Xanalteric Acids I and II and Related Phenolic Compounds from an Endophytic *Alternaria* sp. Isolated from the Mangrove Plant *Sonneratia alba*

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Two new 10-oxo-10*H*-phenaleno[1,2,3-*de*]chromene-2-carboxylic acids, xanalteric acids I (**1**) and II (**2**), and 11 known secondary metabolites were obtained from extracts of the endophytic fungus *Alternaria* sp., isolated from the mangrove plant *Sonneratia alba* collected in China. The metabolites were confirmed to be of fungal origin, and the structures of the new natural products were unambiguously elucidated on the basis of extensive one- and two-dimensional NMR spectroscopic studies and mass spectrometric analysis. The two new compounds **1** and **2** exhibited weak antibiotic activity against multidrug-resistant *Staphylococcus aureus*. Altenusin (**3**) displayed broad antimicrobial activity against several additional multidrug-resistant bacterial and fungal strains.

Terrestrial fungi are known as rich sources of biologically active secondary metabolites that are indispensable for medicinal and agricultural applications. However, due to the frequent rediscovery of previously described metabolites of fungi from traditionally investigated habitats, the attention of natural product researchers has been increasingly attracted to fungi from less common sources and ecological niches such as fungal endophytes.[1−3] An endophytic fungus spends a part or all of its whole life cycle inside living tissues of a host plant and establishes a relationship with its host that may range from symbiotic to slightly pathogenic. The fungus obtains nutrients and protection from the host, whereas it is generally assumed that its metabolites may enhance the host's growth and competitiveness.[3,4] In continuation of our search for new bioactive natural products from fungal endophytes,[5−8] we isolated an *Alternaria* strain from the leaves of *Sonneratia alba*, a mangrove tree mainly used for the production of timber, but also as a traditional medicine against injuries of the skin or intestinal parasites.[9] In their natural habitat, mangroves are prone to numerous stress factors such as changing tides and salinity as well as abundant (pathogenic) microorganisms and insects, which demand a special fitness of the plant.[10,11] Therefore they epitomize an ecological niche and potential habitat of specific microorganisms. *Alternaria* is a cosmopolitan fungal genus, and several species are known as plant pathogens. Although several endophytic *Alternaria* strains have been investigated before,[5] isolates from particular habitats frequently yield novel natural products. This prompted us to investigate the compounds produced by the mangrove-derived *Alternaria* sp. We isolated two new secondary metabolites (**1** and **2**) as well as several known polyketides and report on the structure elucidation of the new natural products. Their fungal origin was confirmed, and this is the first report of fungal metabolites featuring a 10-oxo-10*H*-phenaleno[1,2,3-*de*]chromene skeleton hitherto only reported from bacteria.

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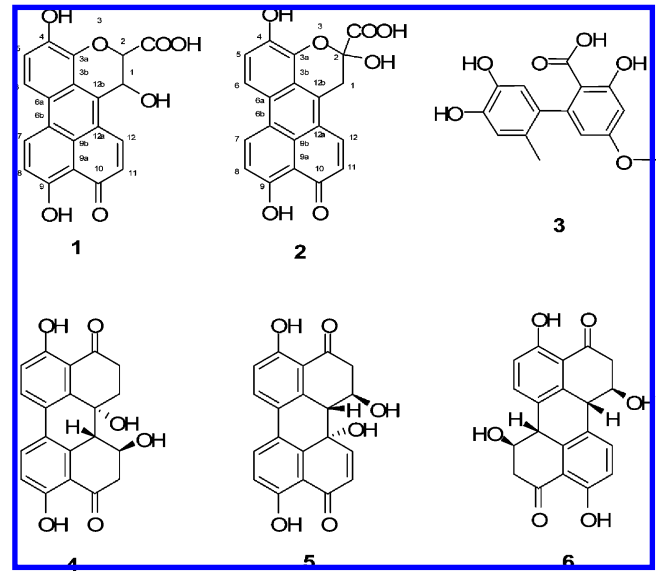
Extracts of *Alternaria* sp., when grown on solid rice medium, yielded two new carboxylic acids, xanalteric acids I (**1**) and II (**2**), together with the known fungal metabolites alternarienonic acid, altenusin (**3**), altenuene, 4′-epialtenuene, alternariol, altertoxin I (**4**), 2,5-dimethyl-7-hydroxychromone, and alternarian acid. When the fungus was grown in liquid medium, compounds **1**, **2**, **3**, altenuene, alternariol, and **4** were likewise detected. Additionally, the known compounds alternariol-5-*O*-methyl ether and the perylene derivatives alterperylenol (**5**) and stemphyperylenol (**6**) were also obtained. The latter compounds were missing when the fungus was cultivated on rice medium. All known compounds were identified by their spectroscopic characteristics involving one- and two-dimensional NMR spectroscopy and mass spectrometry as well as comparison with literature data.[5,12−15]



