponin F (**3**)	
	δ(H)	δ(C)	δ(H)	δ(C)	δ(H)	δ(C)
1	1.38–1.42 (*m*), 2.30–2.34 (*m*)	50.3 (*t*)	1.38–1.43 (*m*), 2.28–2.34 (*m*)	50.0 (*t*)	1.34–1.41 (*m*)	48.2 (*t*)
2	4.29–4.33 (*m*)	68.8 (*d*)	4.22–4.26 (*m*)	68.8 (*d*)	4.04–4.08 (*m*)	69.9 (*d*)
3	4.01–4.06 (*m*)	79.0 (*d*)	3.99–4.03 (*m*)	79.1 (*d*)	3.43–3.47 (*m*)	79.6 (*d*)
4		44.3 (*s*)		44.4 (*s*)		47.9 (*s*)
5	1.88–1.94 (*m*)	48.8 (*d*)	1.84–1.89 (*m*)	50.0 (*d*)	1.58–1.64 (*m*)	48.6 (*d*)
6	4.86–4.92 (*m*)	67.9 (*d*)	4.92 (br. *s*)	68.0 (*d*)	0.94–0.98 (*m*)	19.6 (*t*)
7	1.83–1.88 (*m*), 2.18–2.22 (*m*)	41.1 (*t*)	1.82–1.89 (*m*), 2.10–2.17 (*m*)	41.0 (*t*)		34.0 (*t*)
8		39.5 (*s*)		39.4 (*s*)		43.4 (*s*)
9	1.88–1.92 (*m*)	49.5 (*d*)	1.84–1.89 (*m*)	48.8 (*d*)	1.58–1.64 (*m*)	48.3 (*d*)
10		38.0 (*s*)		38.0 (*s*)		38.8 (*s*)
11	2.08–2.15 (*m*), 2.23–2.27 (*m*)	23.9 (*t*)	1.97–2.02 (*m*)	23.5 (*t*)	1.93–1.98 (*m*)	24.7 (*t*)
12	5.49 (br. *s*)	126.3 (*d*)	5.45 (br. *s*)	123.8 (*d*)	5.24 (br. *s*)	126.9 (*d*)
13		138.0 (*s*)		143.7 (*s*)		139.4 (*s*)
14		43.2 (*s*)		42.8 (*s*)		41.0(*s*)
15	1.11–1.15 (*m*), 1.18–1.22 (*m*)	28.6 (*t*)	1.20–1.26 (*m*), 1.28–1.32 (*m*)	28.1 (*t*)	1.34–1.41 (*m*)	29.3 (*t*)
16	1.88–1.94 (*m*)	24.7 (*t*)	1.97–2.02 (*m*)	24.0 (*t*)	1.93–1.98 (*m*)	25.3 (*t*)
17		48.5 (*s*)		47.1 (*s*)		49.2 (*s*)
18	2.50 (*d*, $J=12$)	53.4 (*d*)	3.15 (*dd*, $J=12,6$)	41.7 (*d*)	2.23 (*d*, $J=5.4$)	54.1 (*d*)
19	1.28–1.35 (*m*)	39.4 (*d*)	1.63–1.67 (*m*)	46.3 (*d*)	0.95–0.98 (*m*)	40.4 (*d*)
20	0.84–0.87 (*m*)	39.1 (*d*)	1.28–1.32 (*m*)	30.7 (*d*)	0.95–0.98 (*m*)	40.2 (*d*)
21	1.28–1.33 (*m*)	30.0 (*t*)	1.20–1.26 (*m*)	34.1 (*t*)	1.28–1.33 (*m*)	31.7 (*t*)
22	1.63–1.66 (*m*)	35.8 (*t*)	1.66–1.72 (*m*)	32.5 (*t*)	1.70–1.76 (*m*)	37.6 (*t*)
23	3.64–3.68 (*m*)	73.3 (*t*)	3.69 (*d*, $J=6$), 4.25–4.28 (*m*)	73.7 (*t*)	3.48–3.52 (*m*), 4.02–4.05 (*m*)	64.6 (*t*)
24	1.72 (*s*)	15.9 (*q*)	1.72 (*s*)	15.9 (*q*)	3.59–3.67 (*m*), 3.77–3.84 (*m*)	61.9 (*t*)
25	1.76 (*s*)	19.3 (*q*)	1.74 (*s*)	19.1 (*q*)	1.04 (*s*)	17.9 (*q*)
26	1.69 (*s*)	19.4 (*q*)	1.66 (*s*)	18.9 (*q*)	0.81 (*s*)	17.9 (*q*)
27	1.11 (*s*)	23.8 (*q*)	1.16 (*s*)	26.1 (*q*)	1.11 (*s*)	24.0 (*q*)
28		176.3 (*s*)		176.5 (*s*)		178.0 (*s*)
29	0.90 (*s*)	17.3 (*q*)	0.83 (*s*)	33.1 (*q*)	0.89 (*s*)	17.7 (*q*)
30	0.86 (*s*)	21.3 (*q*)	0.84 (*s*)	23.6 (*q*)	0.95 (*s*)	21.6 (*q*)

