Acta Crystallographica Section E
Structure Reports Online
ISSN 1600-5368

2-[(7*R*,9*S*,10*R*,12*E*)-4,9-Dihydroxy-10-methyl-5-oxo-7,8,9,10,11,14-hexahydro-5*H*-6-oxa-benzocyclododecen-7-yl]ethyl octanoate

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Key indicators

Single-crystal X-ray study
T = 293 K
Mean σ(C–C) = 0.011 Å
R factor = 0.056
wR factor = 0.166
Data-to-parameter ratio = 7.5

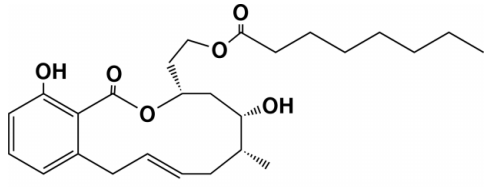
For details of how these key indicators were automatically derived from the article, see http://journals.iucr.org/e.

Received 2 January 2002
Accepted 9 January 2002
Online 18 January 2002

The structure of the title compound, $C_{26}H_{38}O_6$, is described. Two molecules of the title compound are related by a twofold non-crystallographic symmetry operation. There is an extensive hydrogen-bonding network, as well as van der Waals interactions between alkyl groups.

Comment

Salicylihalamides are a class of novel anticancer compounds that were isolated from an unidentified species of the marine sponge *Haliclona sp.* and were shown to produce a highly differential cytotoxicity profile in the National Cancer Institute's 60-cell-line screen with an average GI_{50} of 16 n*M* (Erickson *et al.*, 1997) (GI_{50} = the concentration at which growth of 50% of the cells is inhibited; n*M* = 10^{-9} mol). The absolute configuration assigned to the natural product was later revised through the first total synthesis of salicylihalamide *A* (Wu *et al.*, 2000). As the title compound contains only light atoms, the assignment of the absolute structure was postponed until the structure of a bromine derivative (CCDC Refcode QAMZEJ; Wu *et al.*, 2000) was solved. The asymmetric unit contains two molecules of the title compound, (I). The crystal is made up of molecules that form a two-dimensional network of hydrogen bonds in the *xy* plane and employ hydrophobic interactions *via* the alkyl groups of the octanoic acid side chains to pack along the *z* direction.



(I)

Experimental

Crystals of the title compound were obtained from a saturated hexane solution by vapor diffusion at room temperature. The title compound was characterized by standard spectroscopic techniques: IR 3412, 3152, 2918, 2850, 1738, 1686, 1591, 1467 cm^{-1}; ^1H NMR (400 MHz, $CDCl_3$) δ 11.0 (1H, *br s*), 7.30 (1H, *dd*, *J* = 7.6, 8.4 Hz), 6.90 (1H, *dd*, *J* = 0.8, 8.4 Hz), 6.71 (1H, *dd*, *J* = 0.8, 7.6 Hz), 5.62 (1H, *app.ddt*, *J* = 0.8, 6.0, 12.0 Hz), 5.49 (1H, *br d*, *J* = 15.6 Hz), 5.03–5.13 (1H, *m*), 4.24 (1H, *app.dt*, *J* = 6.0, 6.4, 11.6 Hz), 4.18 (1H, *app.dt*, *J* = 6.0, 11.6 Hz), 3.76 (1H, *dd*, *J* = 6.0, 17.2 Hz), 3.64 (1H, *dd*, *J* = 3.6, 8.8 Hz), 3.39 (1H, *br d*, *J* = 17.2 Hz), 2.30–2.40 (1H, *m*), 2.27 (2H, *t*, *J* = 7.2 Hz), 1.99–2.09 (3H, *m*), 1.78–1.97 (2H, *m*), 1.54–1.64 (2H, *m*), 1.39 (1H, *ddd*, *J* = 0.8, 8.8, 15.2 Hz), 1.20–1.34 (8H, *m*), 0.93 (3H, *d*, *J* =

