Alkaloids from the Roots of *Stemona saxorum*

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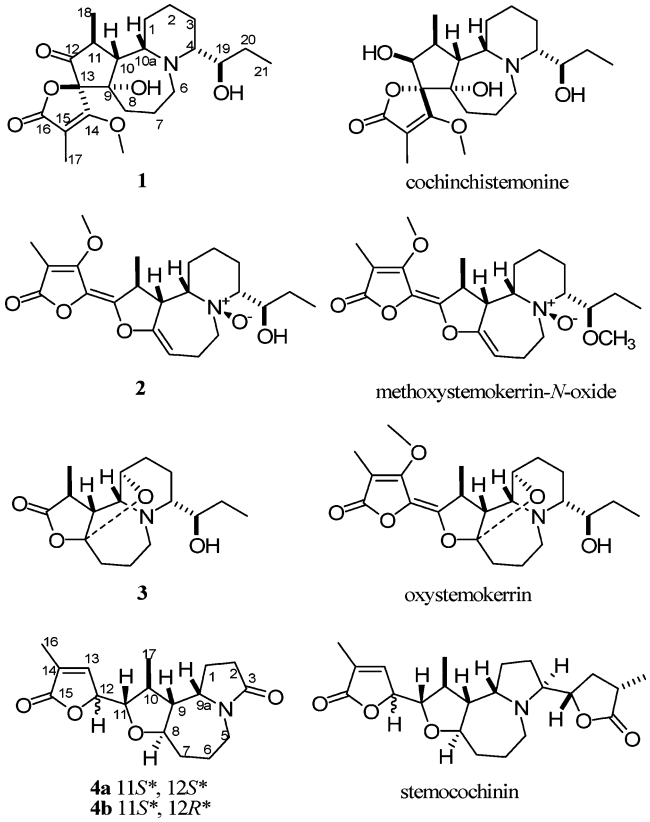
Five new *Stemona* alkaloids, cochinchistemoninone (**1**), stemokerrin-*N*-oxide (**2**), oxystemokerrilactone (**3**), saxorumamide (**4a**), and isosaxorumamide (**4b**), as well as 12 known compounds, were isolated from the roots of Vietnamese *Stemona saxorum*. The structures of these alkaloids were characterized on the basis of spectroscopic methods.

Various species in the genus *Stemona* (Stemonaceae) are widely used in China and Southeast Asian countries as anticough and antiparasitic remedies. Previous chemical and pharmacological investigations have revealed that alkaloids might represent the main bioactive constituents in these plants.[1,2] So far, about 80 alkaloids have been isolated and structurally identified from the *Stemona* genus.[1−6] Most of them shared the same pyrrolo[1,2-α]azepine nucleus, while several alkaloids reported from Thai *Stemona* species were characterized by a pyrido[1,2-α]azepine skeleton.[1,7,8] Recently, a novel *Stemona* alkaloid skeleton with such a pyrido[1,2-α]azepine nucleus and a spiro α,*β*-unsaturated *γ*-lactone moiety at C-13 was reported from Vietnamese *S. cochinchinensis*.[5]

S. saxorum Gagnep is one of the endemic *Stemona* species in Vietnam. In 2002, Pham et al. reported neostemonine, bisdehydroneostemonine, protostemonine, and bisdehydroprotostemonine from the title plant.[1,9] In the present paper, we describe the results of our phytochemical investigation of the roots of *S. saxorum* collected from Hanam Province in Northern Vietnam. Five new metabolites (**1**−**3**, **4a**, and **4b**) were isolated and structurally elucidated. Cochinchistemoninone (**1**) is characterized as the second cochinchistemonine-type alkaloid. Stemokerrin-*N*-oxide (**2**) and oxystemokerrilactone (**3**) belong to the stemokerrin class alkaloids. Saxorumamide (**4a**) and isosaxorumamide (**4b**) are one pair of diastereomers with a pyrrolo[1,2-α]azepine nucleus. Accompanying these new compounds, 12 known alkaloids were separated and identified as oxystemokerrin, stemonamine, isostemonamine, maistemonine, isomaistemonine, protostemonine, isoprotostemonine, dehydroprotostemonine, oxyprotostemonine, stemocochinin, stemokerrin, and oxystemokerrin-*N*-oxide.[7,10−12] The structures of the new compounds were determined by 1D and 2D NMR analyses and other spectroscopic studies. The known compounds, except for protostemonine, were isolated from this plant for the first time. Their structural elucidation was carried out by comparison of their spectroscopic data with those reported in the literature.

