Supplementary data

Two new phenolic glycosides with anti-complementary activity from the roots of *Sanguisorba officinalis* L.

Rongshen Wang[a†], Jinfeng Sun[a†], Mei Jin[b], Chao Ye[a], Jiaming Wang[a], Long Jin[a], Ying Jie Ma[a, c*], Wei Zhou[a*], Gao Li[a*]

[a]*Key Laboratory of Natural Resources of Changbai Mountain and Functional Molecules, Ministry of Education, Yanbian University College of Pharmacy, Yanji, P. R. China*
[b]*Department of Pharmacy, Yanbian University Hospital, Yanji, P. R. China*
[c]*The Laboratory of Molecular Medicine, Department of Clinical Immunology, Section 7631, Rigshospitalet, Faculty of Health and Medical Sciences, University of Copenhagen, Copenhagen, Denmark*

Abstract: *Sanguisorba officinalis* L. is a traditional herbal plant that belongs to the genus *Sanguisorba* and the family Rosaceae. Two new phenolic glycosides (**1**−**2**), ten known phenolics (**3**−**12**), and six known monoterpenoid glycosides (**13**−**18**) were isolated from the roots of *S. officinalis* using silica gel column and preparative middle pressure liquid chromatography (MPLC). The chemical structures were elucidated based on extensive spectroscopic experiments, including 1D and 2D NMR as well as HR-ESI-MS, and comparison with those reported in the literature. Compounds **3**−**5**, and **13** were isolated from the Rosaceae family and compound **7** was obtained from the genus *Sanguisorba* for the first time. Additionally, all compounds were evaluated for their anti-complementary activities against the classical pathway. Furthermore, compounds **1**, **5**, **9**, and **14** showed significant anti-complementary activities with the 50% hemolytic inhibition concentrations (CH_{50}) values of 0.40 ± 0.03, 0.57 ± 0.01, 0.51 ± 0.07, and 0.53 ± 0.05 mM, respectively.

Keywords: *Sanguisorba officinalis* L.; Rosaceae; phenolic glycoside; monoterpenoid glycoside; anti-complementary activity

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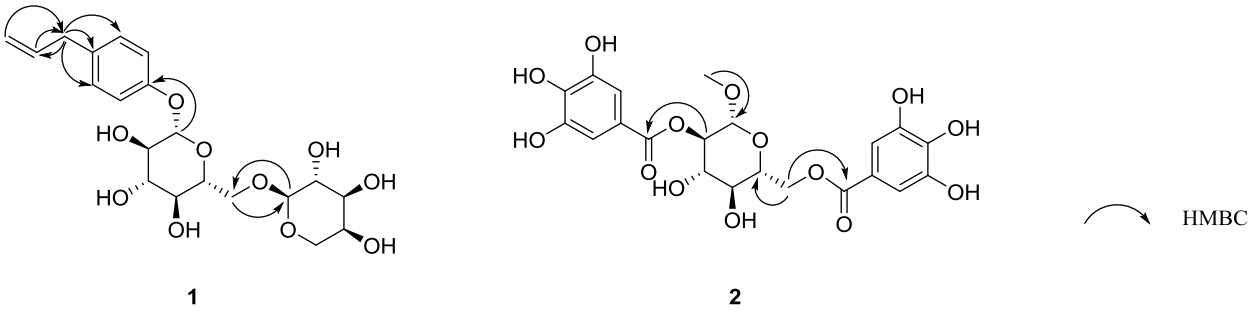