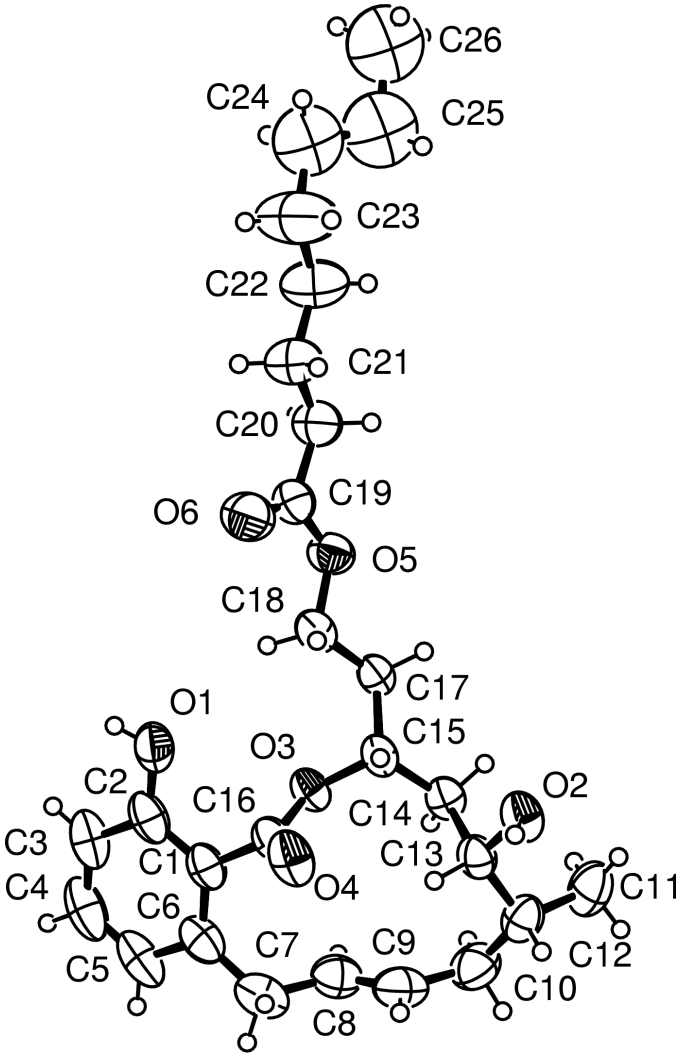


Figure 1
The structure of molecule 1 of (I) drawn with displacement ellipsoids at the 50% probability level for non-H atoms.

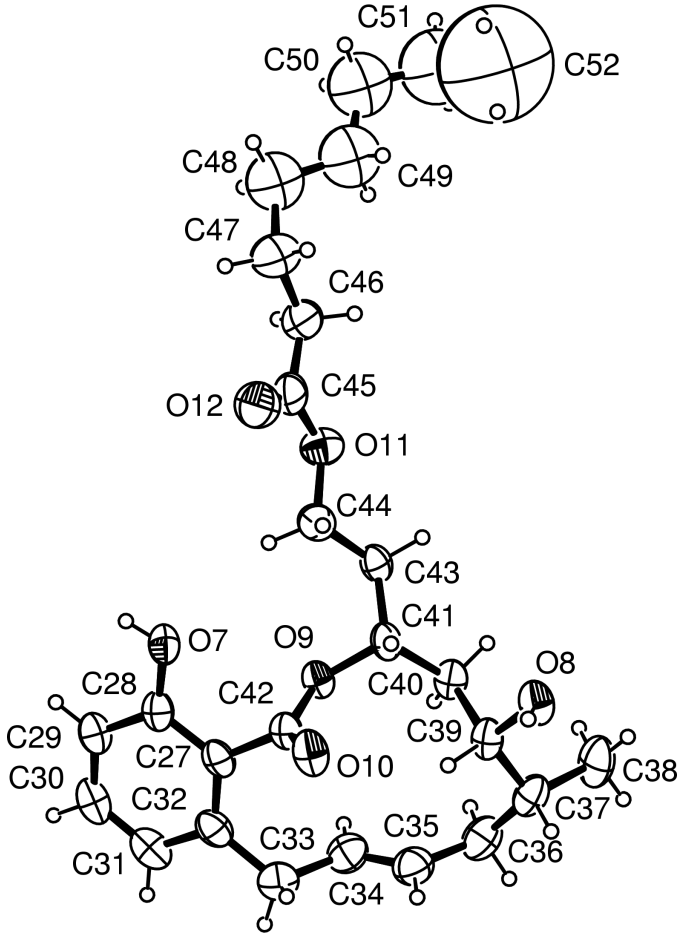


Figure 2
The structure of molecule 2 of (I) drawn with displacement ellipsoids at the 35% probability level for non-H atoms. The C52 methyl group exhibits a very large average displacement owing to the spread of electron density over a large volume.

