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Chemical examination of the soft coral *Sarcophyton infundibuliforme* collected from the South China Sea resulted in the isolation of the three new *O*-glycosylglycerol derivatives sarcoglycosides A-C (1-3), together with two known compounds, chimyl alcohol (4) and hexadecanol (5). Their structures were elucidated by combined spectral and chemical methods. All the compounds showed moderate toxicity to brine shrimps *Artemia salina*.

Introduction. – Soft corals are Coelenterates (class Anthozoa, subclass Octocorallia, order Alcyonacea, family Alcyoniidae) [1]. *Sarcophyton*, one of the most widely distributed genus of soft corals, elaborates a rich harvest of secondary metabolites including sesquiterpenes, diterpenes, and polyhydroxylated steroids [2].

O-Glycosylglycerol derivatives are rare in soft corals. Only few glycoglyceryl ethers have been reported from the genus of *Sarcophyton* [3], *Sinularia* [4][5], and *Cladiella* [6], all of them possessing a batyl alcohol (= 3-(octadecyloxy)propane-1,2-diol) moiety. As part of an effort to discover bioactive substances from Chinese marine invertebrates [7], we now found that the 95% EtOH extract of the soft coral *Sarcophyton infundibuliforme* from the South China Sea showed lethal activity toward brine shrimps *Artemia salina*. Bioassay-guided isolation of the extracts led to the identification of three new *O*-glycosylglycerol derivatives, designated as sarcoglycosides A-C (1-3), together with two known compounds, chimyl alcohol (= 3-(hexadecyloxy)propane-1,2-diol; 4) and hexadecanol (5). The present work deals with the isolation and structure elucidation of the new compounds.

Results and Discussion. – Freshly collected specimens of *S. infundibuliforme* were immediately chilled to -20° and kept frozen until their extraction with 95% EtOH. The EtOH extract was partitioned between AcOEt and H₂O, then between BuOH and H₂O. The BuOH-soluble portion was subjected to column chromatography (CC; silica gel). The fraction showing a strong lethal activity toward brine shrimps *A. salina* was further separated by CC (*Sephadex LH-20*) and reversed-phase CC (silica gel (*ODS*))

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into sarcoglycosides A-C (1-3). The AcOEt-soluble portion was fractionated by similar procedures into chimyl alcohol (4) [8][9] and hexadecanol (5) [10].

Sarcoglycoside A (1) is a white amorphous powder. The molecular formula, $C_{33}H_{54}O_{14}$, indicating seven degrees of unsaturation, was established by positive-mode HR-ESI-MS (m/z 697.3413 ([M + Na]⁺)). The NMR spectra of 1 revealed two anomeric CH groups (δ (C) 100.0 and δ (H) 4.67 (d, J = 4.1), and δ (C) 104.6 and δ (H) 4.09 (d, J = 6.5)), together with nine CH–O and four CH₂O groups (δ (C) 61.1–73.7 and δ (H) 3.27–4.04), suggesting the presence of two sugar residues and one glycerol unit. Furthermore, the ¹H- and ¹³C-NMR spectra of 1 showed signals attributable to an acyl group (δ (C) 173.4), four disubstituted C=C bonds (δ (C) 14.7 and δ (H) 0.92 (t, J = 7.2)), which formed a long-chain unsaturated fatty acid ester moiety. Extensive interpretation of 2D-NMR spectra (¹H,¹H-COSY, HMQC, and HMBC) led to the complete assignments of the ¹H- and ¹³C-NMR data of the sugar and the glycerol moieties (*Table 1*). Furthermore, significant HMBCs (*Fig. 1*) between CH₂(1) and C(1') indicated that the long-chain unsaturated fatty acyl moiety was linked to C(1).

The above-mentioned structural features of **1** were strongly reminiscent of those of O-(galactosylgalactosyl)di-O-acylglycerol [11], previously isolated from the cultured marine dinoflagellate *Amphidinium carterae*. In fact, **1** differs from **6** only by the functionality at C(2) which lacks a long-chain unsaturated fatty acyloxy substituent. The loss of the fatty acyl group shifted the signal of H-C(2) significantly upfield from $\delta(H)$ 5.30 to 3.49–3.54. Thus, compound **1** was identified as an O-(galactosylgalactosyl)-O-acylglycerol.