Compound **1**, obtained as a red powder, had the molecular formula $C_{20}H_{12}O_7$ as determined by HRESIMS (*m*/*z* 365.0656 [M + H]$^+$), corresponding to eight double-bond equivalents. Taken together with the UV/vis spectrum, which exhibits maxima at 413 and 514 nm, these data suggested that **1** featured a complex aromatic ring system, which is in accordance with three sets of ortho-coupled

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Table 1. ^{1}H and ^{13}C NMR, HMBC, and NOESY Spectroscopic Data for Xanalteric Acids I (**1**) and II (**2**)

	xanalteric acid I (**1**)						xanalteric acid II (**2**)			
position	δ_C[a] mult.	δ_H (J Hz)[a]	δ_H (J Hz)[b]	COSY[b]	HMBC[a]	NOESY[a]	δ_C[a] mult.	δ_H (J Hz)[a]	δ_H (J Hz)[b]	HMBC[a]
1	65.1, CH	6.17, d (3.0)	5.93, d (2.3)	2, 1-OH	3b, 12a, 12b, COOH-2	12	34.8, CH_2	A: 4.22, d (17.3) B: 3.66, d (17.3)	A: 3.88, d (18.3) B: 3.71, d (18.0)	3b, 2, 12a, 12b 2, 3b, 9b, 12a, 12b, COOH
2	81.7, CH	5.06, d (3.0)	4.74, brs	1	1, 3a, 12b, COOH-2		97.0, qC			
3a	140.6, qC						138.8, qC			
3b	119.3, qC						120.0, qC			
4	143.6, qC						144.4, qC			
5	123.3, CH	7.46, d (9.1)	7.35, d (7.4)	6	3a, 4, 6a		122.8, CH	7.43, d (8.8)	7.42, d (8.9)	3a, 4, 6a
6	115.9, CH	8.24, d (8.8)	8.16, d (9.3)	5	3a, 3b, 4, 6a, 6b	7	116.3, CH	8.24, d (9.1)	8.24, d (8.8)	3b, 4, 6b, 12b
6a	126.9, qC						126.7, qC			
6b	122.9, qC						122.1, qC			
7	134.0, CH	9.00, d (9.1)	9.04, d (7.5)	8	6a, 6b, 9, 9a, 9b, 12a	6	134.1, CH	8.98, d (9.5)	9.07, d (8.6)	6a, 9, 9b
8	119.6, CH	7.38, d (9.1)	7.35, d (7.4)	7	6b, 9, 9a, 9b		118.7, CH	7.38, d (9.1)	7.37, d (9.2)	6b, 9, 9a
9	167.1, qC						167.4, qC			
9a	112.9, qC						113.2, qC			
9b	126.4, qC						126.7, qC			
10	191.0, qC						190.5, qC			
11	127.3, CH	6.94, d (10.0)	6.94, d (9.4)	12	9, 9a, 9b, 12a		126.9, CH	6.92, d (9.8)	6.89, d (9.8)	9a, 12a
12	140.4, CH	8.74, d (10.1)	8.62, d (7.3)	11	6b, 9a, 9b,10, 12a, 12b	1	139.7, CH	8.53, d (10.0)	8.62, d (9.8)	9b, 10, 12a, 12b
12a	121.6, qC						122.0, qC			
12b	137.1, qC				3b, 12a, 12b, COOH-2		138.7, qC			
OH-1			3.3	1						
OH-2										
COOH-2	174.7		8.73, s				174.7		9.35, s	
OH-4			5.75, s						5.75, s	
OH-9			15.12, s						15.19, s	

