JOURNAL OF NATURAL PRODUCTS

Volume 66, Number 2 February 2003

Full Papers

Oxygenated Analogues of Gorgosterol and Ergosterol from the Soft Coral *Capnella lacertiliensis*[1]

Anthony D. Wright,* Eva Goclik, and Gabriele M. König

Institute for Pharmaceutical Biology, University of Bonn, Nussallee 6, 53115 Bonn, Germany

Received January 11, 2002

From the dichloromethane solubles of *Capnella lacertiliensis* five new sterols were isolated that are highly functionalized with oxygen-containing substituents: 12β-acetoxy-7α-hydroxygorgosterol (**1**), 12β-acetoxy-7α,19-dihydroxygorgosterol (**2**), 12β-acetoxyergost-5-ene-3β,23-diol (**4**), 12β-acetoxyergost-5-ene-3β,11β,-16-triol (**5**), and 11β-acetoxyergost-5-ene-3β,12β,16-triol (**6**). The structures of all compounds were deduced from interpretation of their spectroscopic data, mainly 1D and 2D NMR spectra and HREIMS. Biological activities of the isolates were assessed, and all were found to be weakly antifungal. Compounds **5** and **6** were also found to have weak tyrosine kinase p56^{lck} (TK) inhibitory activity at the 200 μg/mL level.

The secondary metabolite chemistry of soft corals belonging to the genus *Capnella* is dominated by sesquiterpenes, typically capnellenes and capnellanes,[2,3] together with a few diterpenes: xenicanes,[4] but no sterols.[5] Interestingly, of the great majority of the published material attributed to *Capnella* spp., about 70% concerns chemical synthesis of its various unusual terpenoids[6] and has essentially nothing to do with the animals themselves or the biological activities of their secondary metabolites. In the current project a species of *Capnella* (*Capnella lacertiliensis* Macfadyen, 1963), which had never before been investigated for its secondary metabolite content, was selected for study. From the dichloromethane solubles of the dry animal tissue five new (**1**, **2**, **4**, **5**, and **6**) polyoxygenated sterols were isolated.

Results and Discussion

From the ^{1}H and ^{13}C NMR data of **1** (see Tables 1 and 2) it was evident that the molecule was a relatively highly functionalized sterol similar to gorgost-5-en-3β,11α-diol (**3**).[7] Its MS data indicated it to have the molecular formula $C_{32}H_{52}O_4$. Of the seven degrees of unsaturation indicated by the molecular formula only two were present as multiple bonds (1 × C=C and 1 × C=O); the molecule was therefore pentacyclic. As "regular" sterols are normally tetracyclic, a fifth ring had to be accounted for, in this case a cyclopropyl group between C-22 and C-23 characteristic of gorgosterols. Other functionalities deduced to be within the molecule were two secondary hydroxyl groups and a secondary acetoxyl group. Interpretation of the HMBC spectrum of **1** (see Supporting Information) confirmed the position of the cyclopropyl group, showed the acetoxyl group to reside at C-12, and supported the deduction that **1** was a gorgosterol derivative. Still requiring resolution were the locations of the two hydroxyl groups and carbon−carbon double bond, as well as the molecule's relative stereochemistry. From ^{13}C NMR data comparisons made between **1** and **3** and from interpretation of all of the NMR data of **1**, it was evident that one of the OH groups must be at C-3 and the double bond must be between C-5 and C-6.[7,8] As H-6 coupled with H-7, which resonated at δ 3.91, it was clear that the remaining OH function must reside at C-7. Further ^{13}C NMR data comparisons between **1** and **3** (see Table 2), for C-17 and the side chain part of **1**, clearly showed the two molecules to have the same relative stereochemistries in these regions. The chemical shift and

* Current address and address for correspondence: 40 Twelfth Ave., Railway Estate, Townsville, 4810 Queensland, Australia. Tel: +61 747 715298. E-mail: adwrightde@yahoo.com.au.