Compound **1** gave the elemental composition $C_{22}H_{33}NO_6$ by combined analyses of its HRESIMS and ^{13}C NMR data (Table 2). The presence of a hydroxy group (3417 cm^{-1}) and an α,*β*-unsaturated *γ*-lactone moiety (1765 cm^{-1}) was indicated in the IR spectrum and supported by ^{13}C NMR quaternary resonances at *δ* 173.1, 169.2, and 98.4. In addition, the typical maximum UV absorption was observed at 229 nm.[11] In the ^{13}C NMR spectrum, 19 additional resonances were displayed, including one ketone carbonyl carbon at *δ* 208.9 and two quaternary, five methylene, seven methine, and four methyl carbons (Table 2). The ^1H NMR spectrum showed characteristic resonances of one methyl singlet (*δ* 2.01), one methyl doublet (*δ* 1.23), one methyl triplet (*δ* 1.08),



and one *O*-methyl singlet (*δ* 4.18) (Table 1). These NMR data, coupled with evidence from $^1H-^1H$ COSY and HMBC spectra (Figure 1), suggested the presence of a cochinchistemonine-type alkaloid skeleton.[5] The differences of ^{13}C NMR resonances between **1** and the first alkaloid of this type, cochinchistemonine, revealed that a ketone functionality instead of a hydroxy group was located at C-12 of **1**. This conclusion was supported by the HMBC correlations from H-10 and H_3-18 to C-12.

In the ROESY spectrum, the key correlations H-4/H-10a, H-10a/H_3-18, and H-8*β*/H-10 (Figure 2) indicated that H-4, H-10, H-10a, and H_3-18 were *β*-oriented. In addition, the α-orientation of the hydroxy at C-9 was elucidated from the correlation of H-8*β*/H-10. The relative configuration of these positions remained the same as those in cochinchistemonine. Except for H_3-17, H_3-22 has no direct NOE correlations to any resonances in rings A, B, and C in **1**, while obvious NOE correlations among H_3-22, H-10, and H_3-18 were observed in cochinchistemonine.[5] It was implied that **1** has a different spiro configuration at C-13. Given that C-13 is in *S**-configuration, the HGS stereochemistry molecular model showed that the H_3-22 moiety was remote from other protons. Conversely,

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Table 1. ^{1}H NMR Data for Alkaloids **1**−**3**, **4a**, and **4b**