Table (cont.)

Position	Centellasaponin G (**1**)		Centellasaponin H (**2**)		Centellasaponin F (**3**)	
	δ(H)	δ(C)	δ(H)	δ(C)	δ(H)	δ(C)
Glc I						
1′	5.29 (br. *s*)	101.2 (*d*)	5.29 (*d*, *J* = 6)	101.2 (*d*)		
2′	4.57 – 4.62 (*m*)	70.5 (*d*)	4.56 – 4.59 (*m*)	70.5 (*d*)		
3′	3.61 – 3.66 (*m*)	77.2 (*d*)	3.62 (br. *d*, *J* = 12)	77.1 (*d*)		
4′	4.20 – 4.26 (*m*)	71.0 (*d*)	4.20 – 4.25 (*m*)	71.0 (*d*)		
5′	4.34 – 4.40 (*m*)	71.8 (*d*)	4.34 – 4.38 (*m*)	71.8 (*d*)		
6′	4.33 – 4.39 (*m*)	62.6 (*t*)	4.34 – 4.38 (*m*)	62.6 (*t*)		
Glc II						
1″	6.13 (*d*, *J* = 6)	95.8 (*d*)	6.16 (*d*, *J* = 6)	95.8 (*d*)	5.28 (*d*, *J* = 7.8)	95.9 (*d*)
2″	4.04 – 4.11 (*m*)	73.8 (*d*)	4.02 – 4.07 (*m*)	73.8 (*d*)	3.29 – 3.34 (*m*)	73.8 (*d*)
3″	4.13 – 4.17 (*m*)	78.6 (*d*)	4.02 – 4.07 (*m*)	78.6 (*d*)	3.36 – 3.40 (*m*)	78.2 (*d*)
4″	4.21 – 4.26 (*m*)	71.1 (*d*)	4.42 – 4.44 (*m*)	71.0 (*d*)	3.83 – 3.88 (*m*)	71.0 (*d*)
5″	4.00 – 4.08 (*m*)	78.2 (*d*)	4.11 – 4.17 (*m*)	78.3 (*d*)	3.36 – 3.40 (*m*)	77.9 (*d*)
6″	4.23 – 4.28 (*m*), 4.60 – 4.66 (*m*)	69.5 (*t*)	4.58 – 4.63 (*m*)	69.3 (*t*)	3.74 – 3.78 (*m*), 4.03 – 4.08 (*m*)	69.6 (*t*)
Glc III						
1″	4.92 – 4.94 (*m*)	105.0 (*d*)	4.92 – 4.95 (*m*)	104.8 (*d*)	4.36 (*d*, *J* = 7.8)	104.5 (*d*)
2″	3.91 (*t*, *J* = 6)	75.4 (*d*)	3.89 (*t*, *J* = 6)	75.3 (*d*)	3.21 – 3.25 (*m*)	75.3 (*d*)
3″	4.08 – 4.15 (*m*)	76.5 (*d*)	4.07 – 4.12 (*m*)	76.5 (*d*)	3.44 – 3.48 (*m*)	76.9 (*d*)
4″	4.36 – 4.43 (*m*)	77.9 (*d*)	4.34 – 4.38 (*m*)	78.0 (*d*)	3.50 – 3.56 (*m*)	79.5 (*d*)
5″	4.62 – 4.68 (*m*)	72.6 (*d*)	4.61 – 4.65 (*m*)	72.5 (*d*)	3.44 – 3.48 (*m*)	76.7 (*d*)
6″	4.02 – 4.08 (*m*), 4.14 – 4.21 (*m*)	61.3 (*t*)	4.02 – 4.07 (*m*), 4.11 – 4.17 (*m*)	61.3 (*t*)	3.60 – 3.64 (*m*), 4.01 – 4.05 (*m*)	62.7 (*t*)
Rha IV						
1‴	5.84 (br. *s*)	102.7 (*d*)	5.81 (br. *s*)	102.7 (*d*)	4.84 (br. *s*)	102.9 (*d*)
2‴	4.45 – 4.54 (*m*)	72.7 (*d*)	4.47 – 4.53 (*m*)	72.7 (*d*)	3.38 – 3.42 (*m*)	72.5 (*d*)
3‴	4.45 – 4.54 (*m*)	72.8 (*d*)	4.47 – 4.53 (*m*)	72.7 (*d*)	3.60 – 3.64 (*m*)	72.3 (*d*)
4‴	4.26 – 4.33 (*m*)	74.0 (*d*)	4.07 – 4.12 (*m*)	74.0 (*d*)	3.28 – 3.34 (*m*)	73.8 (*d*)
5‴	4.91 – 4.98 (*m*)	70.3 (*d*)	4.56 – 4.60 (*m*)	70.3 (*d*)	3.92 – 3.97 (*m*)	70.7 (*d*)
6‴	1.68 (*s*)	18.5 (*q*)	1.67 (*s*)	18.5 (*q*)	1.26 (*s*)	18.0 (*q*)