Figure S1: The key HMBC correlations of compounds **1**–**2**

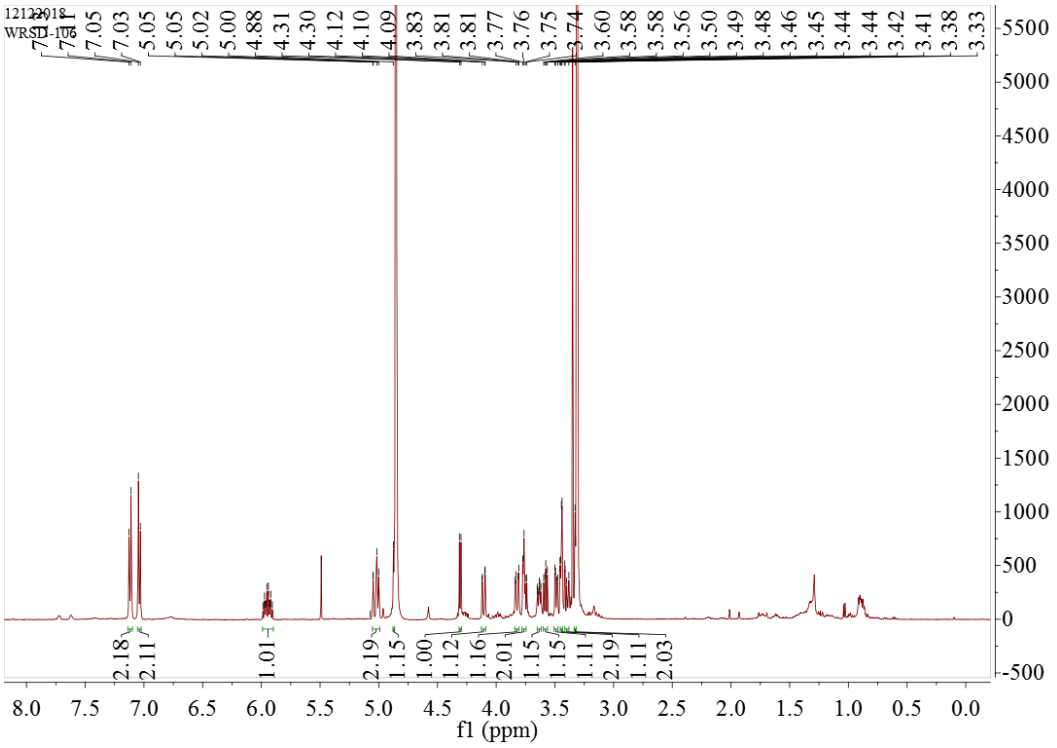

Figure S2: ^{1}H NMR spectrum of compound **1** in methanol-d_4 (500 MHz)

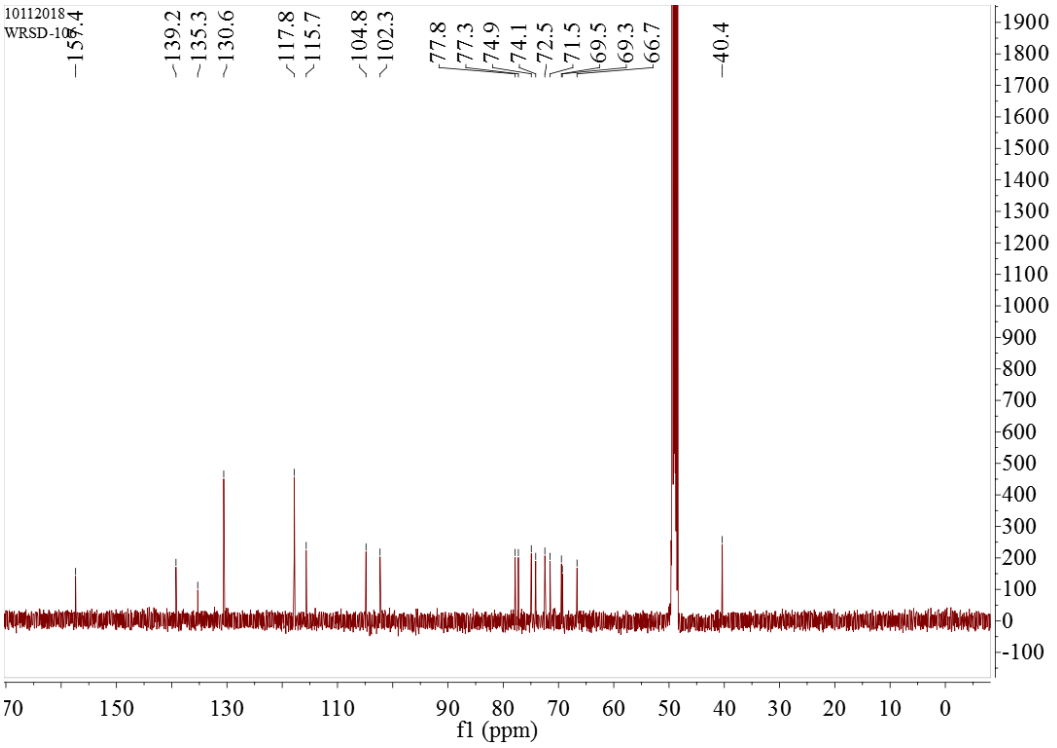

Figure S3: ^{13}C NMR spectrum of compound **1** in methanol-d_4 (125 MHz)