[a] Measured in MeOH-d_4. [b] measured in DMSO-d_6 at 500 MHz.

aromatic protons (δ_H 7.46/8.24, 9.00/7.38, and 6.94/8.74; H-5/H-6, H-7/H-8, and H-11/H-12, respectively; Table 1) that were observed in the ^{1}H NMR spectrum. Two vicinal coupling protons at δ_H 6.17 and 5.06 (H-1/H-2) form a fourth spin system, with their coupling constant of 3.0 Hz suggesting that at least one of them must have a pseudoequatorial orientation. When the ^{1}H NMR spectrum was measured in DMSO-d_6, four hydroxy protons (δ_H 3.3, 5.75, 8.73, and 15.12; OH-1, OH-4, COOH, and OH-9) were detected. The striking downfield shift of OH-9 is typical of a strong hydrogen bond, which is in accordance with the downfield shift of C-10 (δ_C 191.0) observed in the ^{13}C NMR spectrum, which is indicative of an aromatic carbonyl group. The COSY spectrum revealed the correlation between OH-1 (overlapping with water peak) and H-1 (δ_H 5.93). HMBC data allowed the arrangement of the different spin systems to be deduced. The quaternary carbons C-9a (δ_C 112.9) and C-9b (δ_C 126.4) show correlations to the aromatic doublets H-8 (δ_H 7.38) and H-11 (δ_H 6.94), and H-7 (δ_H 9.00) and H-12 (δ_H 8.74), respectively. Moreover, H-7 and H-5 (δ_H 7.46) show correlations with C-6a (δ_C 126.9), whereas H-8 and H-6 (δ_H 8.24) correlate with C-6b (δ_C 122.9). Protons H-6 and H-1 both exhibit correlations to C-3b. The correlations of H-11 and H-1 to C-12a and of H-12 and H-2 to C-12b, respectively, provide the remaining connections of the five ring core structure of **1**. NOESY correlations that were observed between the aromatic protons H-6 and H-7, and H-12 with H-1, confirm this result. The presence of the oxygen in the heterocyclic ring system is corroborated by the downfield shifts of the aromatic carbons C-3a (δ_C 140.6) and C-2 (δ_C 81.7). The presence of a carboxyl group at C-2 is indicated by the downfield shift of the carbon (δ_C 174.7), which correlates with H-1 as well as with H-2. ESIMS/MS experiments supported this structural feature by the observed facile decarboxylation of **1** in the negative as well as in the positive ionization mode. Hence, **1** was found to be the new natural product 1,4,9-trihydroxy-10-oxo-2,10-dihydro-1*H*-phenaleno[1,2,3-*de*]chromene-2-carboxylic acid, for which we propose the name xanalteric acid I.

Compound **2**, also obtained as a red powder, displayed physical characteristics comparable to those of **1**. The HRESIMS again exhibited a peak at *m*/*z* 365.0656 $[M + H]^+$, and in the MS/MS experiment a facile decarboxylation of the compound was observed. ^{1}H NMR and HMBC spectra revealed very similar signals for the three spin systems of the aromatic protons H-5/H-6, H-7/H-8, and H-11/H-12 as found for **1**, whereas the fourth spin system attracted our attention due to its upfield shift (compared to **1**, Table 1) and the large coupling constant of 17.3 Hz, indicating the presence of geminal protons. This observation was confirmed by a HMQC experiment, which displayed correlations of protons H-1A and H-1B to C-1 at δ_C 34.8. Accordingly, **2** (2,4,9-trihydroxy-10-oxo-2,10-dihydro-1*H*-phenaleno[1,2,3-*de*]chromene-2-carboxylic acid) is an isomer of **1**, for which we propose the name xanalteric acid II.