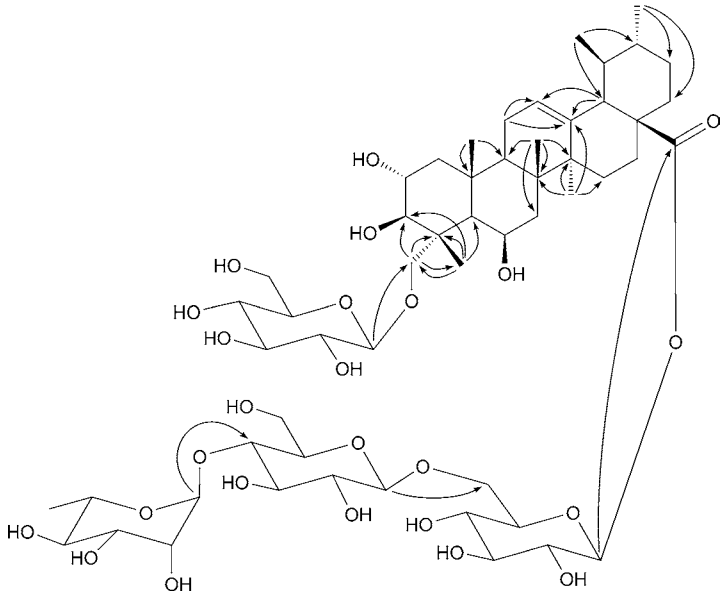

Fig. 2. *Key HMBC* (H → C) *features for* **1**

consistent with the molecular formula $C_{54}H_{88}O_{25}$. The IR spectrum displayed characteristic absorptions for OH (3441 cm^{-1}), C=O (1736 cm^{-1}), and olefin moieties (1637 cm^{-1}). The NMR data (*Table*) were similar to those of **1** for rings *A* – *D* and the sugar moieties. Comparison of the differing data for ring *E* and of the olefinic signals between **1** and **2** indicated that they exactly correspond to the typical spectral features of an ursane- and oleanane-type aglycon, respectively. The ^{13}C-NMR data of compound **2** exhibited two olefinic signals at δ(C) 123.8 and 143.7. The long-range correlations Me(29) (δ(H) 0.83)/C(19) (δ(C) 46.3); Me(29)/C(20) (δ(C) 30.7); Me(29)/C(21) (δ(C) 34.1); Me(29)/C(22) (δ(C) 32.5); Me(29)/C(30) (δ(C) 23.6); Me(30) (δ(H)0.84)/C(20); Me(30)/C(21); Me(30)/C(22); and Me(30)/C(29) (δ(C) 33.1) evidenced that compound **2** posessed an oleanane-type skeleton (*Fig. 3*). The long-range correlations H–C(1″) (δ(H) 6.16)/C(28) (δ(C) 176.5); H–C(1‴) (δ(H) 4.92 – 4.95)/C(6″) (δ(C) 69.3); and H–C(1⁗) (δ(H) 5.81)/C(4‴) (δ(C) 78.0) revealed the linkage sequence of the sugar units. The long-range correlations H–C(1′) (δ(H) 5.29)/C(23) (δ(C) 73.7) was also observed, indicating that the single sugar unit is linked to C(23) of the aglycon. From the above evidences, the structure of compound **2**, named centellasaponin H, was elucidated as depicted in *Fig. 1*.