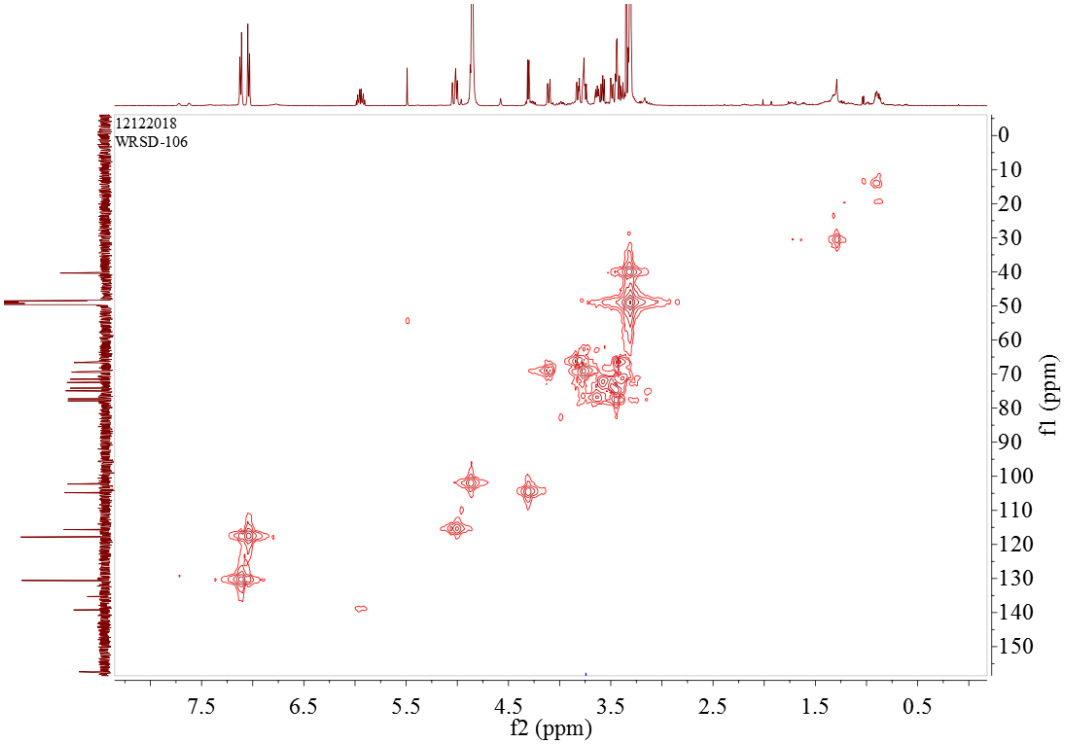

Figure S4: HMQC spectrum of compound **1** in methanol-d_4

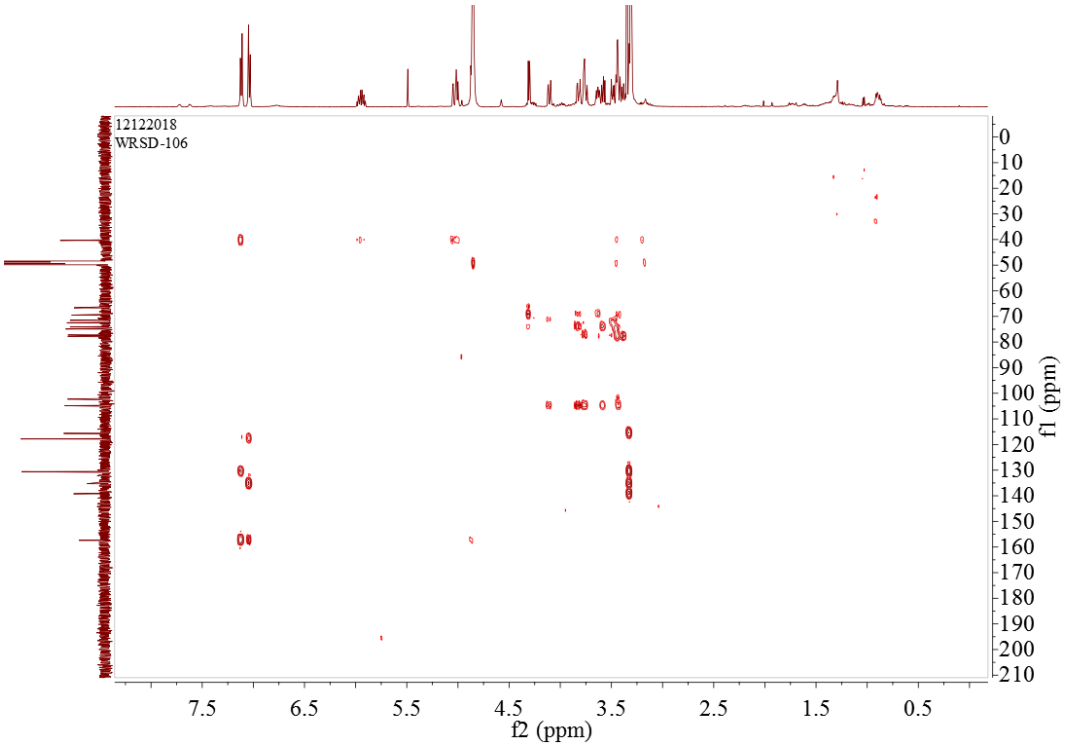

Figure S5: HMBC spectrum of compound **1** in methanol-d_4

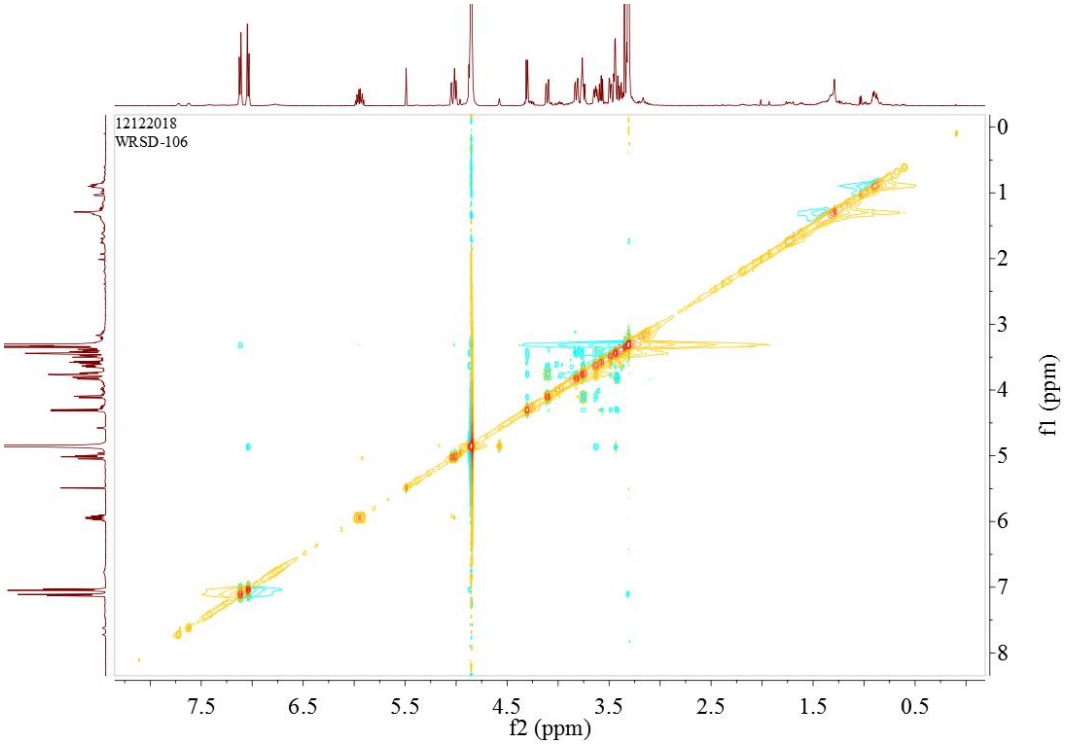

Figure S6: NOESY spectrum of compound **1** in methanol-d_4

Mass Spectrum SmartFormula Report

Analysis Info

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Sample Name	WRSD-106	Instrument / Ser#	micrOTOF-Q II 10351
Comment			

Acquisition Parameter

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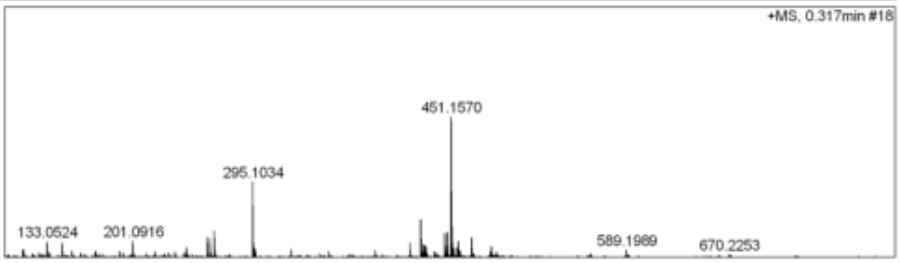

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451.1570	1	C 20 H 28 Na O 10	96.12	451.1575	0.4	1.0	10.9	6.5	even	ok
	2	C 22 H 27 O 10	17.80	451.1599	2.8	6.3	11.7	9.5	even	ok
	3	C 18 H 23 N 6 O 8	100.00	451.1572	0.2	0.3	15.3	10.5	even	ok
	4	C 21 H 24 N 4 Na O 6	38.93	451.1588	1.8	3.9	16.7	11.5	even	ok
	5	C 17 H 27 N 2 O 12	55.52	451.1559	-1.2	-2.6	18.3	5.5	even	ok