To confirm the absolute configuration, compound **1** was treated with MeONa/MeOH according to a reported method [11][12], yielding an *O*-(galactosylgalactosyl)glycerol **1a** and a fatty acid methyl ester **1b**. Product **1a** ($[\alpha]_D^{25} = +81.0$ (c = 0.36, H₂O)) was identical with the previously reported (2*R*)-3-*O*-(6-*O*- α -D-galactopyranosyl- β -D-galactopyranosyl)glycerol (=(2*R*)-2,3-dihydroxypropyl 6-*O*- α -D-galactopyranosyl- β -D-galactopyranoside) on the basis of a comparison of the optical rotation

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	$\delta(\mathrm{H})$	$\delta(C)^{c})$	HMBC
CH ₂ (1)	$4.04 (dd, J = 11.1, 4.0, H_a),$	66.1 (<i>t</i>)	C(1'), C(3)
	$3.97 (dd, J = 11.1, 6.2, H_b)$		C(1'), C(3)
H-C(2)	3.49 - 3.54 (m)	68.0(d)	
HO-C(2)	4.54 (d, J = 5.3)		C(1)
$CH_2(3)$	$3.59 - 3.64 (m, H_a),$	71.0(t)	C(1"), C(1)
	$3.50 - 3.56 (m, H_b)$		C(1''), C(1)
β -d-Gal:			
H - C(1'')	4.09 (d, J = 6.5)	104.6(d)	C(3), C(3'')
H - C(2'')	3.58 - 3.62 (m)	71.8(d)	C(4'')
HO-C(2'')	4.50 (d, J = 4.1)		C(1"), C(3")
H-C(3")	3.27 - 3.32 (m)	73.7 (<i>d</i>)	C(1"), C(5")
HO-C(3")	4.75 (br. s)		
H-C(4'')	3.79 - 3.83(m)	68.6(d)	C(2"), C(6")
HO-C(4'')	4.98 (d, J = 5.6)		C(5")
H - C(5'')	3.52 - 3.57 (m)	73.5(d)	C(3'')
CH ₂ (6")	$3.56 - 3.61 (m, H_a),$	67.1(t)	C(4'')
	$3.52 - 3.56 (m, H_b)$		C(4'')
α-D-Gal:			
H - C(1''')	4.67 (d, J = 4.1)	100.0(d)	C(6"), C(3"")
H - C(2''')	3.63 - 3.67 (m)	69.0(d)	C(4''')
HO-C(2''')	4.39 (d, J = 5.5)		C(1''')
H-C(3''')	3.52 - 3.56 (m)	70.1(d)	C(1'''), C(5''')
HO-C(3''')	4.90 (br. s)		
H-C(4''')	3.66 - 3.71 (m)	69.4(d)	C(2'''), C(6''')
HO-C(4''')	4.38 (br. s)		C(5''')
H - C(5''')	3.58 - 3.62(m)	71.1(d)	C(1'''), C(3''')
CH ₂ (6''')	$3.48 - 3.53 (m, H_a),$	61.1(t)	C(4""), C(5"")
	$3.40 - 3.45 (m, H_b)$		C(4''')
HO-C(6"')	4.59 (d, J = 6.0)		C(5''')

Table 1. ¹*H*- and ¹³*C*-*NMR* Data^a)^b) of the Glycerol and Sugar Moieties of **1**. δ in ppm, J in Hz.

 $([\alpha]_D^{25} = +83.0 \ (c = 0.50, H_2O))$ and NMR data [11-13]. And **1b** was determined as methyl octadeca-6,9,12,15-tetraenoate by GC/MS analysis. Consequently, the whole structure of sarcoglycoside A was identified as shown in formula **1**.

Sarcoglycoside B (2) was obtained as a white amorphous powder, and had the molecular formula $C_{24}H_{48}O_7$, as deduced from its HR-ESI-MS exhibiting a *pseudo*-molecular-ion peak at m/z 471.3307 ($[M + Na]^+$). Its ESI-MS exhibited a fragment-ion peak at m/z 317 ($[M + H - 132]^+$) corresponding to the loss of one pentosyl moiety. Analysis of the spectroscopic data of 2 (*Table 2*) revealed that it was a glycoglyceryl ether. Thus, the ¹H- and ¹³C-NMR spectra of 2 displayed characteristic signals assignable to a terminal β -D-lyxose moiety at $\delta(C)$ 100.0 (d), 70.5 (d), 68.8 (d), 80.3 (d), and 63.3 (t), and $\delta(H)$ 5.05 (d, J = 2.2, H - C(1'')), 3.82–3.87 (m, H - C(2'')), 4.01 (br. *s*, H - C(3'')), 3.85–3.89 (m, H - C(4'')), 3.95 (br. d, J = 11.9, $H_b - C(5'')$), and 3.79 (br. d,

^a) In (D₆)DMSO, referred to the residual DMSO (δ (H) 2.50, δ (C) 39.5); at 600 (¹H) and 150 MHz (¹³C); for the NMR data of the acyl residue, see *Exper. Part.* ^b) Assignments by ¹H,¹H-COSY, HMQC, and HMBC experiments. ^c) By DEPT sequence.



