SUPPLEMENTARY MATERIAL

Systematic Assignment of the Configuration of Flexible Natural Products by Spectroscopic & Computational Methods: The Bistramide C Analysis

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Calculated CD spectra of fragments **1**–**4**, $[\alpha]_D$ values and free energies for the corresponding conformers.

Free-energy and Molar Rotation Calculations

Table S1. Calculated molar rotation of fragment (6*S*,9*R*,11*R*)-**1**. $[M]_D^i$ and x_i are the molar rotation and the Boltzmann weighting factor of conformer *i*. Relative free-energies ΔG and x_i were computed at the RI-DFT BP86/SVP level of theory, while optical rotation values were calculated using RI-*J* TDDFT BP86/aug-cc-pVDZ including the COSMO implicit solvation model (chloroform with $\varepsilon = 4.9$).

Conformer	ΔG [kJ/mol]	x_i	$[M]_D^i$	$x_i[M]_D^i$
1	0.00	0.531	457	243
2	3.38	0.136	–177	–24
3	3.45	0.132	–28	–4
4	4.01	0.105	–35	–4
5	7.20	0.029	–541	–16
6	7.55	0.025	–185	–5
7	7.89	0.022	422	9
8	8.25	0.019	–541	–10
			$[M]_D = \sum_i x_i[M]_D^i$	**190**

Table S2. Calculated molar rotation of fragment (15*S*,16*S*)-**2**. See Table S1 for computational details.

Conformer	ΔG [kJ/mol]	x_i	$[M]_D^i$	$x_i[M]_D^i$
1	0.00	0.922	43	39
2	7.20	0.050	–40	–2.0
3	8.70	0.028	–63	–1.7
			$[M]_D = \sum_i x_i[M]_D^i$	**36**

Table S3. Calculated molar rotation of fragment (22*R*,23*S*,27*S*,31*S*)-**3**. See Table S1 for computational details.

Conformer	ΔG [kJ/mol]	x_i	$[M]_D^i$	$x_i[M]_D^i$
1	0.00	0.693	190	132
2	2.17	0.289	67	19
3	8.99	0.018	96	2
			$[M]_D = \sum_i x_i[M]_D^i$	**153**

Table S4. Calculated molar rotation of fragment (34*S*)-**4**. See Table S1 for computational details.

Conformer	ΔG [kJ/mol]	x_i	$[M]_D^i$	$x_i[M]_D^i$
1	0.00	0.509	123	62
2	1.49	0.280	74	21
3	4.73	0.075	193	15
4	5.17	0.063	–23	–1
5	6.89	0.032	66	2
			$[M]_D = \sum_i x_i[M]_D^i$	**98**

Based on our unpublished results and on a previous study (Grimme, S.; Furche, F.; Ahlrichs, R. *Chem. Phys. Lett.* **2002**, *361*, 321) of the deviation of optical rotations between experimental and calculated (BP86/aug-cc-pVDZ level of theory) values, one obtains a standard deviation of 33 for molar rotation calculations at the BP86/aug-cc-pVDZ level of theory. This value corresponds to an associated error of ±33 with 68% confidence, and an increase to ±65 if one increases the level of confidence to 95%.

Calculated Electronic Circular Dichroism Spectra

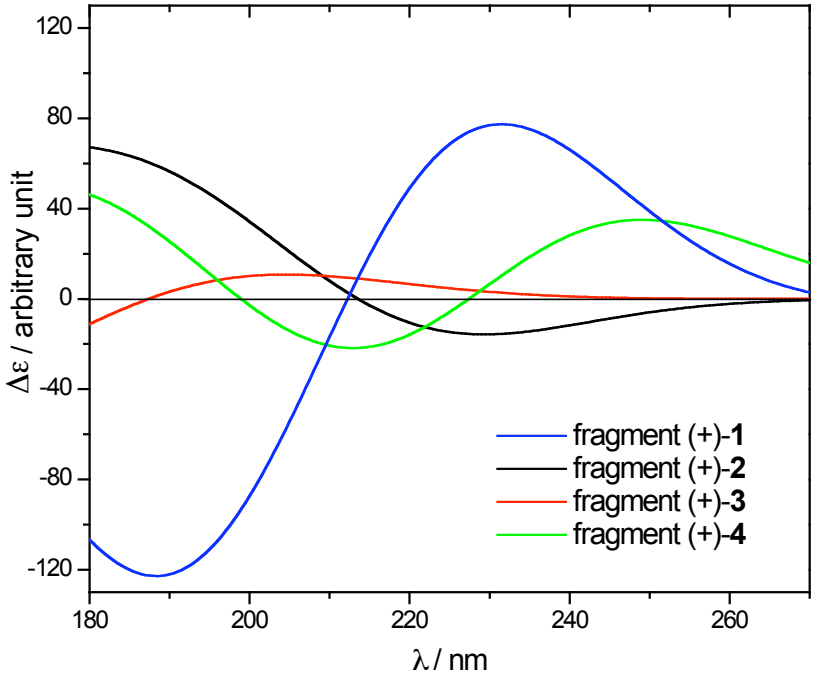

Figure S1. Calculated free-energy Boltzmann-weighted CD spectra of fragments **1**–**4**. CD spectra have been blue-shifted by 20 nm. Rotatory strengths for all conformers were computed at the RI-TDDFT BP86/aug-cc-pVDZ level of theory.