	6	C 19 H 19 N 10 O 4	45.02	451.1585	1.5	3.3	19.0	15.5	even	ok
	7	C 17 H 20 N 10 Na O 4	63.75	451.1561	-0.9	-2.0	19.1	12.5	even	ok
	8	C 15 H 15 N 16 O 2	51.02	451.1558	-1.2	-2.6	21.9	16.5	even	ok
	9	C 18 H 16 N 14 Na	73.60	451.1575	0.4	0.9	24.0	17.5	even	ok
	10	C 16 H 24 N 6 Na O 8	22.91	451.1548	-2.3	-5.0	24.3	7.5	even	ok
	11	C 14 H 19 N 12 O 6	17.39	451.1545	-2.5	-5.6	26.0	11.5	even	ok
	12	C 13 H 16 N 16 Na O 2	5.74	451.1534	-3.6	-8.0	28.5	13.5	even	ok
	13	C 15 H 28 N 2 Na O 12	5.80	451.1534	-3.6	-8.0	28.6	2.5	even	ok
	14	C 22 H 20 N 8 Na O 2	9.56	451.1601	3.1	6.9	28.6	16.5	even	ok
	15	C 20 H 15 N 14	12.00	451.1599	2.8	6.3	30.3	20.5	even	ok
	16	C 11 H 11 N 22	3.93	451.1532	-3.9	-8.6	31.1	17.5	even	ok
	17	C 13 H 23 N 8 O 10	3.69	451.1532	-3.9	-8.6	34.1	6.5	even	ok
	18	C 29 H 23 O 5	6.80	451.1540	-3.0	-6.7	44.4	18.5	even	ok
	19	C 7 H 16 N 20 Na O 3	2.88	451.1606	3.6	8.0	53.0	9.5	even	ok
	20	C 5 H 11 N 26 O	3.83	451.1604	3.3	7.4	53.4	13.5	even	ok
	21	C 30 H 19 N 4 O	14.03	451.1553	-1.7	-3.8	57.2	23.5	even	ok