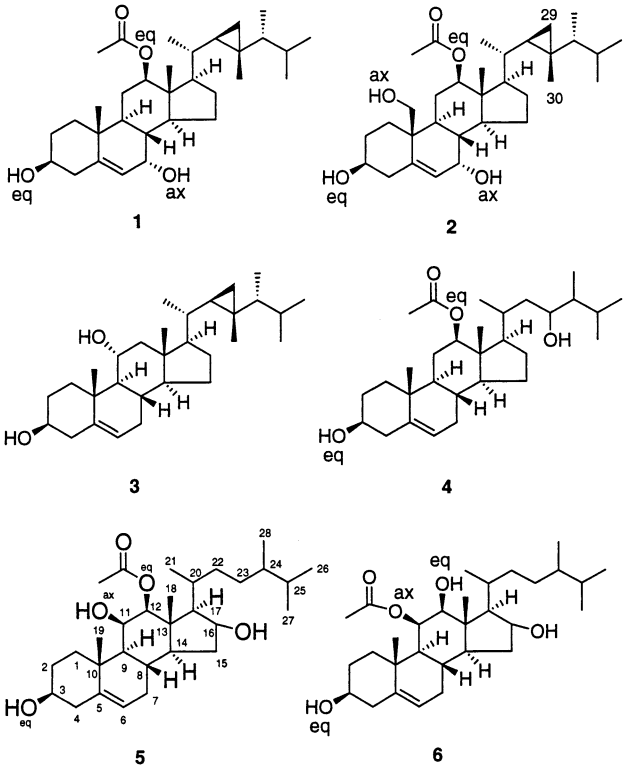
10.1021/np0200111 CCC: $25.00
Published on Web 12/20/2002

Table 1. ^{1}H NMR Spectral Data for Compounds **1**, **2**, and **4**−**6** (δ in ppm, J in Hz)[a]

proton	**1**[a]	**2**[b]	**4**[c]	**5**[b]	**6**[c]
1	1.79 m, 1.12 m	1.93 m	1.41 m	1.93 m	1.63 m
2	1.82 m, 1.48 m	1.83 m, 1.35 m	1.81 m, 1.95 m	1.84 m	1.83 m
3	3.55 m	3.63 m	3.49 m	3.51 m	3.52 m
4	2.32 ddd (J = 1.5, 4.9, 12.2) 2.23 ddd (J = 11.3, 12.2)	2.44 ddd (J = 1.5, 5.6, 11.4) 2.26 brdd (J = 11.4, 11.6)	2.28 ddd (J = 1.5, 5.6, 11.2) 2.20 ddd (J = 11.2, 11.6)	2.28 m	2.29 m
6	5.59 dd (J = 1.5, 5.3)	5.95 dd (J = 1.5, 5.4)	5.34 brs	5.23 brs	5.27 brs
7	3.85 brs	3.91 dd (J = 1.9, 3.5)	1.92 m, 1.54 m	2.16 m, 1.55 m	2.17 m, 1.46 m
8	1.39 m	1.89 m	1.25 m	1.87 m	1.86 m
9	1.41 m	1.44 m	1.08 m	1.12 m	1.20 m
11	1.87 m, 1.40 m	1.90 m, 1.66 m	1.77 m, 1.07 m	4.26 dd (J = 3.2, 3.2)	5.53 dd (J = 3.3, 3.3)
12	4.63 dd (J = 4.5, 9.8)	4.61 dd (J = 4.6, 11.1)	4.66 dd (J = 4.6, 10.7)	4.64 d (J = 3.2)	3.52 d (J = 3.3)
14	1.56 m	1.55 m	1.10 m	1.10 m	1.01 m
15	1.79 m, 1.24 m	1.76 m, 1.24 m	1.65 m, 1.20 m	1.55 m, 1.01 m	1.55 m, 1.02 m
16	1.94 m, 1.56 m	1.56 m	1.80 m, 1.40 m	3.81 m	3.80 ddd (J = 1.3, 3.6, 9.7)
17	1.53 m	1.43 m	1.52 m	1.54 m	1.50 m
18	0.80 s	0.86 s	0.80 s	1.01 s	0.86 s
19	0.97 s	3.90 d (J = 11.1) 3.60 d (J = 11.1)	1.00 s	1.26 s	0.97 s
20	1.15 m	1.16 m	1.52 m	1.45 m	1.59 m
21	0.93 d (J = 6.8)	0.95 d (J = 6.8)	0.86 d (J = 6.6)	0.87 d (J = 6.8)	0.98 d
22	0.24 ddd (J = 5.1, 5.4, 8.7)	0.23 ddd (J = 5.2, 5.4, 8.7)	1.53 m, 0.98 m	1.72 m	1.71 m
23			3.81 dd (J = 2.5, 9.2)	1.93 m, 1.19 m	1.84 m, 1.15 m
24	0.23 m	0.23 m	1.54 m	1.48 m	1.48 m
25	1.55 m	1.55 m	1.48 m	1.55 m	1.55 m
26	0.84 d (J = 6.8)	0.84 d (J = 6.8)	0.82 d (J = 6.6)	0.81 d (J = 6.8)	0.81 d (J = 6.6)
27	0.93 d (J = 6.8)	0.93 d (J = 6.8)	0.85 d (J = 6.6)	0.86 d (J = 6.8)	0.85 d (J = 6.6)
28	0.92 d (J = 6.8)	0.91 d (J = 7.2)	0.80 d (J = 6.6)	0.82 d (J = 6.8)	0.81 d (J = 6.6)
29	0.45 dd (J = 4.5, 8.7) −0.13 dd (J = 4.5, 5.1)	0.45 dd (J = 4.3, 8.7) −0.13 dd (J = 4.3, 5.4)			
30	0.89 s	0.90 s			
32	2.01 s	2.02 s	2.01 s	2.12 s	2.10 s