This is the first report of fungal substances featuring a 10*H*-phenaleno[1,2,3-*de*]chromene skeleton. A structurally similar compound, xanosporic acid (**8**), was previously isolated as a degradation product of the fungal phototoxic compound cercosporin (**7**), which had been added to the fermentation broth of *Xanthomonas campestris* pv zinniae.[16−18] Cercosporin (**7**) was catabolized by the bacteria, thereby yielding the corresponding acid (**8**), which was extracted from the fermentation broth and identified after lactoniszation (structure of lactone not shown) (Figure 1). Viewed against this background it appeared possible that xanalteric acids I (**1**) and II (**2**) could have originated in a similar way (Figure 2), especially as the isolated metabolites **4**−**6** seem to support the presence of the putative precursors. Potentially endosymbiotic bacteria that reside in fungal hosts could be involved, as recently reported for the fungus *Rhizopus* sp. inhabited by *Burkholderia* sp.[19,20] This possibility of a bacterial origin of xanalteric acids I and II could, however, be discarded on the basis of two experiments: When the well-known antibiotics penicillin G and chloramphenicol

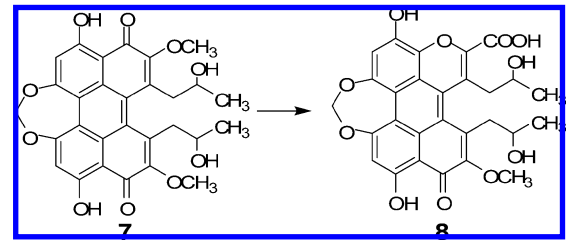

Figure 1. Structures of cercosporin (**7**) and xanosporic acid (**8**).

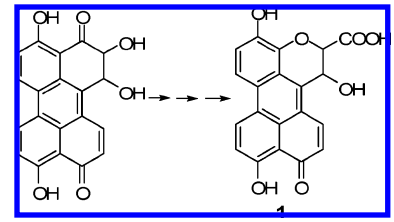

Figure 2. Possible precursor of xanalteric acid I (**1**).

Table 2. Cytotoxicity Assay for *Alternaria* Extracts and Isolated Compounds

sample tested	L5178Y growth in % (at 10 μg/mL)
Alternaria rice EtOAc	14.2
Alternaria liquid EtOAc	−1.4
xanalteric acid I (**1**)	45.0
xanalteric acid II (**2**)	87.5
alternarian acid	99.2

were added to the fermentation broth of *Alternaria* sp., production of xanalteric acids by the fungus still proceeded. When a PCR experiment involving total DNA of the fungus and the eubacterial primers 27f and 149r was performed, no bacterial DNA could be identified following gel electrophoresis.

Extracts of *Alternaria* sp. obtained by fermentation on rice or in liquid growth media exhibited strong cytotoxicity against L5178Y cells at a concentration of 10 μg/mL. Recent investigations of our group had already indicated the remarkable cytotoxic effects of **3**, alternariol, and alternariol-5-*O*-methyl ether, whereas only marginal or no cytotoxic activity had been found for alternarienonic acid, altenuene, 4′-epialtenuene, and 2,5-dimethyl-7-hydroxychromone.[5] As **5** and **6** were obtained in minute amounts that prevented *in vitro* testing, only **1** and **2** together with the known alternarian acid were investigated for their cytotoxicity against L5178Y cells using the MTT assay. However, all three compounds exhibited only marginal activity (Table 2).