Figure S7: HR-ESI-MS of compound **1**

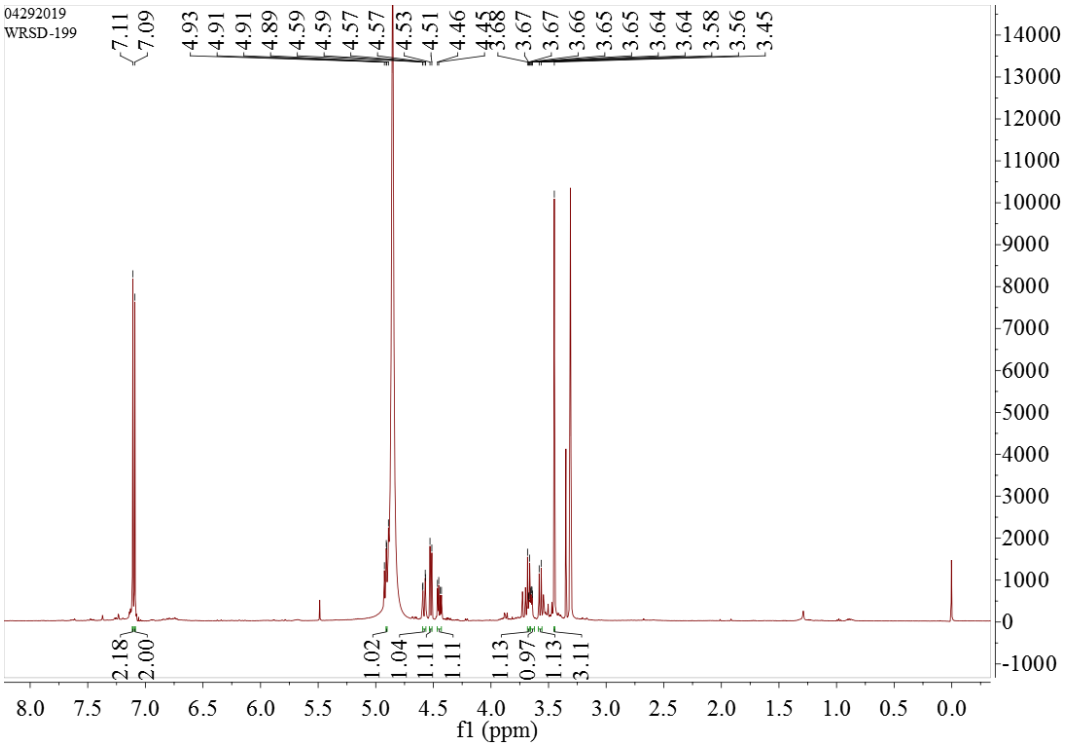

Figure S8: ^{1}H NMR spectrum of compound **2** in methanol-d_4 (500 MHz)

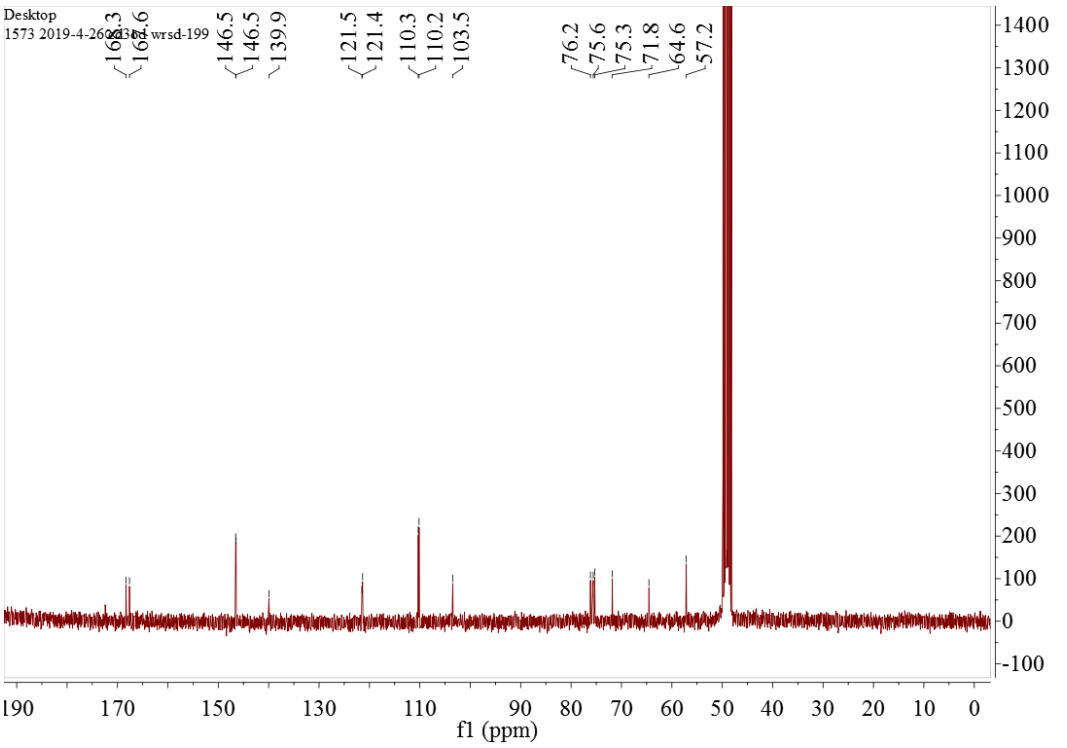

Figure S9: ^{13}C NMR spectrum of compound **2** in methanol-d_4 (125 MHz)