Fig. 1. Selected ¹H,¹H-COSY correlations and HMBCs of compound 1

J = 11.9 Hz, $H_a - C(5'')$ [14] and a glycerol moiety at $\delta(C)$ 70.2 (*t*), 69.8 (*d*), and 63.6 (*t*), and $\delta(H)$ 3.52 (*d*, J = 5.4, CH₂(1)), 3.83–3.87 (*m*, H–C(2)), 3.67 (*dd*, J = 11.4, 3.5, H_a–C(3)), and 3.63 (*dd*, J = 11.4, 6.0, H_b–C(3)) [3]. Furthermore, the ¹H-NMR spectrum of **2** showed a terminal-Me signal at δ 0.87 (*t*, J = 6.9, Me(16')), a broad CH₂ s at δ 1.26 (26 H, CH₂(3') to CH₂(15')), a *m* at δ 1.52–1.58 (CH₂(2')), and another *m* at δ 3.40–3.46 (CH₂(1')), all asignable to the long-chain fatty alcohol moiety.

The structure of **2** was established by detailed analysis of the 1D- and 2D-NMR (¹H,¹H-COSY, HMQC, and HMBC) spectra (*Table 2, Fig. 2*). In particular, the location of the long-chain fatty alcohol moiety at C(1) and the β -D-lyxose moiety at C(3) was secured by the ¹H,¹³C-long-range correlations observed in the HMBC spectrum between CH₂(1') and C(1), and between H–C(1'') and C(3), respectively. The NOESY correlations H–C(1'')/H–C(2''), H–C(2'')/H–C(3''), and H–C(3'')/H–C(4'') suggested that all these H-atoms are orientated on the same face (*a*) of the molecule (*Fig. 3*), confirming the identity of a lyxose unit. Furthermore, the β -orientation of H–C(2) was also supported by two clear NOE cross-peaks between H–C(2) and CH₂(5'') in the NOESY plot (*Fig. 3*).

The absolute configuration of **2** was determined after acid hydrolysis [3]. From the reaction of **2** with $2M H_2SO_4$, 3-*O*-hexadecyl-*sn*-glycerol and D-lyxose were obtained. The configuration of 3-*O*-hexadecyl-*sn*-glycerol was determined as (*R*) by comparison of its optical rotation ($[\alpha]_D^{25} = +1.2$ (c = 0.24, THF)) with those of authentic samples, *i.e.*, *O*-3-hexadecyl-*sn*-glycerol ($[\alpha]_D^{20} = +2.7$, THF)) and 1-*O*-hexadecyl-*sn*-glycerol ($[\alpha]_D^{20} = -2.7$, THF)) [15]. Thus, the configuration of C(2) in sarcoglycoside B was deduced as (*S*). In addition, the configuration of the obtained lyxose was determined as D by comparison of its optical rotation ($[\alpha]_D^{25} = -12.4$ (c = 0.11, H₂O)) with those of authentic samples, *i.e.*, D-lyxose ($[\alpha]_D^{20} = -14.8$, H₂O) and L-lyxose ($[\alpha]_D^{20} = +13.5$, H₂O) [16]. The D-lyxose was further confirmed by a co-TLC with an authentic sample (PrOH/H₂O/ammonia 60:30:2.4, R_f 0.55).