	1[a]	**2**[a]	**3**[b]	**4a**[a]	**4b**[a]
1	1.90, m	1.53, m	4.25, dd (4.1, 2.2)	1.77, m	1.70, m
	2.14, m	1.92, m		2.02, m	2.01, m
2	1.56, m	1.55, m	1.86, m	2.37, m	2.38, dd (10.5, 4.4)
	2.02, m	1.78, m	2.21, m		
3	1.56, m	1.58, m	1.35, m		
	1.83, m	1.93, m	1.66, m		
4	3.45, m	3.22, m	2.56, ddd (11.0, 8.4, 2.0)		
5				2.60, dd (14.0, 12.4)	2.62, m
				4.08, dd (14.0, 2.3)	4.08, m
6	3.34, m	3.42, m	3.04, dd (12.5, 5.9)	1.42, m	1.42, m
	3.75, m	3.46, m	3.32, m	1.74, m	1.75, m
7	2.02, m	2.03, m	1.68, m	1.38, m	1.40, m
	2.38, m	3.29, m	1.86, m	2.12, m	2.15, m
8	1.77, m	5.42, ddd (6.7, 5.0, 1.6)	1.72, m	3.78, ddd (13.0, 10.2, 2.7)	3.88, m
	2.18, m		2.16, m		
9				2.10, m	2.12, m
9a				3.93, m	3.92, m
10	3.60, dd (12.5, 5.3)	4.48, br s	3.01, br d (9.2)	2.38, m	2.12, m
10a	3.75, m	3.22, m	3.44, br s		
11	2.60, dq (12.5, 7.4)	2.88, dq (7.0, 1.6)	2.82, dq (7.2, 1.6)	3.87, dd (8.8, 2.0)	3.52, dd (7.9, 6.9)
12				4.96, dd (3.8, 2.0)	4.78, ddd (6.9, 3.9, 1.8)
13				6.99, m	7.15, t (1.6)
14					
15					
16				1.94, dd (1.7, 1.7)	1.93, dd (1.7, 1.9)
17	2.01, s	2.05, s		1.10, d (6.6)	1.13, d (8.0)
18	1.23, d (7.4)	1.38, d (7.0)	1.32, d (7.2)		
19	3.36, m	3.86, m	3.56, ddd (11.7, 8.5, 3.4)		
20	1.53, m	1.42, m	1.40, m		
	1.65, m	1.60, m	1.68, m		
21	1.08, t (7.1)	1.01, t (7.4)	0.99, t (7.3)		
22(OMe)	4.18, s	4.18, s			

[a] In $CDCl_3$. [b] In CD_3OD.

Table 2. ^{13}C NMR Data for Alkaloids **1**−**3**, **4a**, and **4b**

	1[a]		**2**[a]		**3**[b]		**4a**[a]		**4b**[a]	
1	20.1	t	25.5	t	77.4	d	22.4	t	22.6	t
2	23.4	t	22.7	t	28.7	t	30.7	t	30.8	t
3	22.7	t	22.7	t	36.2	t	174.1	s	174.0	s
4	70.0	d	81.9	d	66.2	d				
5							40.4	t	40.4	t
6	43.0	t	54.1	t	44.5	t	25.8	t	25.9	t
7	20.5	t	18.5	t	28.7	t	36.0	t	36.0	t
8	28.9	t	98.5	d	36.2	t	80.1	d	79.7	d
9	81.0	s	157.7	s	117.1	s	55.1	d	55.6	d
9a							56.0	d	55.9	d
10	46.8	d	42.9	d	55.6	d	37.6	d	39.7	d
10a	64.2	d	78.3	d	66.1	d				
11	42.5	d	38.5	d	39.8	d	83.6	d	85.6	d
12	208.9	s	145.8	s	181.1	s	80.1	d	82.9	d
13	90.6	s	123.7	s			145.8	d	147.0	d
14	169.2	s	162.9	s			131.2	s	130.8	s
15	98.4	s	97.7	s			174.1	s	174.0	s
16	173.1	s	169.7	s			10.8	q	10.7	q
17	8.6	q	9.2	q			15.9	q	16.5	q
18	12.8	q	21.8	q	16.3	q				
19	72.9	d	72.1	d	73.6	d				
20	28.6	t	28.6	t	28.7	t				
21	9.9	q	8.6	q	10.6	q				
22(OMe)	60.3	q	59.2	q						

[a] In $CDCl_3$. [b] In CD_3OD.

the C-13 *R**-configuration HGS model disclosed that H_3-22 should show apparent NOE correlations to H-10 and H_3-18, which was well-demonstrated in the case of cochinchistemonine.[5] Therefore, the C-13 *S**-configuration was deduced for **1**. Such spiro isomers are commonly found in *Stemona* alkaloids, e.g., C-12 spiro isomers of maistemonine, C-11 spiro isomers of stemoninine, and C-9 spiro isomers of croomine.