[a] All assignments are based on 1D and 2D NMR measurements including COSY, HMQC, and HMBC. [b] Recorded in $CDCl_3$ at 300 MHz. [c] Recorded in $CDCl_3$ at 400 MHz.

^{1}H−^{1}H coupling pattern associated with the resonance of H-3 were typical for this proton having an axial and α orientation.[7−9] The shielded and deshielded nature of the ^{13}C NMR resonances associated with C-5, C-9, and C-14 were all consistent with the 7-OH group having an axial orientation and the four rings all being *trans*-fused.[9,10] The latter deduction was also supported by the width and coupling patterns of the ^{1}H NMR resonances associated with H-8, H-9, and H-14 (see Supporting Information). The ^{1}H−^{1}H coupling pattern associated with H-12 showed it to have an axial and α orientation and therefore completed the structure and relative stereochemistry of **1**.



The spectroscopic data recorded for **2** were almost identical to those for **1**; however, **2** was 16 amu (e.g., an oxygen atom) heavier than **1**. Inspection of the ^{1}H and ^{13}C NMR data for both compounds showed the resonances associated with the C-19 methyl group in **1** to be absent in **2** and in its place the resonances for a CH_2OH moiety were noted. NOE difference measurements showed an interaction between H_2-19 and H-4$_{ax}$, indicating both to be axial and β. On the basis of the similarity between the two sets of ^{1}H and ^{13}C NMR data, it was concluded that the two molecules had identical relative configurations at all remaining centers.

The molecular formula of **4** ($C_{30}H_{50}O_4$) showed it to be C_2H_2 less than **1**, and C_2H_2O less than **2**. The ^{1}H NMR data of **4** lacked resonances attributable to the cyclopropyl group as well as the C-29 methyl group found in **1** and **2**. Also absent in the ^{1}H NMR data of **4** were the signals found in the NMR data of **2** associated with the C-10 CH_2OH and the C-7 CHOH groups. Instead, ^{1}H and ^{13}C NMR resonances for a C-19 methyl group, a C-7 methylene, and a C-22 CHOH group were present. ^{13}C NMR data comparisons made between the data sets of **4** and **1** and **2** enabled the relative configuration around the four rings within **4** to be deduced as being the same as those shown for **1** and