Additionally, all compounds except 2,5-dimethyl-7-hydroxychromone were tested for their antibiotic activity against multiresistant bacterial and fungal strains (*E. coli*, *Klebsiella pneumoniae*, *Enterococcus faecium*, *Enterococcus cloacae*, *Staphylococcus aureus*, *Streptococcus pneumonia*, *Pseudomonas aeruginosa*, *Acinetobacter baumanii*, *Candida albicans*, *Candida krusei*, *Aspergillus faecalis*, and *Aspergillus fumigatus*). In these studies xanalteric acids I (**1**) and II (**2**) showed weak antibacterial activity against *Staphylococcus aureus* with MIC values of 250 −125 μg/mL. Altenusin (**3**) exhibited broad antimicrobial activity against several resistant pathogens with MIC values of 31.25−125 μg/mL (Table 3), whereas all other compounds lacked antibiotic properties toward the tested bacteria and fungi.

Experimental Section

General Experimental Procedures. Optical rotations were determined on a Perkin-Elmer-241 MC polarimeter. IR data were recorded on a Nicolet 4800 FTIR-FMIR spectrometer using a diamond as ATR crystal. ^{1}H, ^{13}C, and two-dimensional NMR spectra were recorded on

Table 3. Antimicrobial Activities for Isolated Compounds from *Alternaria* sp.

	MIC (μg/mL)					
	MRSA	*S. pneum.*	*E. faecium*	*E. cloacae*	*A. faecalis*	*C. albicans*
xanalteric acid I (**1**)	125	n.d.	n.d.	n.d.	n.d.	n.d.
xanalteric acid II (**2**)	250	n.d.	n.d.	n.d.	n.d.	n.d.
altenusin (**3**)	31.25	31.25	62.5	125	62.5	125

Bruker ARX 500 or AVANCE DMX 600 NMR spectrometers. ESIMS was conducted on a Finnigan LCQ Deca mass spectrometer, and HRESIMS spectra were obtained on a FTHRMS-Orbitrap (Thermo-Finnigan) mass spectrometer. HPLC analysis was performed using a HPLC (Dionex P580) system coupled to a photodiode array detector (UVD340S). Routine detection was at 235, 254, 280, and 340 nm. The separation column (125 × 4 mm, L × i.d.) was prefilled with Eurospher-10 C_{18} (Knauer, Germany), and the following gradient was used (MeOH, 0.02% H_3PO_4 in H_2O): 0 min, 10% MeOH; 5 min, 10% MeOH; 35 min, 100% MeOH; 45 min, 100% MeOH. Solvents were distilled before use, and spectral grade solvents were used for spectroscopic measurements. TLC was performed on TLC plates precoated with silica Si 60 F_{254} (Merck, Germany). The compounds were detected and fractions monitored by their UV absorbance at 254 and 366 nm and by spraying the plates with anisaldehyde reagent.

Fungal Material. The fungus *Alternaria* sp. was isolated from fresh healthy leaves of *Sonneratia alba* J.E. Smith (family Sonneratiaceae, order Myrtales). The plant material was collected in Dong Zhai Gang Mangrove Garden on Hainan Island, China, in October 2005. A voucher specimen (code no. 6) was deposited at one of the authors' laboratory (P.P.). Following surface sterilization of the leaves with 70% EtOH for 2 min the samples were air-dried under a laminar air flow. To distinguish the remaining epiphytic fungi from endophytic fungi, an imprint of the leaf surface on biomalt agar was performed. Small tissue samples from inside the leaves were cut aseptically and pressed onto agar plates containing an antibiotic to suppress bacterial growth (composition of isolation medium: 15 g/L malt extract, 15 g/L agar, and 0.2 g/L chloramphenicol in distilled water, pH 7.4−7.8, adjusted with 10% NaOH or 36.5% HCl). After incubation at room temperature, the fungal strain under investigation was found to grow exclusively out of the leaf tissue, but not on the agar plates taken from the imprint of the leaf surface. From the growing cultures pure strains of *Alternaria* sp. were isolated by repeated reinoculation on malt agar plates.

Identification of Fungal Cultures. The fungus (strain no. JCM9.2) was identified using a molecular biological protocol by DNA amplification and sequencing of the ITS region as described previously.[21] The strain was identified as *Alternaria* sp.; however, due to the lack of similar sequences in GenBank, identification of the strain to the species level was not possible. A voucher strain is kept at the one of the authors' laboratory (P.P.). The sequence data have been submitted to and deposited at GenBank (accession no. FJ465171).