The HRESIMS of compound **2** suggested its molecular formula as $C_{22}H_{31}O_6$. The presence of a hydroxy group (3430 cm^{-1}) and an α,β-unsaturated γ-lactone moiety (1747, 1681, 1621 cm^{-1}) was observed in its IR spectrum, which was supported by the maximum UV absorption at 306 nm. In the ^{1}H NMR spectrum, some resonances were observed, such as one methyl singlet (δ 2.05), one methyl doublet (δ 1.38), one methyl triplet (δ 1.01), one *O*-methyl singlet (δ 4.18), and one olefinic proton (δ 5.42, ddd, J = 6.7, 5.0, 1.6). Comparing its NMR data with those of methoxystemokerrin-*N*-oxide,[7] the similarity of most chemical shift values, the lack of one *O*-methyl resonance, and the slight difference of chemical shift values for the 1-hydroxypropyl moiety (Tables 1 and 2) suggested that **2** was a 19-de-*O*-methyl derivative of methoxystemokerrin-*N*-oxide. The suggested structure was further supported by its molecular composition. The NOESY cross-peaks H-4/H-10a, H-4/H-6β, H-10a /H-10, H-10/H_3-18, and H_3-18/H_3-22 revealed that the relative configuration of C-10, C-10a, C-11, C-12, C-13, and C-19 remained the same as those of methoxystemokerrin-*N*-oxide.[7]

Compound **3** had a molecular formula of $C_{16}H_{25}NO_4$, as indicated by its HRESIMS ([M + Na]$^+$, 318.1710). The IR spectrum displayed absorption bands at 3430 and 1780 cm^{-1} corresponding to hydroxy and ester carbonyl groups, respectively. The ^{13}C NMR spectrum displayed 16 resonances, including two methyls, six methylenes, six methines, and two carbonyls. Resonances of one methyl doublet (δ 1.32) and one methyl triplet (δ 0.99) were observed in its ^{1}H NMR spectrum. NMR data comparison of **3** and oxystemokerrin showed that they shared the same structural

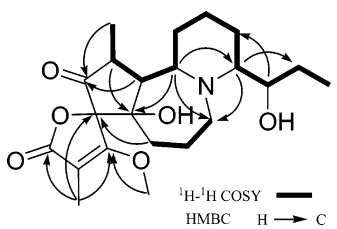

Figure 1. ^{1}H−^{1}H COSY and selected HMBC correlations for cochinchistemoninone (**1**).

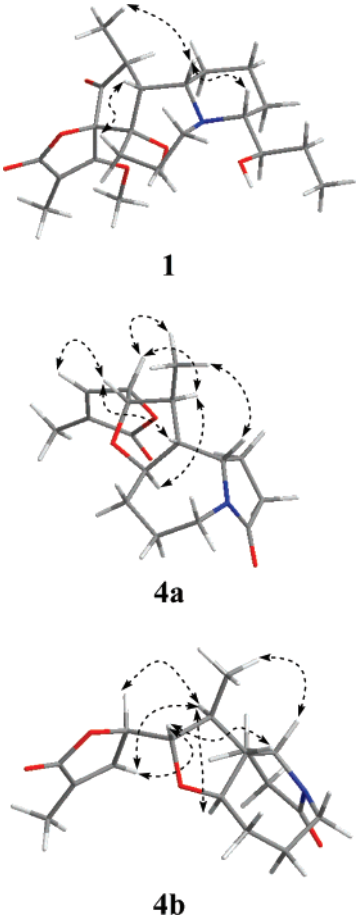

Figure 2. Key ROESY corrections (dashed lines) of compounds **1**, **4a**, and **4b**.

moieties of rings A, B, and C and the 1-hydroxypropyl side chain. However, an ester carbonyl (δ 181.1), instead of an α,β-unsaturated γ-lactone moiety, was located at C-12 of **3**. Such an assignment was supported by HMBC correlations from H-10 to C-12 and from H_3-17 to C-12. ROESY correlations of H-1/H-10, H-4/H-10a, and H-3β/H-19 indicated that **3** had the same relative configuration as that of oxystemokerrin.