Compound **3** was isolated as white amorphous powder. The HR-ESI mass spectrum exhibited a *quasi*-molecular-ion peak at *m*/*z* 997.4990 ($[M+Na]^+$; calc. 997.4984), consistent with the molecular formula $C_{48}H_{78}O_{20}$. The IR spectrum displayed characteristic absorptions for OH (3423 cm^{-1}), C=O (1735 cm^{-1}), and olefin moieties (1637 cm^{-1}). The ^{13}C-NMR spectrum data of compound **3** displayed two olefinic signals at δ(C) 126.9 and 139.4. The correlations CH_2(11) (δ(H) 1.93 – 1.98)/C(12) (δ(C) 126.9); CH_2(11)/C(13) (δ(C) 139.4); H–C(18) (δ(H) 2.23)/C(12); H–C(18)/C(13); and

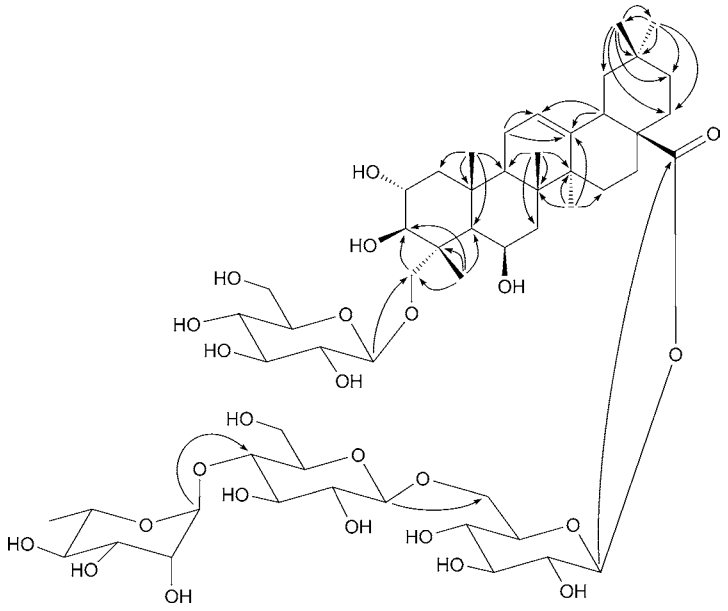

Fig. 3. *Key HMBC* (H → C) *features for* **2**

Me(27) (δ(H) 1.11)/C(13) established the presence of the C(12)=C(13) bond as shown in *Fig. 4*. The long-range correlations Me(29) (δ(H) 0.89)/C(18) (δ(C) 54.1); Me(29)/C(19) (δ(C) 40.4); Me(29)/C(20) (δ(C) 40.2); Me(30) (δ(H) 0.95)/C(19); Me(30)/C(20); and Me(30)/C(21) (δ(C) 31.7) indicated that compound **3** possessed an ursane-type skeleton. The NMR data (*Table*) were different from those of madecassoside (**5**) concerning rings *A* and *B*. Compound **3** is lacking a Me signal and displays an additional