Isolation of bacterial 16S rDNA genes was achieved using a modification of the protocol mentioned above. PCR was performed with the primer pair 27f (AGAGTTTGATCCTGGCTCAG) and 149r (GGTTACCTTGTTACGACTT)[22] using the following amplification program: 1: 94 °C for 10 min, 2: 94 °C for 2 min, 3: 65 °C for 1.30 min (steps 2−4 were repeated 35 times), 4: 65 °C for 10 min, 5: 4 °C until workup. *Escherichia coli* and *Bacillus subtilis* were used as positive controls.

Cultivation. Mass growth of the fungus for the isolation and identification of new metabolites was carried out in Erlenmeyer flasks (1 L each). The fungus was grown on rice solid medium (to 100 g commercially available rice was added 110 mL of distilled water, and the mixture was kept overnight prior to autoclaving, 20 flasks) or in liquid Wickerham medium (3 g yeast extract, 3 g malt extract, 5 g peptone, 10 g glucose, distilled water added up to 1000 mL, pH 7.2−7.4, adjusted with 10% NaOH or 36.5% HCl, liquid medium/flask; 300 mL per flask, 20 flasks) at room temperature under static conditions and daylight for 45 or 28 days, respectively.

To suppress the potential growth of bacteria, chloramphenicol at a concentration of 200 mg/L or penicillin G at a concentration of 500 mg/L was added in a second experiment to the liquid Wickerham medium mentioned above.

Extraction and Isolation. The rice culture was extracted with EtOAc. The extract obtained was dried and partitioned between *n*-hexane and 90% MeOH. The 90% MeOH-soluble material (4.6 g) was then fractionated by vacuum-liquid chromatography (VLC) over silica gel using a step gradient method of elution employing CH_2Cl_2 and MeOH as solvent systems. Fraction 3 (80% CH_2Cl_2) was chromatographed over silica gel using CH_2Cl_2 and MeOH (90:10, v/v) as eluent mixture. Alternarienonic acid (30.5 mg) was obtained from the combined fractions 5 and 6 following purification over a Sephadex LH-20 column with MeOH as eluent. Fractions 3 and 4 were combined and rechromatographed via normal-phase VLC using a step gradient of CH_2Cl_2 and MeOH as mobile phase. Fraction 3 from the silica column yielded altenusin (**3**, 18.8 mg), and fraction 5 was further purified over a RP-18 column and H_2O/MeOH (7:3, v/v) to give altenuene (3.0 mg; $[\alpha]^{20}_D$ −62 (*c* 0.02, MeOH)), 4′-epialtenuene (2.2 mg; $[\alpha]^{20}_D$ −140 (*c* 0.02, MeOH)), and 2,5-dimethyl-7-hydroxychromone (1.1 mg) after semipreparative HPLC over a RP-18 column with MeOH/H_2O (25:75, v/v) as eluent. Alternariol (36.1 mg) and altertoxin I (**4**, 4.3 mg) were obtained from fraction 7 and final purification by semipreparative HPLC over a RP-18 column with MeOH/H_2O (35:65, v/v) as eluent. VLC fractions 5 to 7 were combined and purified over a Sephadex LH 20 column with MeOH as mobile phase, followed by semipreparative HPLC over a RP-18 column with a mixture of MeOH/H_2O as eluent to yield alternarian acid (5.7 mg). The new compounds xanalteric acid I (**1**, 4.5 mg) and xanalteric acid II (**2**, 5.7 mg) were obtained from the combined VLC fractions 5 to 7 after final purification by semipreparative HPLC over a RP-18 column with a gradient of MeOH/H_2O as eluent.