The molecular formula of **4a** was determined to be $C_{17}H_{23}NO_4$ by a combined analyses of its HRESIMS ($[M + H]^+$, 306.1699) and ^{13}C NMR data (Table 2). The maximum UV absorption at 300 nm and IR absorptions at 1755 and 1684 cm^{-1} indicated the presence of an α,β-unsaturated γ-lactone moiety. The ^{13}C NMR spectrum displayed 17 resonances, including two methyls, five methylenes, seven methines, two carbonyls, and one olefinic quaternary carbon. The diagnostic resonances of an allylic proton at δ 6.99 (m) and an allylic methyl at δ 1.94 (dd, $J = 1.7, 1.7$), as well as carbon resonances at δ 131.2, 145.8, and 174.1, suggested the presence of a de-*O*-methyl α,β-unsaturated γ-lactone moiety in its structure. Such a characteristic moiety was previously reported in stemochinin.[7] NMR data analysis of **4a** and stemochinin disclosed that **4a** had a ketone functionality at C-3, but not the α-methyl γ-lactone ring as in stemochinin. This conclusion was supported not only by its molecular composition but also by key HMBC cross-peaks between C-3 (δ 174.1) and H_2-1, H_2-2, H_2-5, and H-9a. The structure of **4a** was further confirmed by HSQC, HMBC, and $^1H-^1H$ COSY spectra. Compound **4b** gave the same molecular formula ($C_{17}H_{23}NO_4$) as **4a**. The maximum UV absorption at 299 nm and the IR absorptions at 1755 and 1682 cm^{-1} in **4b** also indicated the presence of an α,β-unsaturated γ-lactone moiety. The NMR data comparison of **4b** and **4a** revealed that both compounds shared the same structural skeleton. Such elucidation of **4b** was further confirmed by HSQC and HMBC experiments.

In the ROESY spectra of both compounds, correlations of H-9/H-11, H-11/H_3-17, H-9/H_3-17, and H-9a/H_3-17 were observed, suggesting that H-9, H-9a, H-10, and H-11 were all β-oriented. The difference in C-12 configuration was evident from the slight difference of their NMR data at C-11, C-12, and C-13 (Tables 1 and 2). The correlations of H-12/H-10 and H-13/H-11 were observed in both ROESY spectra, while the ROESY correlation of H-12/H_3-17 was observed only in **4a** and the ROESY correlation of H-13/H-10 was observed only in **4b**. The 12*S** and 12*R** assignments in **4a** and **4b** were clearly elucidated from HGS stereochemistry molecular models where corresponding ROESY correlations in each molecule were satisfactorily considered. Additional evidence was also found in their ^1H NMR spectra. The $J_{11,12}$ values of **4a** (2.0 Hz) and **4b** (6.9 Hz) agreed well with those in the two stereoisomers of dihydrostemofoline.[13]

In 2004, a report showed that $J_{11,12}$ values directly reflected C-12 configuration of 11(*S*),12-dihydrostemofoline isomers.[13] The $J_{11,12}$ value of 11(*S*),12(*S*)-dihydrostemofoline was 7 Hz, and that of 11(*S*),12(*R*)-dihydrostemofoline was 3 Hz. Except for the *O*-methyl at C-13, rings C and D fragments in compounds **4a** and **4b** were very similar to those in 11(*S*),12-dihydrostemofoline. Corresponding $J_{11,12}$ values of **4a** and **4b** were consistent with reported *J* values of the known compounds. These data further confirmed the above conclusion.

Experimental Section

General Experimental Procedures. Optical rotations were recorded on a Perkin-Elmer 341 polarimeter. IR spectra were recorded on Nicolet Magna FT-IR 750 spectrophotometer using KBr disks. NMR spectra were recorded on Bruker AM-400 and INVOR-600 NMR spectrometers. The chemical shift (δ) values are given in ppm with TMS as internal standard, and coupling constants (*J*) are in Hz. EIMS and HREIMS spectra were recorded on a Finnigan MAT-95 mass spectrometer. ESIMS and HRESIMS spectra were recorded on a Micromass LC-MS-MS mass spectrometer. The HGS stereochemistry molecular model was Maruzen advanced set 7000 produced by Hinomoto Plastics Co., Ltd., Japan. Silica gel was used for flash chromatography and was produced by Qingdao Marine Chemical Industrials. Sephadex LH-20 for column chromatography was produced by Pharmacia Biotech AB, Uppsala, Sweden. TLC was carried out on precoated Si gel GF254 plates (Yantai Chemical Industrials), and the TLC spots were viewed at 254 nm and visualized by spraying with Dragendorff's reagent.