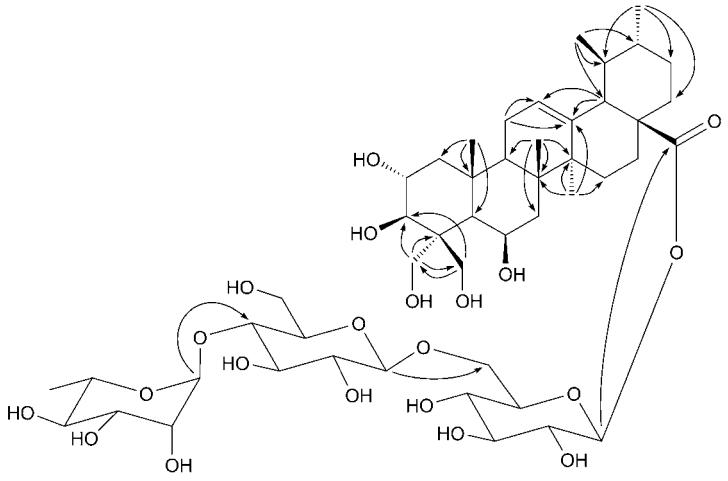

Fig. 4. *Key HMBC* (H → C) *features for* **3**

HO–CH_2 group signal (CH_2 (δ(C) 61.9/δ(H) 3.59–3.67, 3.77–3.84)). In the HMBC experiment, the long-range correlations CH_2(23) (δ(H) 3.48–3.52, 4.02–4.05)/C(24) (δ(C) 61.9); CH_2(23)/C(3) (δ(C) 79.6); CH_2(23)/C(4) (δ(C) 47.9); and CH_2(24) (δ(H) 3.59–3.67)/C(23) (δ(C) 64.6) were observed (*Fig. 4*). The ^{1}H,^{1}H-COSY and NOESY plots showed the correlations CH_2(23) (δ(H) 4.02–4.05) and CH_2(24) (δ(H) 3.77–3.84), which suggested that the HO–CH_2 group (δ(C) 61.9) was positioned at C(4) as OH–CH_2(23). The long-range correlations H–C(1′) (δ(H) 5.28)/C(28) (δ(C) 178.0); H–C(1″) (δ(H) 4.36)/C(6′) (δ(C) 69.6); and H–C(1‴) (δ(H) 4.84)/C(4″) (δ(C) 79.5) revealed the linkage sequence of the sugar units. From the above evidence, the structure of compound **3**, named centellasaponin F, was elucidated as depicted in *Fig. 1*.

Experimental Part

General. TLC: Silica gel *HSGF$_{254}$* (*Yantai Jiangyou Guijiao Kaifa Co., Ltd.*, P. R. China); detection by spraying with 10% H_2SO_4 in EtOH, followed by heating. Column chromatography (CC): silica gel (SiO_2, 200–300 mesh; *Shanghai Sanpont Co., Ltd.*, P. R. China). Prep. HPLC: *CXTH LC3000* HPLC system (*P3000* pump, *UV 3000* scanning spectrophotometer, P. R. China); column: *YMC-Pack ODS-AQ*, 5 μm, i.d. 20 × 250 mm; *Waters* μ*Bondapak C18*, 10 μm, i.d. 7.8 × 300 mm; *Inertsil ODS-3*, 5 μm, i.d. 7.6 × 250 mm. Optical rotations: *Perkin-Elmer-341* polarimeter. IR Spectra: *Nicolet-NEXUS-670-FT-IR* spectrophotometer, KBr pellets; in cm^{-1}. NMR Spectra: *Varian INOVA-400/500* instrument at 400/500 MHz (^{1}H) and 100/125 MHz (^{13}C) in (D_5)pyridine; *Bruker 600* instrument at 600 (^{1}H) and 150 MHz (^{13}C) in (D_5)pyridine; δ in ppm rel. to Me_4Si; *J* in Hz. MS: *Waters Q-Tof micro YA019* mass spectrometer; in *m*/*z*.

Plant Material. The whole-plant material of *Centella asiatica* (L.) URBAN was collected in the Guangxi Zhuang Autonomous Region, P. R. China, in July 2008, and identified by Dr. *Tong Wu* at the Shanghai Institute of Pharmaceutical Industry. A voucher specimen (SIPITCM-080711) has been deposited with the institute.