Sarcoglycoside C (3) was also obtained as a white amorphous powder. Its molecular formula was deduced to be $C_{24}H_{48}O_7$, identical to that of 2. ¹H,¹H-COSY and HMBC (*Table 2, Fig. 2*) experiments established the same H-atom sequence and framework as

	2		3	
	$\delta(H)$	$\delta(C)^{c}$	$\delta(H)$	$\delta(C)^{c}$
CH ₂ (1)	3.52 (d, J = 5.4)	70.2 (<i>t</i>)	3.53 (d, J = 5.6)	69.9 (<i>t</i>)
H-C(2)	3.83 - 3.87 (m)	69.8(d)	3.82 - 3.86 (m)	69.5(d)
$CH_2(3)$	$3.67 (dd, J = 11.4, 3.5, H_a),$	63.6(t)	3.65 - 3.70 (m),	63.3(t)
	$3.63 (dd, J = 11.4, 6.0, H_b)$		3.63 - 3.67(m)	
$CH_2(1')$	3.40 - 3.46 (m)	71.9 (t)	3.40 - 3.46(m)	71.8(t)
$CH_2(2')$	1.52 - 1.58(m)	29.5(t)	1.52 - 1.58(m)	29.5(t)
$CH_2(3')$	1.26 (br. s)	32.0(t)	1.26 (br. s)	31.9(t)
$CH_2(4')$ to $CH_2(13')$	1.26 (br. s)	29.0 - 30.0(t)	1.26 (br. s)	29.0 - 30.0(t)
$CH_2(14')$	1.26 (br. s)	26.1(t)	1.26 (br. s)	26.0 (<i>t</i>)
$CH_2(15')$	1.26 (br. s)	22.8(t)	1.26 (br. s)	22.7(t)
Me(16')	0.87(t, J = 6.9)	14.2(q)	0.87(t, J = 6.9)	14.1(q)
β -D-Lyx:				(1)
H - C(1'')	5.05 (d, J = 2.2)	100.0(d)	5.06 (d, J = 2.3)	99.2 (d)
H-C(2'')	3.82 - 3.87 (m)	70.5(d)	3.85 - 3.91 (m)	70.2(d)
H-C(3'')	4.01 (br. s)	68.8(d)	4.00 (br. s)	68.9(d)
H-C(4'')	3.85 - 3.89(m)	80.3(d)	3.83 - 3.89(m)	79.0(d)
$CH_2(5'')$	3.79 (br. $d, J = 11.9, H_a$),	63.3(t)	3.75 (br. $d, J = 11.9$),	63.2(t)
	3.95 (br. $d, J = 11.9, H_b$)		3.94 (br. $d, J = 11.9$)	

Table 2. ¹H- (600 MHz) and ¹³C- (150 MHz) NMR Data^a)^b) of **2** and **3**. δ in ppm, J in Hz.

^a) In CDCl₃, referred to the residual CHCl₃ (δ (H) 7.26, δ (C) 77.0). ^b) Assignments by ¹H,¹H-COSY, HMQC, and HMBC experiments. ^c) By DEPT sequence.



Fig. 2. ¹H,¹H-COSY correlations and key HMBCs of compounds 2 and 3

those of **2**. Careful comparison of the ¹H-NMR data of **3** and **2** revealed differences at C(3) and the sugar moiety. The CH₂(3) signals of **2** were splitted into two *dd* with distinct coupling constants, $J(H_a,2) = 3.5$ Hz and $J(H_b,2) = 6.0$ Hz, respectively (*Table 2*). The CH₂(3) signals of **3**, however, were splitted into two *m*, of which the coupling constants were unidentified. The $\delta(H)$ values of CH₂(5") of the lyxose moiety were particularly diagnostic: δ 3.75 and 3.94 for **3**, and δ 3.79 and 3.95 for **2** due to the spatial interaction with H–C(2). These differences suggested the inversion of the configuration at C(2). *a*-Orientation of H–C(2) in **3** was further confirmed by the NOESY experiment (*Fig. 3*), where no cross-peaks H–C(2)/CH₂(5") were observed. Furthermore, following the same method as for **2**, 1-*O*-hexadecyl-*sn*-glycerol and D-lyxose were obtained from **3** with 2M H₂SO₄. The 1-*O*-hexadecyl-*sn*-glycerol from **3** ($[\alpha]_{D}^{25} = -1.3$ (c = 0.20, THF)) differed from the corresponding *O*-hexadecylglycerol



Fig. 3. Key NOESY correlations of compounds 2 and 3

from **2** only by the sign of the optical rotation. This confirmed that the configuration at C(2) of **3** was (*R*). Thus, sarcoglycoside C was the 2-epimer of sarcoglycoside B.

Compounds 1-3 showed lethality to brine shrimps *A. salina* at a concentration of 50 µg/ml with lethal rates of 78.4, 44.7, and 41.5%, respectively. And the two known compounds, chimyl alcohol (4) and hexadecanol (5), also exhibited moderate lethal activities toward *A. salina*, with lethal rates of 58.9 and 32.5%, respectively.