For the extraction of natural products from the liquid culture, culture filtrates and mycelia were collected and extracted with EtOAc or MeOH, respectively. The MeOH portion was then taken to dryness and partitioned between water and successively *n*-hexane, EtOAc, and *n*-BuOH. The EtOAc crude fraction (1.5 g) was chromatographed by VLC over silica gel using CH_2Cl_2/MeOH gradient elution. Alternariol-5-*O*-methyl ether (6.7 mg) was obtained from the combined fractions 6, 7, and 8 (60, 50, 40% CH_2Cl_2) after rechromatography over Sephadex LH20 with MeOH as eluent. The VLC fractions 3 and 4 (95 and 90% CH_2Cl_2) were also combined and further purified using Sephadex LH20 and CH_2Cl_2/MeOH (50:50, v/v) as eluent and subsequent semipreparative HPLC over RP-18 material with a gradient of MeOH/H_2O as eluent to yield **4**, **5** (1.3 mg), and **6** (1.8 mg).

Fractionation of the extracts obtained from fermentation in liquid medium containing antibiotics was achieved by separation over Diaion HP-20 material using a step gradient of water and methanol.

Xanalteric acid I (1): dark red powder; $[\alpha]^{20}_D$ −120 (*c* 0.03, MeOH); UV λ_{max} (log ϵ) 204.4 (4.21), 231.2 (4.23), 261.8 (4.24), 410.4 (4.06), 513.7 (3.54) nm; ^{1}H, ^{13}C NMR see Table 1; ESIMS positive *m/z* 365.3 $[M + H]^+$, 319.2 $[M + H - CO_2]^+$, 303.4 $[M + H - CO_2 - H_2O]^+$, negative *m/z* 363.0 $[M - H]^-$, 301.3 $[M - H - CO_2 - H_2O]^-$; HRESIMS *m/z* 365.0656 $[M + H]^+$ (calcd for $C_{20}H_{13}O_7$, 365.0661).

Xanalteric acid II (2): dark red powder; $[\alpha]^{20}_D$ +40 (*c* 0.019, MeOH); UV λ_{max} (log ϵ) 204.3 (4.13), 228.2 (4.22), 260.8 (4.24), 408.5 (4.08), 503.1 (3.54) nm; IR (ATR) ν_{max} 3045, 2868, 2688, 1610, 1584, 1517, 1471, 1224 cm^{-1}; ^{1}H, ^{13}C NMR see Table 1; ESIMS positive *m/z* 365.2 $[M + H]^+$, 347.0 $[M + H - H_2O]^+$, 319.2 $[M + H - CO_2]^+$, 303.4 $[M + H - CO_2 - H_2O]^+$, negative *m/z* 363.0 $[M - H]^-$, 301.3 $[M - H - CO_2 - H_2O]^-$; HRESIMS *m/z* 365.0656 $[M + H]^+$ (calcd for $C_{20}H_{13}O_7$, 365.0661).

Cell Proliferation Assay. Cytotoxicity was tested against the L5178Y mouse lymphoma cell line using the microculture tetrazolium (MTT) assay as described earlier.[23,24] Experiments were repeated three times and carried out in triplicate. As negative controls, media with 0.1% (v/v) EtOH were included in all experiments.

Determination of Minimal Inhibitory Concentration (MIC). Tests were carried out according to the EUCAST (http://www.eucast.org) criteria in a dilution assay against the following multidrug-resistant pathogens: *Escherichia coli*, *Enterococcus faecium*, *Enterococcus cloacae, Staphylococcus aureus*, *Streptococcus pneumonia*, *Pseudomonas aeruginosa, Klebsiella pneumonia, Candida albicans, Candida krusei, Aspergillus faecalis*, and *Aspergillus fumigatus.* Compound

concentrations were between 250 and 0.48 μg/mL. The minimal inhibitory concentration (MIC) of a substance was defined as the lowest concentration at which bacterial or fungal growth was inhibited.

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Supporting Information Available: Details of the HRMS spectrum of xanalteric acid I, of the 1D and 2D ^{1}H (COSY, ROESY) and 2D ^{13}C (HMQC, HMBC) NMR spectra of xanalteric acids I and II, and of the 1D ^{13}C spectrum of xanalteric acid II are provided. This material is available free of charge via the Internet at http://pubs.acs.org.

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