Table 2. ^{13}C NMR Spectral Data for Compounds **1**, **2**, Gorgost-5-en-3β,11α-diol (**3**),[7] and **4**−**6**[a]

carbon	**1**[b]	**2**[b]	**3**[c]	**4**[c]	**5**[b]	**6**[c]
1	36.9 CH_2	33.5 CH_2	31.1 CH_2	31.4 CH_2	26.3 CH_2	26.8 CH_2
2	31.2 CH_2	31.5 CH_2	32.0 CH_2	31.5 CH_2	31.4 CH_2	31.3 CH_2
3	71.2 CH	71.1 CH	71.0 CH	71.6 CH	71.3 CH	71.1 CH
4	41.8 CH_2	41.9 CH_2	43.3 CH_2	42.1 CH_2	41.3 CH_2	41.3 CH_2
5	146.0 C	141.3 C	139.2 C	140.6 C	141.5 C	140.6 C
6	123.9 CH	128.6 CH	121.2 CH	121.5 CH	120.4 CH	121.0 CH
7	64.9 CH	64.7 CH	27.0 CH_2	26.2 CH_2	31.7 CH_2	31.4 CH_2
8	36.5 CH	37.9 CH	35.2 CH_2	31.0 CH	27.2 CH	27.4 CH
9	41.5 CH	41.6 CH	57.6 CH	54.9 CH	53.2 CH	52.2 CH
10	37.5 C	42.2 C	43.0 C	36.6 C	36.9 C	36.2 C
11	27.0 CH_2	27.5 CH_2	69.3 CH	37.2 CH_2	70.4 CH	73.4 CH
12	80.8 CH	80.8 CH	46.9 CH_2	81.1 CH	82.7 CH	80.0 CH
13	46.1 C	46.4 C	42.8 C	46.2 C	45.9 C	47.2 C
14	57.4 CH	57.4 CH	49.4 CH	49.0 CH	57.2 CH	57.3 CH
15	23.6 CH_2	23.4 CH_2	24.1 CH_2	23.7 CH_2	41.1 CH_2	41.0 CH_2
16	27.9 CH_2	27.9 CH_2	28.3 CH_2	27.6 CH_2	70.7 CH	72.4 CH
17	48.3 CH	49.4 CH	50.8 CH	55.1 CH	55.1 CH	56.7 CH
18	9.0 CH_3	9.2 CH_3	12.1 CH_3	8.5 CH_3	10.7 CH_3	10.2 CH_3
19	18.1 CH_3	63.1 CH_2	22.1 CH_3	19.3 CH_3	22.6 CH_3	21.9 CH_3
20	33.6 CH	33.6 CH	34.5 CH	39.0 CH	39.6 CH	39.7 CH
21	22.2 CH_3	22.2 CH_3	21.1 CH_3	13.6 CH_3	13.5 CH_3	12.1 CH_3
22	30.6 CH	30.6 CH	27.8 CH	41.1 CH_2	23.6 CH_2	23.3 CH_2
23	25.3 C	25.3 C	25.8 C	70.8 CH	36.5 CH_2	37.1 CH_2
24	50.6 CH	50.7 CH	49.5 CH	32.7 CH	35.0 CH	35.0 CH
25	32.2 CH	32.2 CH	31.5 CH	35.0 CH	32.7 CH	32.7 CH
26	21.5 CH_3	21.5 CH_3	21.4 CH_3	15.2 CH_3	18.0 CH_3	17.9 CH_3
27	22.2 CH_3	22.2 CH_3	21.9 CH_3	20.1 CH_3	20.1 CH_3	20.1 CH_3
28	15.4 CH_3	15.4 CH_3	15.4 CH_3	18.0 CH_3	15.2 CH_3	15.1 CH_3
29	21.5 CH_2	21.5 CH_2	21.2 CH_2			
30	13.8 CH_3	13.8 CH_3	14.3 CH_3			
31	170. 7 C	170.8 C		170.5 C	170.0 C	174.5 C
32	21.8 CH_3	21.8 CH_3		21.7 CH_3	21.7 CH_3	21.8 CH_3

[a] All assignments are based on extensive 1D and 2D NMR measurements including DEPT, COSY, and HMQC. [b] Recorded in $CDCl_3$ at 75.5 MHz. [c] Recorded in $CDCl_3$ at 100 MHz.