Plant Material. The plants of *S. saxorum* were collected from Hanam Province of Northern Vietnam in April 2002. A voucher specimen (No. QM831119) is deposited in the Herbarium of Hanoi National University of Education.

Extraction and Isolation. The air-dried roots of *S. saxorum* (5.2 kg) were ground into powder and extracted with 95% EtOH. After evaporation of the collected percolate, the crude extract was acidified with dilute HCl (4%) to pH = 1−2 and partitioned between CH_2Cl_2 and H_2O. The aqueous part was made basic with aqueous NH_3 to pH = 9−10 and extracted with CH_2Cl_2 to afford 28 g of crude alkaloids. Crude alkaloids (15.6 g) were subjected to column chromatography over silica gel and eluted with petroleum ether−acetone (3:1, 2:1, 1:1, 1:2), acetone, and then MeOH, giving fraction (Fr.) A (1.48 g), Fr. B (1.57 g), Fr. C (6.80 g), Fr. D (1.50 g), Fr. E (1.65 g), and Fr. F (2.86 g). These fractions were further purified by repeated column chromatography over Si gel and then Sephadex LH-20. Accordingly, stemonamine (5 mg), isostemonamine (7 mg), maistemonine (2 mg), and isomaistemonine (3 mg) were obtained from Fr. B, oxystemokerrin (50 mg), **4a** (6 mg), **4b** (7 mg), protostemonine (18 mg), isoprotostemonine (12 mg), dehydroprotostemonine (73 mg), oxyprotostemonine (46 mg), and stemocochinin (26 mg) from Fr. C, **2** (36 mg), **3** (4 mg), stemokerrin (300 mg), and oxystemokerrin-*N*-oxide (120 mg) from Fr. D, and **1** (3 mg) from Fr. E.

Cochinchistemoninone (1): yellow-brown gum; $[\alpha]_D^{20}$ +39 (*c* 0.28, MeOH); UV (MeOH) λ_{max} (log ϵ) 229 (3.91) nm; IR (KBr) ν_{max} 3417, 2926, 1765, 1659, 1460, 1329, 1076 cm^{-1}; ^1H and ^{13}C NMR, see Tables 1 and 2; HRESIMS *m*/*z* 408.2375 $[M + H]^+$ (calcd for $C_{22}H_{34}NO_6$, 408.2386).

Stemokerrin-*N*-oxide (2): light yellow powder; $[\alpha]_D^{22}$ +118 (*c* 0.24, MeOH); UV (MeOH) λ_{max} (log ϵ) 306 (4.30), 212 (3.89) nm; IR (KBr) ν_{max} 3430, 2958, 2873, 1747, 1681, 1621, 1460, 1398, 1277, 1221, 1049, 1005 cm^{-1}; ^1H and ^{13}C NMR, see Tables 1 and 2; HRESIMS *m*/*z* 406.2205 $[M + H]^+$ (calcd for $C_{22}H_{32}NO_6$, 406.2230).

Oxystemokerrilactone (3): light yellow powder; $[\alpha]_D^{20}$ −34 (*c* 0.14, MeOH); IR (KBr) ν_{max} 3430, 2933, 1780, 1632, 1458, 1296, 1209, 1032, 976, 933 cm^{-1}; ^1H and ^{13}C NMR, see Tables 1 and 2; HRESIMS *m*/*z* 318.1710 $[M + Na]^+$ (calcd for $C_{16}H_{25}NO_4Na$, 318.1681).