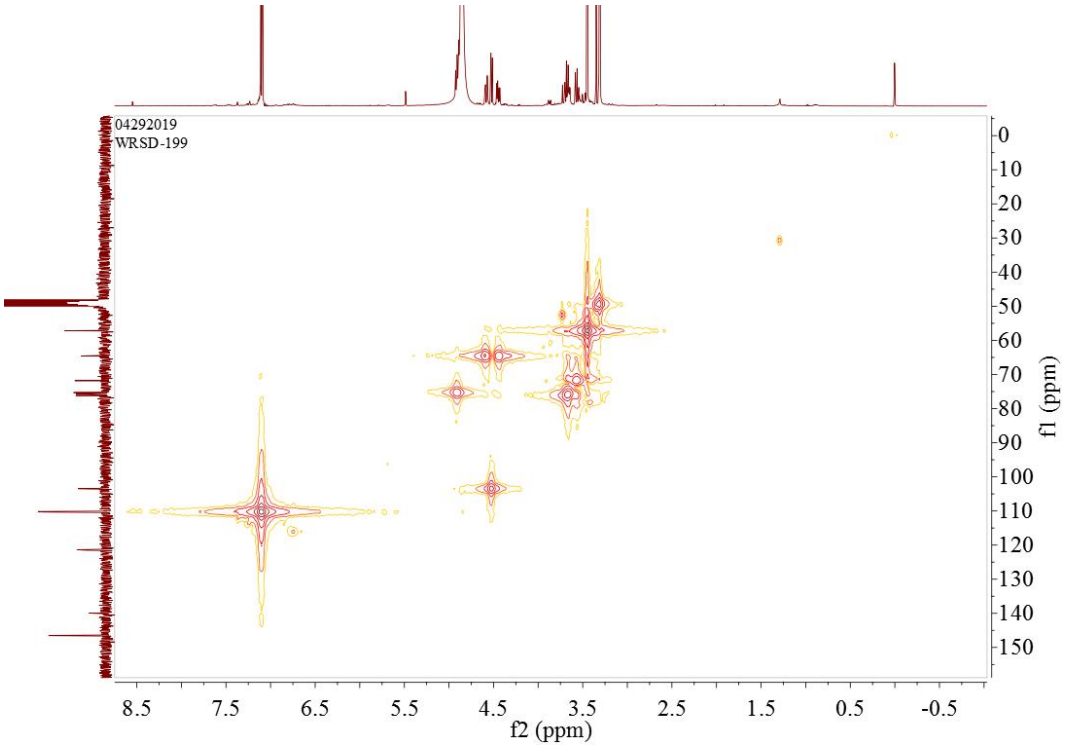

Figure S10: HMQC spectrum of compound **2** in methanol-d_4

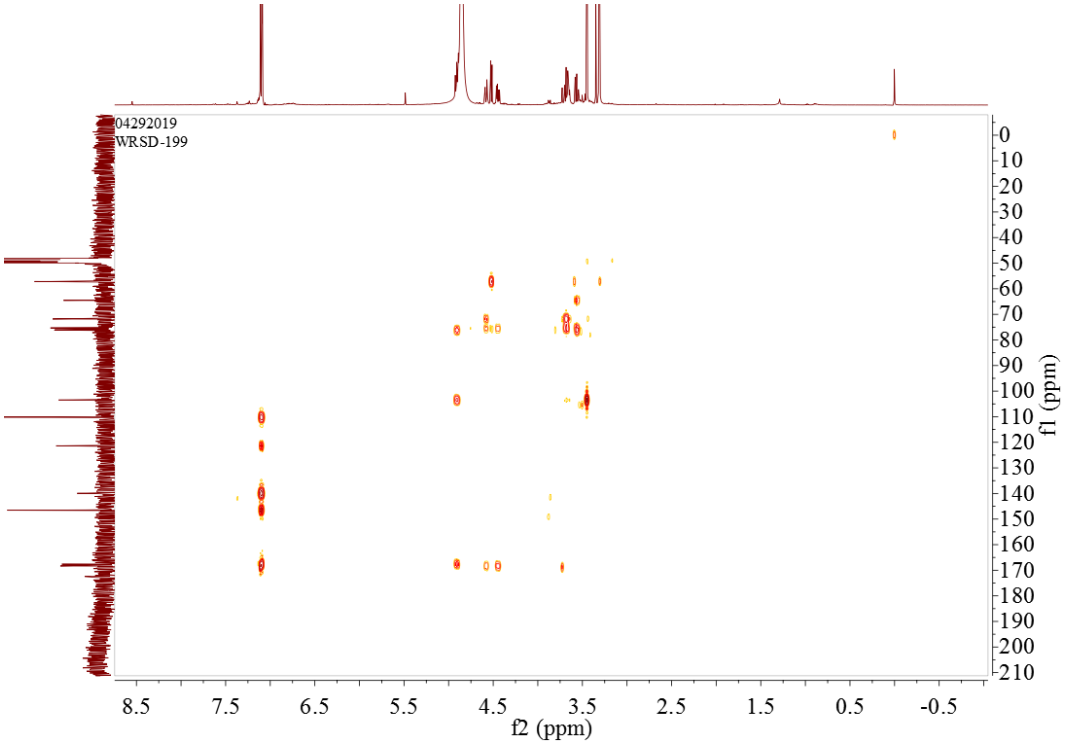

Figure S11: HMBC spectrum of compound **2** in methanol-d_4

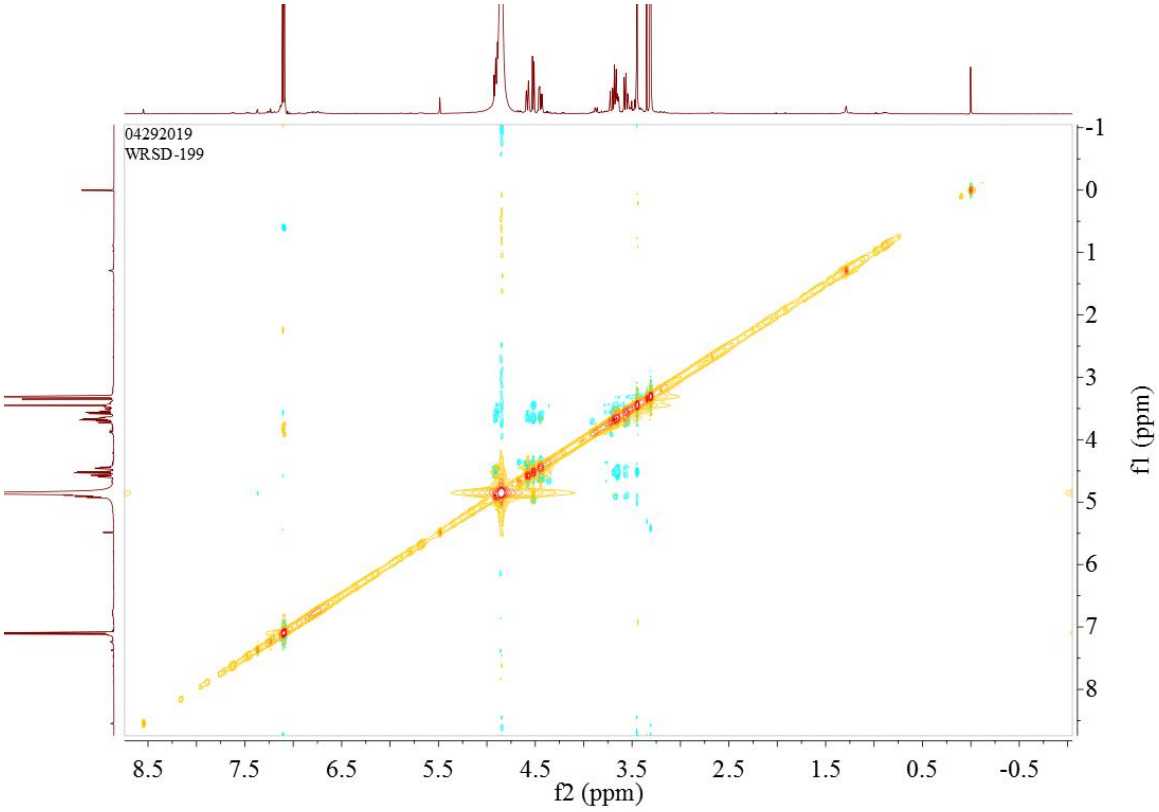

Figure S12: NOESY spectrum of compound **2** in methanol-d_4

Mass Spectrum SmartFormula Report

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Sample Name WSD-199 Instrumen micrOTOF-Q 228888.10351
I I
Comment

Acquisition Paramet

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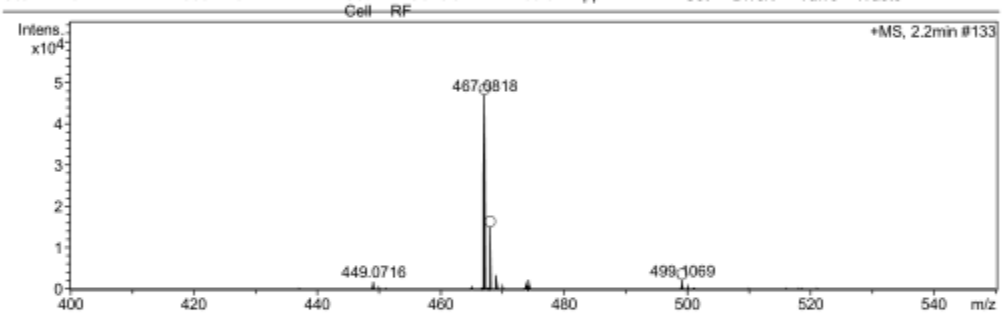
Scan End	1500 m/z	Set Collision Cell RF	100.0 Vpp	Set Divert Valve	Waste	



Meas. m/z	#	Ion Formula	m/z	err [ppm]	mSigma	#	mSigma	Score	rdb	e⁻	Con	N-Rule
467.0818	1	C29H7N8	467.0788	-6.3	17.2	1		13.47	30.5	even		ok
	2	C33H11N2O2	467.0815	-0.5	23.1	2		100.00	29.5	even		ok