It may be worthy to point out that sarcoglycoside A (1) is the first glycoglycerolipid isolated from soft corals. Sarcoglycosides B (2) and C (3), two glycoglyceryl ethers consisting of a lyxose residue and a chimyl alcohol moiety, are the first example of the co-occurrence of both C(2) epimers of a naturally occurring *O*-glycosylglycerol derivative. In addition, *O*-glycosylglycerol derivatives with lyxose residues are rare in marine materials; to the best of our knowledge, there has been only one analogue isolated before from the same genus of *Sarcophyton* (*S. solidum* [3]). These characters showed that there might be chemotaxonomic relationships between the two species. Furthermore, compounds 2-5 containing the same hexadecanol moiety, suggest that they are probably biogenetically related to each other. The evaluation of their physiological functions in soft coral *S. infundibuliforme* as well as the exploration of their chemoecological roles in the coral-reef ecosystem would be interesting subjects for future investigations.

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Experimental Part

General. Column chromatography (CC): commercial silica gel (SiO₂, 200–300 mesh; Qingdao Haiyang Chemical Group Co.), octadecylsilyl (ODS) silica gel (Unicorn; 45–60 μ m), and Sephadex LH-20 (Amersham Biosciences). TLC: precoated SiO₂ plates (Yantai Zifu Chemical Group Co.; G60, F₂₅₄).

Optical rotation: *Jasco-P-1020* digital polarimeter. IR Spectra: *Nicolet-Nexus-470* spectrophotometer; $\tilde{\nu}$ in cm⁻¹. ¹H- and ¹³C-NMR Spectra: *Jeol-Eclips-600* spectrometer; at 600 (¹H) and 150 MHz (¹³C); δ in ppm rel. to Me₄Si as internal standard, *J* in Hz. ESI- and HR-ESI-MS: *Q-TOF-Ultima-Global-GAA076* LC mass spectrometer; in *m/z*. GC/MS System: *Agilent-6890* gas chromatograph and *Agilent-5973* mass-selective detector in the EI mode.

Animal Material. Specimen of the soft coral S. infundibuliforme were collected from the Wenchang coral reef at a depth of -10 m in the South China Sea, in November 2006 and were frozen immediately after collection. The animal was identified by H. H. of the South China Sea Institute of Oceanology, Chinese Academy of Sciences. A voucher sample (No. WCLL-1-4) is available for inspection at the Ocean University of China.

Extraction and Isolation. The frozen specimen (460.0 g, dry weight) were cut into pieces and extracted exhaustively with 95% EtOH (3×1000 ml) at r.t. The EtOH extract was evaporated to give a residue (18.0 g) which was partitioned between AcOEt (3×600 ml) and H₂O (300 ml), and then between BuOH (3×400 ml) and H₂O (300 ml), successively. The BuOH soln. was concentrated to give a dark green residue (4.8 g) which was fractionated by CC (SiO₂, $0 \rightarrow 100\%$ MeOH/CHCl₃): *Fractions A* – *D*. The bioactive *Fr. D* (270.0 mg) was purified by CC (*Sephadex LH-20*, CHCl₃/MeOH 1:1) followed by reversed-phase CC (SiO₂ (*ODS*)): **1** (12.0 mg), **2** (6.4 mg), and **3** (10.0 mg). The AcOEt-soluble portion (7.0 g) was separated by CC (SiO₂, $0 \rightarrow 100\%$ AcOEt/petroleum ether): *Frs. 1–10* (by TLC). *Fr.* 7 (268 mg) was subjected to CC (*Sephadex LH-20*, CHCl₃) and further purified by CC (SiO₂, petroleum ether/acetone $6:1 \rightarrow 7:3$): **4** (38.5 mg) and **5** (160.0 mg).