2. While it is likely that the relative configurations at C-20, C-22, and C-24 are identical to those found in **1** and **2**, no conclusive stereochemical deductions could be made even after extensive NMR data comparisons with molecules such as ergosterol.[10]

The spectroscopic data of **5**, in particular the HMBC couplings observed between H_3-18 and C-12 and between H-12 and C-31, and the COSY couplings seen between H-12 and H-11 and between H-11 and H-9, showed it to be the 11,16-dihydroxy derivative of **4**. From the NMR data of **5** it was not possible to draw any firm conclusions about the configurations at C-20 and C-24 except that they were the same as those found in **4**; however, it was evident from the $^1H-^1H$ coupling constants between H-9 and H-11 (3.2 Hz), and H-11 and H-12 (3.2 Hz), that H-11 must be equatorial and α with H-12 axial and α.

The MS data of **5** and **6** were essentially identical. Inspection of NMR spectroscopic data for **6**, in particular the HMBC coupling observed between H_3-18 and C-12, showed that the 11-OH and 12-OAc groups found in **5** had exchanged places. In all other respects the two molecules were essentially identical. On standing in the NMR solvent ($CDCl_3$) for more than a day **5** partially rearranged to **6**.

Bioassays

The isolated compounds were tested in several assays for their biological activity. Antimicrobial activity was assessed against *Escherichia coli*, *Bacillus megaterium* (bacteria), *Eurotium repens*, *Fusarium oxysporum*, *Mycotypha microspora*, and *Microbotryum violaceum* (fungi), and algicidal activity against *Chlorella fusca*. Inhibition of reverse transcriptase of the human immunodeficiency virus type 1 (HIV-1-RT), tyrosine kinase p56^{lck} (TK), nematicidal (*Caenorrhabditis elegans*), antiplasmodial (*Plasmodium falciparum*), and antitrypanosomal (*Trypanosoma brucei rhodesiense*, *T. cruzi*) activities, cytotoxic properties (selected cancer cell lines), and lethalities (brine shrimp assay) were also assessed.

All compounds were found to inhibit the growth of the fungus *M. violacea* at concentrations between 10 and 20 μg: compound **1** producing a 1 mm zone of inhibition around a filter disk at a concentration of 20 μg, **2** a 2 mm inhibition zone at 10 μg, **4** a 3 mm zone at 10 μg, **5** a 1 mm zone at 25 μg, and **6** a 3 mm zone at 10 μg. The growth of the fungus *E. repens* was inhibited by **1** (2 mm inhibition zone at 20 μg) and **6** (2 mm zone at 10 μg). Compounds **4** and **6** also weakly inhibited the enzyme tyrosine kinase p56^{lck} to 42% and 47%, respectively, at the 200 μg/mL level.

Experimental Section

General Experimental Procedures. These were performed as previously reported.[11]

Animal Material. Animal material was obtained in May 1983, from Old Reef, the Great Barrier Reef, Queensland, Australia. Animals growing at 4−7 m depth were collected, deep frozen, and on return to the laboratory, freeze-dried. A voucher specimen of *Capnella lacertiliensis*[12] (family Nephtheidae) is stored at the Museum and Art Gallery of the Northern Territory, Darwin, Australia (voucher number NTM C13069).

Extraction and Isolation. Soft coral tissue (45 g) was exhaustively extracted with CH_2Cl_2 (2 L) and MeOH (2 L) to yield 2.1 g (4.7%) of a CH_2Cl_2-soluble material. Vacuum-liquid chromatography (VLC) of the crude extract over Si gel, using petroleum ether with increasing proportions of $(CH_3)_2CO$ as eluent, followed by MeOH, afforded 20 fractions each of 80 mL volume. TLC and ^1H NMR examination of these fractions indicated VLC fractions 8 and 12 to be of further interest. VLC separation (Si gel, $CH_2Cl_2/(CH_3)_2CO$,