6.8 Hz), 0.88 (3H, *t*, *J* = 7.2 Hz); ^{13}C NMR (75 MHz, $CDCl_3$) δ 174.2, 171.2, 162.8, 142.4, 134.3, 133.1, 126.6, 123.8, 117.0, 113.4, 72.3, 70.6, 60.8, 39.3, 38.6, 37.5, 34.7, 34.5, 31.9, 29.9, 29.3, 29.1, 25.1, 22.8, 14.3, 13.9; HRMS (FAB, MNBA). Calculated for $C_{26}H_{38}O_6$ ([MH]$^+$): 446.2668; found: 446.2658.

Crystal data

$C_{26}H_{38}O_6$	D_x = 1.145 Mg m^{-3}
M_r = 446.56	Mo $K\alpha$ radiation
Monoclinic, $P2_1$	Cell parameters from 16547 reflections
a = 14.7661 (3) Å	θ = 1.0–23.5°
b = 10.5226 (2) Å	μ = 0.08 mm^{-1}
c = 16.8753 (5) Å	T = 293 (2) K
β = 98.8586 (7)°	Parallelpiped, colorless
V = 2590.77 (11) Å^3	0.42 × 0.36 × 0.18 mm
Z = 4	

Data collection

Nonius KappaCCD diffractometer	R_{int} = 0.027
φ scans	θ_{max} = 23.5°
Absorption correction: none	$h = -16 \rightarrow 16$
7442 measured reflections	$k = -10 \rightarrow 11$
4045 independent reflections	$l = -18 \rightarrow 18$
3198 reflections with $I > 2\sigma(I)$	

Refinement

Refinement on F^2	$w = 1/[\sigma^2(F_o^2) + (0.1107P)^2 + 0.3625P]$ where $P = (F_o^2 + 2F_c^2)/3$
$R[F^2 > 2\sigma(F^2)]$ = 0.057	
$wR(F^2)$ = 0.166	
S = 1.03	$(\Delta/\sigma)_{max}$ = 0.005
4045 reflections	$\Delta\rho_{max}$ = 0.33 e Å^{-3}
540 parameters	$\Delta\rho_{min}$ = −0.39 e Å^{-3}
H-atom parameters constrained	

Table 1
Hydrogen-bonding geometry (Å, °).

D—H···A	D—H	H···A	D···A	D—H···A
O1—H1···O8^{i}	0.82	1.89	2.70 (1)	168
O2—H2···O10^{ii}	0.82	1.99	2.77 (1)	160
O7—H7*C*···O2^{iii}	0.82	1.93	2.73 (1)	167
O8—H8*A*···O4^{iv}	0.82	1.89	2.69 (1)	166

Symmetry codes: (i) $-x, y-\frac{1}{2}, -z$; (ii) $x, y-1, z$; (iii) $1-x, \frac{1}{2}+y, -z$; (iv) $x, 1+y, z$.

Friedel pairs were merged because compound (I) contains no atoms heavier than oxygen. The absolute configuration was assumed from comparison with the bromo derivative.

Data collection: *COLLECT* (Nonius, 1999); cell refinement: *DENZO* (Otwinowski & Minor, 1997); data reduction: *DENZO* and *SCALEPACK* (Otwinowski & Minor, 1997); program(s) used to solve structure: *SHELXS*97 (Sheldrick, 1997); program(s) used to refine structure: *SHELXL*97 (Sheldrick, 1997); molecular graphics: *PLATON*98 (Spek, 1999) and *ORTEP*-3 (Farrugia, 1997).

Financial support from the Robert A. Welch Foundation is gratefully acknowledged.

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