	3	C22H11N8O5	467.0847	6.3	34.1	3		9.08	21.5	even		ok
	4	C38H11	467.0855	8.1	45.9	4		3.66	33.5	even		ok
468.0857	1	C16H6N17O2	468.0885	5.9	7.0	1		40.98	22.5	even		ok
	2	C18H18N3O12	468.0885	5.9	12.8	2		48.55	11.5	even		ok
	3	C15H10N13O6	468.0872	3.0	15.1	3		100.00	17.5	even		ok
	4	C25H14N3O7	468.0826	-6.6	24.6	4		27.45	20.5	even		ok
	5	C26H10N7O3	468.0840	-3.8	41.6	5		41.91	25.5	even		ok
	6	C30H14NO5	468.0866	2.0	48.1	6		79.56	24.5	even		ok
	7	C31H10N5O	468.0880	4.8	59.6	7		22.19	29.5	even		ok
499.1069	1	C34H15N2O3	499.1077	1.7	18.1	1		100.00	28.5	even		ok
	2	C30H11N8O	499.1050	-3.7	20.3	2		50.85	29.5	even		ok
	3	C29H15N4O5	499.1037	-6.4	23.9	3		14.74	24.5	even		ok
	4	C23H15N8O6	499.1109	8.1	46.0	4		3.24	20.5	even		ok
	5	C22H19N4O10	499.1096	5.4	55.5	5		9.81	15.5	even		ok
	6	C20H7N18	499.1096	5.4	56.8	6		7.13	26.5	even		ok
	7	C21H23O14	499.1082	2.7	65.7	7		19.43	10.5	even		ok