4:1) of original VLC fraction 8 yielded another 11 fractions (8.1−8.11), each of 60 mL volume. HPLC separation (normal-phase silica [LiChrosorb Si60, 5 μm, 250 × 8 mm, NP-Si], $CH_2Cl_2/(CH_3)_2CO$, 4:1) of combined fractions 8.3 and 8.4 yielded compound **4** (3.0 mg, 0.007%). HPLC separation (reversed-phase C-18 silica [Spherisorb S ODS2 5 μm, 250 × 8 mm, RP-Si], $MeOH/H_2O$, 9:1) of combined fractions 8.3 and 8.4 yielded compound **5** (4.0 mg, 0.009%). HPLC separation (RP-Si, $MeOH/H_2O$, 95:5) of combined fractions 8.7 and 8.8 yielded compound **6** (3.6 mg, 0.008%). HPLC separation (RP-Si, $MeOH/H_2O$, 4:1) of fraction 8.11 yielded compound **2** (8.6 mg, 0.02%). VLC separation (Si gel, $CH_2Cl_2/(CH_3)_2CO$/MeOH, 85:10:5) of original VLC fraction 12 yielded another 11 fractions (12.1−12.11), each of 60 mL volume. HPLC separation (RP-Si, $MeOH/H_2O$, 4:1) of fraction 12.6 yielded compound **1** (30.1 mg, 0.07%).

12β-Acetoxy-7α-hydroxygorgosterol (1): clear oil; $[\alpha]_D^{22}$ −64.0° (*c* 0.01, $CHCl_3$); IR ν_{max} (film) 3367, 2935, 1730, 1715 1246, 1024 cm^{-1}; ^1H and ^{13}C NMR data, see Tables 1 and 2; EIMS *m/z* $[M]^+$ 500 (1), 484 (3), 483 (24), 482 (60), 456 (70), 440 (100), 422 (83), 328 (70), 310 (74), 269 (80), 152 (80); HREIMS *m/z* 482.3745 (calcd for $[M - H_2O]^+$, $C_{32}H_{50}O_3$, 482.3747).

12β-Acetoxy-7α,19-dihydroxygorgosterol (2): clear oil; $[\alpha]_D^{22}$ −98.0° (*c* 0.01, $CHCl_3$); IR ν_{max} (film) 3394, 2927, 1734, 1716, 1244, 1027 cm^{-1}; ^1H and ^{13}C NMR data, see Tables 1 and 2; CIMS (NH_3) *m/z* $[M]^+$ 516; EIMS *m/z* $[M]^+$ 516 (1), 498 (10), 480 (50), 420 (50), 390 (50), 237 (100), 195 (90); HREIMS *m/z* 480.3591 (calcd for $[M - 2H_2O]^+$, $C_{32}H_{48}O_3$, 480.3591).

12β-Acetoxyergost-5-ene-3β,23-diol (4): clear oil; $[\alpha]_D^{22}$ −50.0° (*c* 0.01, $CHCl_3$); IR ν_{max} (film) 3406, 2929, 1734, 1715, 1244, 1022 cm^{-1}; ^1H and ^{13}C NMR data, see Tables 1 and 2; CIMS (NH_3) *m/z* $[M + NH_4]^+$ 492; EIMS *m/z* $[M]^+$ 474 (<1), 457 (1), 397 (4), 300 (100) 282 (30), 267 (30), 145 (30); HREIMS *m/z* 474.3697 (calcd for $C_{30}H_{50}O_4$, 474.3696).

12β-Acetoxyergost-5-ene-3β,11β,16-triol (5): clear oil; $[\alpha]_D^{22}$ −49.0° (*c* 0.01, $CHCl_3$); IR ν_{max} (film) 3459, 2927, 1734, 1719, 1458, 1262, 1027 cm^{-1}; ^1H and ^{13}C NMR data, see Tables 1 and 2; EIMS *m/z* $[M]^+$ 490 (3), 430 (84), 400 (60), 346 (50), 328 (60), 298 (60), 145 (86); HREIMS *m/z* 430.3434 (calcd for $[M - HOAc]^+$, $C_{28}H_{46}O_3$, 430.3435).