Extraction and Isolation. The air-dried whole plants of *C. asiatica* (10 kg) were extracted two times with H_2O (100 l for 1.5 h; 80 l for 1 h). The extracts were combined and concentrated to 3 l, and then 95% EtOH (15 l) was added, and the mixture was kept for 24 h. The precipitate was removed by filtration. After solvent removal from the filtrate to reach a volume of 3 l, the crude extract was suspended in H_2O and extracted two times with BuOH (6 and 4.8 l, resp.). The BuOH extract (165 g) was subjected to CC (SiO_2; $CHCl_2$/MeOH/H_2O 10:2:0.2, 10:4:0.4, 10:5:0.6, and 10:6:1, finally EtOH, each 6 l): *Frs. 1–12*. *Fr. 11* (1.8 g) was purified by prep. HPLC (MeCN/H_2O 15:85, 2 ml/min; 204 nm) to afford *Frs.* A_{11}–G_{11}. *Fr.* D_{11} (85 mg) was further separated by prep. HPLC (MeCN/H_2O 18:82; 2 mmol/L-β-cyclodextrin; 1 ml/min; 204 nm): **1** (t_R 27 min; 6 mg) and **2** (t_R 19 min; 5 mg). *Fr. 6* (3.4 g) was purified by prep. HPLC (MeCN/H_2O 22:53; 6 ml/min; 204 nm) to afford *Frs.* A_6–F_6. *Fr.* D_6 (273 mg) was further separated by prep. HPLC (MeCN/H_2O 24:76; 2 mmol/L-β-cyclodextrin; 6 ml/min; 204 nm): **3** (t_R 66 min; 3 mg), **6** (t_R 57 min; 9 mg), and **7** (t_R 68 min; 14 mg). Similarly, **4** (t_R 28 min; 23 mg) and **5** (t_R 34 min; 14 mg) were isolated from *Fr.* C_6 (140 mg) by prep. HPLC (MeCN/H_2O 22:78; 2 mmol/L-β-cyclodextrin; 2 ml/min; 204 nm).

Centellasaponin G (= *α-L-Rhamnopyranosyl-(1→4)-β-D-glucopyranosyl-(1→6)-1-O-[(2α,3β,6β)-23-(β-D-glucopyranosyloxy)-2,3,6-trihydroxy-28-oxours-12-en-28-yl]-β-D-glucopyranose*; **1**). White amorphous powder. $[\alpha]_D^{20} = 5.304$ ($c = 0.198$, MeOH). IR (KBr): 3442, 2925, 1735, 1637, 1458, 1380, 1234, 1062, 801, 558. ^{1}H- and ^{13}C-NMR: see the *Table*. ESI-MS (pos.): 1159.36 ($[M+Na]^+$). ESI-MS (neg.): 1135.08 ($[M-H]^-$). HR-ESI-MS: 1159.5516 ($[M+Na]^+$, $C_{54}H_{88}NaO_{25}^+$; calc. 1159.5512).

Centellasaponin H (= *α-L-Rhamnopyranosyl-(1→4)-β-D-glucopyranosyl-(1→6)-1-O-{(2α,3β,6β)-23-[(β-D-glucopyranosyl)oxy]-2,3,6-trihydroxy-28-oxoolean-12-en-28-yl}-β-D-glucopyranose*; **2**). White amorphous powder. $[\alpha]_D^{20} = 12.069$ ($c = 0.174$, MeOH). IR (KBr): 3441, 2924, 2855, 1736, 1637, 1459, 1377, 1261, 1061, 804, 582. ^{1}H- and ^{13}C-NMR: see the *Table*. ESI-MS (pos.): 1159.39 ($[M+Na]^+$). ESI-MS (neg.): 1135.24 ($[M-H]^-$). HR-ESI-MS: 1159.5519 ($[M+Na]^+$, $C_{54}H_{88}NaO_{25}^+$; calc. 1159.5512).

Centellasaponin F (= α-L-*Rhamnopyranosyl-(1 → 4)-β*-D-*glucopyranosyl-(1 → 6)-1*-O-*[(2α,3β)-2,3,23,24-tetrahydroxy-28-oxours-12-en-28-yl]-β*-D-*glucopyranose*; **3**). White amorphous powder. $[\alpha]_D^{20} = -11.628$ ($c = 0.043$, MeOH). IR (KBr): 3423, 2924, 2855, 1735, 1637, 1458, 1382, 1261, 1063, 802, 577. ^{1}H- and ^{13}C-NMR: see the *Table*. ESI-MS (pos.): 997.36 ($[M + Na]^+$). ESI-MS (neg.): 973.39 ($[M - H]^-$). HR-ESI-MS: 997.4990 ($[M + Na]^+$, $C_{48}H_{78}NaO_{20}^+$; calc. 997.4984).

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