Sarcoglycoside A (=(6Z,9Z,12Z,15Z)-Octadeca-6,9,12,15-tetraenoic Acid (2R)-3-[(6-O- α -galacto-pyranosyl- β -D-galactopyranosyl)oxy]-2-hydroxypropyl Ester; **1**): White amorphous powder. [α]_D²² = +20.8 (c = 0.30, MeOH). IR (KBr): 3350, 2926, 1739, 1693, 1534, 1076, 1023, 678. ¹H-NMR ((D₆)DMSO): 5.30-5.40 (m, H-C(6'), H-C(7'), H-C(9'), H-C(10'), H-C(12'), H-C(13'), H-C(15'), H-C(16')); 2.75-2.80 (m, 2 H-C(8'), 2 H-C(11'), 2 H-C(14')); 2.31 (t, J = 7.0, 2 H-C(2')); 2.01-2.06 (m, 2 H-C(5'), 2 H-C(17')); 1.50-1.55 (m, 2 H-C(3')); 1.31-1.34 (m, 2 H-C(4')); 0.92 (t, J = 7.2, Me(18')). ¹³C-NMR ((D₆)DMSO): 173.4 (s, C(1')); 132.1 (d, C(16')); 3.9 (t, C(2')); 2.9.6 (t, C(4')); 2.9.0 (t, C(5')); 27.0, 25.8, 25.7 (3t, C(8'), C(11'), C(14')); 24.6 (t, C(3')); 20.6 (t, C(17')); 14.7 (q, C(18')). ¹H- and ¹³C-NMR: Table 1. ESI-MS: 697 ([M+Na]⁺). HR-ESI-MS: 697.3413 ([M+Na]⁺, C₃₃H₅₄NaO⁺₄; calc. 697.3411).

Sarcoglycoside $B (=(2S)-3-(Hexadecyloxy)-2-hydroxypropyl \beta-D-Lyxofuranoside;$ **2** $): White amorphous powder. <math>[\alpha]_{25}^{25} = -41.2 \ (c = 0.50, \text{CHCl}_3)$. IR (KBr): 3393, 2920, 2851, 1467, 1143, 1073, 1005. ¹H- and ¹³C-NMR: *Table 2*. ESI-MS: 919 ($[2M + \text{Na}]^+$), 471 ($[M + \text{Na}]^+$), 449 ($[M + \text{H}]^+$), 317, 299. HR-ESI-MS: 471.3307 ($[M + \text{Na}]^+$, $C_{24}H_{48}\text{NaO}_7^+$; calc. 471.3298).

Sarcoglycoside $C (= (2R)-3-(Hexadecyloxy)-2-hydroxypropyl \beta-D-Lyxofuranoside;$ **3** $): White amorphous powder. <math>[a]_{D}^{25} = -58.5 (c = 0.50, CHCl_3)$. IR (KBr): 3393, 2920, 2851, 1467, 1143, 1073, 1005. ¹H- and ¹³C-NMR: *Table 2*. ESI-MS: 471 ($[M + Na]^+$), 449 ($[M + H]^+$), 317. HR-ESI-MS: 471.3280 ($[M + Na]^+$, $C_{24}H_{48}NaO_7^+$; calc. 471.3298).

Methanolysis of **1**. A soln. of **1** (7.5 mg) in anh. MeOH (1.5 ml) was treated with 3% MeONa/MeOH (1.5 ml), and the mixture was stirred at r.t. for 1.5 h. The mixture was neutralized with positive-ion-exchange resin and filtered, and the filtrate partitioned between CH₂Cl₂ and H₂O. Evaporation of the solvent from the CH₂Cl₂ phase yielded fatty acid methyl ester **1b** (2.3 mg), which was identified by GC/ MS to be *methyl octadeca-6,9,12,15-tetraenoate*. The aq. phase was concentrated to give a residue, which was purified by CC (*Sephadex LH-20*): (2R)-2,3-dihydroxypropyl 6-O- α -D-galactopyranosyl- β -D-galactopyranoside (**1**; 3.6 mg).

Acid Hydrolysis of 2 and 3. A soln. of 2 (6 mg) in MeOH (1 ml) was added to $2M H_2SO_4$ (1 ml) and kept for 4 h at 105° in a sealed ampule. The mixture was dried under N₂ to remove MeOH and then diluted with H₂O (3.5 ml) and extracted with CH₂Cl₂ (3 × 7 ml). The org. layer was washed with H₂O, dried (Na₂SO₄), and concentrated to give a white amorphous powder, which was identified as 3-O-*hexadecyl-sn-glycerol* (=(2R)-3-(*hexadecyloxy*)propane-1,2-diol; 2.4 mg). The aq. phase was neutralized with BaCO₃, filtered, and concentrated to give a residue which was purified by CC (*Sephadex LH-20*, MeOH) to furnish D-lyxose (1.1 mg).

By the same hydrolysis procedure, compound **3** yielded *1*-O-*hexadecyl*-sn-glycerol (=(2S)-3-(*hexadecyloxy*)propane-*1*,2-diol; 2.0 mg) and D-lyxose (1.0 mg).

Bioassays. The brine-shrimp lethality assay was performed on *A. salina* according to standard protocols [17][18].

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