11β-Acetoxyergost-5-ene-3β,12β, 16-triol (6): clear oil; $[\alpha]_D^{22}$ −50.0° (*c* 0.01, $CHCl_3$); IR ν_{max} (film) 3417, 2930, 1722, 1716, 1462, 1258, 1028 cm^{-1}; ^1H and ^{13}C NMR data, see Tables 1 and 2; CIMS (NH_3) *m/z* $[M + NH_4]^+$ 508 (30), $[M + H]^+$ 391 (26), $[M]^+$ 390 (24), 431 (36), 413 (100); EIMS *m/z* $[M - HOAc]^+$ 430 (<1), 412 (<1), 298 (50), 207 (50), 145 (100).

Biological Tests. The antimicrobial, tyrosine kinase (TK) inhibition, reverse transcriptase (RT) inhibition, antimalarial, antitrypanosomal, cytotoxic, antitubercular, brine shrimp, and nematicidal assays were carried out as previously described.[13]

Acknowledgment. Soft coral taxonomy was performed by P. Alderslade, Museum and Art Gallery of the Northern Territory, Darwin, Australia. We thank C. Dreikorn, TU-BS, for performing antimicrobial, TK, and the HIV-1-RT assays, and V. Wray and his group, GBF-Braunschweig, Mascheroder Weg 1, 38124 Braunschweig, for recording all NMR spectra. Thanks also go to U. Papke, the late L. Witte, and Ms. D. Döring, MS-Service, Department of Chemistry, TU-BS, for making all MS measurements. Financial support from the Bundesministerium für Bildung und Forschung (BMBF) and the Fond der Chemischen Industrie (No. 164 357) is gratefully acknowledged.

Supporting Information Available: HMBC spectra of **1**, **2**, and **4**−**6**. This material is available free of charge via the Internet at http://pubs.acs.org.

References and Notes

(1) Presented in part at the 42nd Annual Meeting of the American Society of Pharmacognosy, Oaxaca, Mexico, July 14−18, 2001, *Book of Abstracts*, Poster P-104.
(2) Sheikh, Y. M.; Singy, G.; Kaisin, M.; Eggert, H.; Djerassi, C.; Tursch, B. Daloze, D.; Braekman, J. C. *Tetrahedron* **1976**, *32*, 1171−1178.
(3) Kaisin, M.; Braekman, J. C.; Daloze, D.; Tursch, B. *Tetrahedron* **1985**, *41*, 1067−1072.
(4) Hooper, G. J.; Davies-Coleman, M. T. *Tetrahedron* **1995**, *51*, 9973−9984.
(5) Blunt, J.; Munro, M. H. G. *MarinLit Data Base*; Department of Chemistry, University of Canterbury, Canterbury, New Zealand, 2001.
(6) Crisp, G. T.; Scott, W. J.; Stille, J. K. *J. Am. Chem. Soc.* 1**984**, *106*, 7500−7506.
(7) Anjaneyulu, A. S. R.; Murthy, M. V. R. K.; Gowri, P. M. *J. Nat. Prod.* **2000**, *63*, 112−118.
(8) Nick, A.; Wright, A. D.; Sticher, O.; Rali, T. *J. Nat. Prod.* **1994**, *57*, 1245−1250.
(9) Sheu, J.-H.; Chang, K.-C.; Duh, C.-Y. *J. Nat. Prod.* **2000**, *63*, 149−151.
(10) Shirane, N.; Takenaka, H.; Ueda, K.; Hashimoto, Y.; Katoh, K.; Ishii, H. *Phytochemistry* **1996**, *41*, 1301−1308.
(11) Wright, A. D.; König, G. M.; Angerhofer, C. K.; Greenidge, P.; Linden A.; Desqueyroux-Faundez, R. *J. Nat. Prod.* **1996**, *59*, 710−716.
(12) MacFadyen, L. M. I. *Sci. Rep.* **1936**, *5*, 19−71.
(13) Wessels, M.; König, G. M.; Wright, A. D. *J. Nat. Prod.* **2000**, *63*, 920−928, and references therein.

NP0200111