Figure S13: HR-ESI-MS of compound **2**

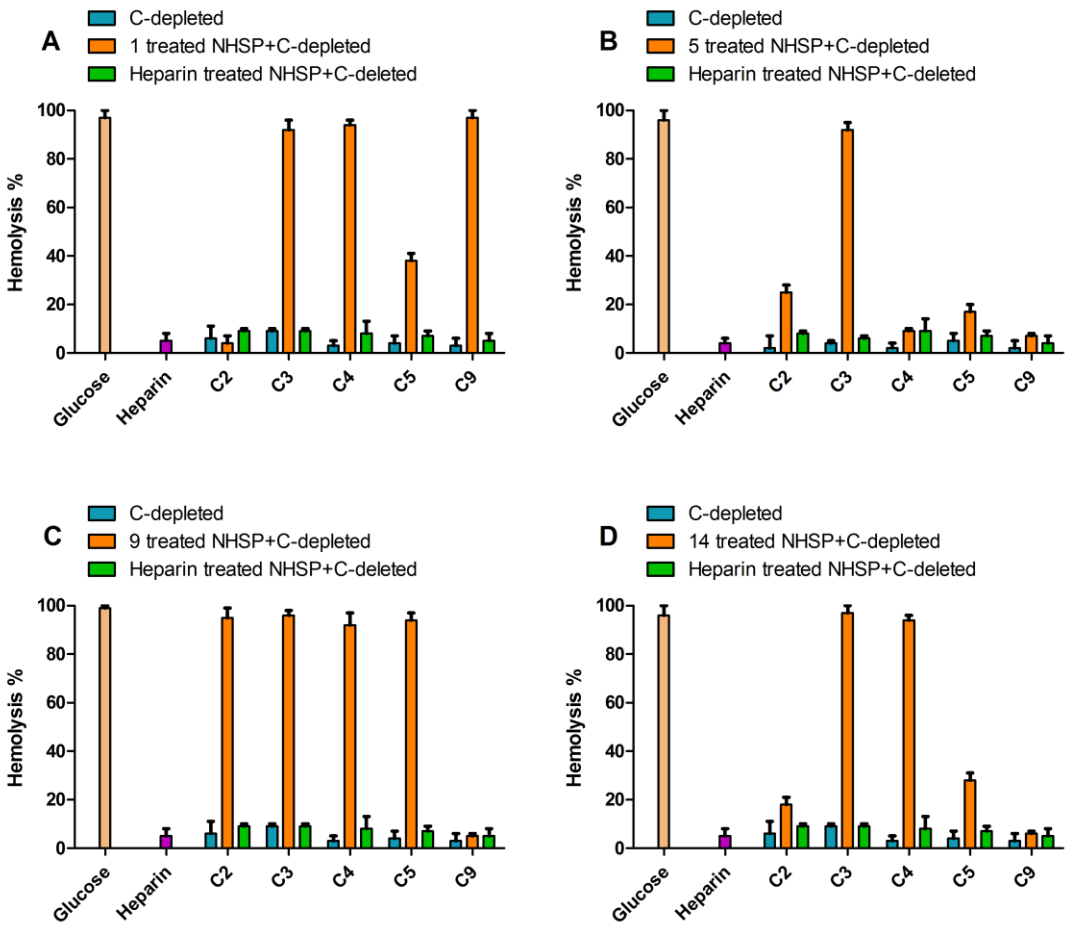


Figure S14: Targets of compounds **1** (A), **5** (B), **9** (C), and **14** (D) in complement activation cascade. 1-, 5-, 9-, and 14-treated sera were mixed with various complement-depleted (C-depleted) sera, and the capacity to restore hemolytic capacity of depleted sera by the CP was estimated by adding sheep antibody-sensitized erythrocytes. Data were expressed as mean ± SD (n = 3).

Table S1: Anti-complementary activity through the classical pathway (CP) of compounds **1**–**18**[a]

Compounds	CH_{50} (mM)
1	0.40 ± 0.03
2	0.98 ± 0.06
3	NE
4	2.08 ± 0.27
5	0.57 ± 0.01
6	1.76 ± 0.08
7	NE
8	1.51 ± 0.21
9	0.51 ± 0.07
10	NE
11	NE
12	1.46 ± 0.24
13	1.54 ± 0.12
14	0.53 ± 0.05
15	0.90 ± 0.07
16	NE
17	NE
18	NE
Heparin[b]	0.30 ± 0.02

[a]Data were expressed as mean ± SD (n = 3); CH_{50} stand for the 50% hemolytic inhibition concentrations through the classic pathway; NE denotes that this compound has no inhibitory effect at the maximal concentration tested.

[b]Heparin was used as the positive controls (mg/mL).