Saxorumamide (4a): light yellow powder; $[\alpha]_D^{20}$ −15.4 (*c* 0.35, MeOH); UV (MeOH) λ_{max} (log ϵ) 300 (2.22), 204 (4.04) nm; IR (KBr) ν_{max} 3427, 2933, 2873, 1755, 1684, 1458, 1423, 1072, 1041 cm^{-1}; ^1H and ^{13}C NMR, see Tables 1 and 2; HRESIMS *m*/*z* 306.1699 $[M + H]^+$ (calcd for $C_{17}H_{24}NO_4$, 306.1705).

Isosaxorumamide (4b): light yellow powder; $[\alpha]_D^{20}$ −152 (*c* 0.13, MeOH); UV (MeOH) λ_{max} (log ϵ) 299 (2.36), 205 (4.20) nm; IR (film) ν_{max} 3426, 2931, 2873, 1755, 1682, 1456, 1385, 1322, 1072, 754 cm^{-1}; ^1H and ^{13}C NMR, see Tables 1 and 2; HRESIMS *m*/*z* 328.1500 $[M + Na]^+$ (calcd for $C_{17}H_{23}NO_4Na$, 328.1525).

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Supporting Information Available: ^{13}C and ^1H NMR and ROESY spectra for cochinchistemoninone (**1**), stemokerrin-*N*-oxide (**2**), oxystemokerrilactone (**3**), saxorumamide (**4a**), and isosaxorumamide (**4b**) are available free of charge via the Internet at http://pubs.acs.org.

References and Notes

(1) Greger, H. *Planta Med.* **2006**, *72*, 99−113.
(2) Pilli, R. A.; Ferreira de Oliveira, M. C. *Nat. Prod. Rep.* **2000**, *17*, 117−127.
(3) Lin, L.-G.; Zhong, Q.-X.; Cheng, T.-Y.; Tang, C.-P.; Ke, C.-Q.; Lin, G.; Ye, Y. *J. Nat. Prod.* **2006**, *69*, 1051−1054.
(4) Hitotsuyanagi, Y.; Hikita, M.; Oda, T.; Kakuta, D.; Fukaya, H.; Takeya, K. *Tetrahedron* **2007**, *63*, 1008−1013.
(5) Lin, L.-G.; Tang, C.-P.; Dien, P.-H.; Xu, R.-S.; Ye, Y. *Tetrahedron Lett.* **2007**, *48*, 1559−1561.
(6) Jiang, R.-W.; Hon, P.-M.; Zhou, Y.; Chan, Y.-M.; Xu, Y.-T.; Xu, H.-X.; Greger, H.; Shaw, P.-C.; But, P. P.-H. *J. Nat. Prod.* **2006**, *69*, 749−754.
(7) Kaltenegger, E.; Brem, B.; Mereiter, K.; Kalchhauser, H.; Kahlig, H.; Hofer, O.; Vajrodaya, S.; Greger, H. *Phytochemistry* **2003**, *63*, 803−816.
(8) Mungkornasawakul, P.; Pyne, S. G.; Jatisatienr, A.; Supyen, D.; Jatisatienr, C.; Lie, W.; Ung, A. T.; Skelton, B. W.; White, A. H. *J. Nat. Prod.* **2004**, *67*, 675−677.
(9) Pham, H. D.; Phan, V. K.; Chau, V. M. *J. Chem. Appl.* (*Hoa Hoc & Ung Dung*) (Vietnamese) **2002**, *9*, 16−20.
(10) Ye, Y.; Qin, G.-W.; Xu, R.-X. *Phytochemistry* **1994**, *37*, 1205−1208.
(11) Ye, Y.; Qin, G.-W.; Xu, R.-X. *J. Nat. Prod.* **1994**, *57*, 665−669.
(12) Zou, C. Y.; Fu, H. Z.; Lei, H. I.; Li, J.; Lin, W. H. *J. Chin. Pharm. Sci.* **1999**, *8*, 185−190.
(13) Mungkornasawakul, P.; Pyne, S. G.; Jatisatienr, A.; Lie, W.; Ung, A. T.; Issakul, K.; Sawatwanich, A.; Supyen, D.; Jatisatienr, C. *J. Nat. Prod.* **2004**, *67*, 1740−1743.

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