

Identifying the Specific-Targeted Marine Cerebrosides against SARS-CoV-2: An Integrated Computational Approach

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Table S1: Reported cerebroside from natural sources

No.	Compound	Subclass	Source	Site of collection	Activity	Reference
1	Agelasphin-10	Glucocerebroside	Sponge <i>Agelas mauritanus</i>	Kume Shima, Okinawa, Japan	- <i>In vivo</i> antitumor activity against B16 murine melanoma with T/C ranging from 160 to 190 %. - No activity against B16 melanoma cells at 20 µg/mL. - Weak acute toxicity in rats (intravenous injection) (LD₅₀ > 10 mg/kg).	[1]
2	Agelasphin-12	Glucocerebroside	Sponge <i>Agelas mauritanus</i>	Kume Shima, Okinawa, Japan.	- <i>In vivo</i> antitumor activity against B16 murine melanoma with T/C ranging from 160 to 190 %. - No activity against B16 melanoma cells at 20 µg/mL. - Weak acute toxicity in rats (intravenous injection) (LD₅₀ > 10 mg/kg).	[1]
3	Agelasphin-7a	Galactocerebroside	Sponge <i>Agelas mauritanus</i>	Kume Shima, Okinawa, Japan	- <i>In vivo</i> antitumor activity against B16 murine melanoma with T/C ranging from 160 to 190 %.	[1]
4	Agelasphin-7b-1	Galactocerebroside	Sponge <i>Agelas mauritanus</i>	Kume Shima, Okinawa, Japan	- No activity against B16 melanoma cells at 20 µg/mL.	[1]
5	Agelasphin-7b-2	Galactocerebroside	Sponge <i>Agelas mauritanus</i>	Kume Shima, Okinawa, Japan	- Weak acute toxicity in rats (intravenous injection) (LD₅₀ > 10 mg/kg).	[1]
6	Agelasphin-9a	Galactocerebroside	Sponge <i>Agelas mauritanus</i>	Kume Shima, Okinawa, Japan	- <i>In vivo</i> antitumor activity against B16 murine melanoma with T/C ranging from	[1]

					160 to 190 %.	
7	Agelasphin-9b	Galacto-cerebroside	Sponge <i>Agelas mauritianus</i>	Kume Shima, Okinawa, Japan	- No activity against B16 melanoma cells at 20 µg/mL.	[1]
8	Agelasphin-11	Galacto-cerebroside	Sponge <i>Agelas mauritianus</i>	Kume Shima, Okinawa, Japan	- Weak acute toxicity in rats (intravenous injection) (LD ₅₀ > 10 mg/kg).	[1]
9	Agelasphin-13	Galacto-cerebroside	Sponge <i>Agelas mauritianus</i>	Kume Shima, Okinawa, Japan	- <i>In vivo</i> antitumor activity against B16 murine melanoma with T/C ranging from 160 to 190 %. - No activity against B16 melanoma cells at 20 µg/mL. - Weak acute toxicity in rats (intravenous injection) (LD ₅₀ > 10 mg/kg).	[1]
10	Cerebroside 1a	Gluco-cerebroside	Glass sponge <i>Aulosaccus sp.</i>	Kuril Islands (45°01, 5N, 147°00, 3E), Russia	Not mentioned.	[2]
11	Cerebroside 1b	Gluco-cerebroside	Glass sponge <i>Aulosaccus sp.</i>	Kuril Islands (45°01, 5N, 147°00, 3E), Russia	Not mentioned.	[2]
12	Cerebroside 1f	Gluco-cerebroside	Glass sponge <i>Aulosaccus sp.</i>	Kuril Islands (45°01, 5N, 147°00, 3E), Russia	Not mentioned.	[2]
13	Cerebroside 1g	Gluco-cerebroside	Glass sponge <i>Aulosaccus sp.</i>	Kuril Islands (45°01, 5N, 147°00, 3E), Russia	Not mentioned.	[2]
14	Cerebroside 1i	Gluco-cerebroside	Glass sponge <i>Aulosaccus sp.</i>	Kuril Islands (45°01, 5N, 147°00, 3E), Russia	Not mentioned.	[2]

15	Cerebroside 1l	Glucocerebroside	Glass sponge <i>Aulosaccus sp.</i>	Kuril Islands (45°01, 5N, 147°00, 3E), Russia	Not mentioned.	[2]
16	Cerebroside 1m	Glucocerebroside	Glass sponge <i>Aulosaccus sp.</i>	Kuril Islands (45°01, 5N, 147°00, 3E), Russia	Not mentioned.	[2]
17	Cerebroside 2d	Glucocerebroside	Glass sponge <i>Aulosaccus sp.</i>	Kuril Islands (45°01, 5N, 147°00, 3E), Russia	Not mentioned.	[2]
18	Cerebroside 2h	Glucocerebroside	Glass sponge <i>Aulosaccus sp.</i>	Kuril Islands (45°01, 5N, 147°00, 3E), Russia	Not mentioned.	[2]
19	Cerebroside 2j	Glucocerebroside	Glass sponge <i>Aulosaccus sp.</i>	Kuril Islands (45°01, 5N, 147°00, 3E), Russia	Not mentioned.	[2]
20	Cerebroside 2k	Glucocerebroside	Glass sponge <i>Aulosaccus sp.</i>	Kuril Islands (45°01, 5N, 147°00, 3E), Russia	Not mentioned.	[2]
21	Cerebroside 3e	Glucocerebroside	Glass sponge <i>Aulosaccus sp.</i>	Kuril Islands (45°01, 5N, 147°00, 3E), Russia	Not mentioned.	[2]
22	Cerebroside 3c	Glucocerebroside	Glass sponge <i>Aulosaccus sp.</i>	Kuril Islands (45°01, 5N, 147°00, 3E), Russia	Not mentioned.	[2]
23	Cerebroside 3h	Glucocerebroside	Glass sponge <i>Aulosaccus sp.</i>	Kuril Islands (45°01, 5N, 147°00, 3E), Russia	Not mentioned.	[2]

24	Cerebroside 3k	Glucocerebroside	Glass sponge <i>Aulosaccus sp.</i>	Kuril Islands (45°01, 5N, 147°00, 3E), Russia	Not mentioned.	[2]
25	Cerebroside 4e	Glucocerebroside	Glass sponge <i>Aulosaccus sp.</i>	Kuril Islands (45°01, 5N, 147°00, 3E), Russia	Not mentioned.	[2]
26	Cerebroside 4h	Glucocerebroside	Glass sponge <i>Aulosaccus sp.</i>	Kuril Islands (45°01, 5N, 147°00, 3E), Russia	Not mentioned.	[2]
27	Cerebroside 5h	Glucocerebroside	Glass sponge <i>Aulosaccus sp.</i>	Kuril Islands (45°01, 5N, 147°00, 3E), Russia	Not mentioned.	[2]
28	Cerebroside 6e	Glucocerebroside	Glass sponge <i>Aulosaccus sp.</i>	Kuril Islands (45°01, 5N, 147°00, 3E), Russia	Not mentioned.	[2]
29	Cerebroside 1a	Glucocerebroside	Glass sponge <i>Aulosaccus sp.</i>	Kuril Islands (45°01, 5N, 147°00, 3E), Russia	Not mentioned.	[3]
30	Cerebroside 1b	Glucocerebroside	Glass sponge <i>Aulosaccus sp.</i>	Kuril Islands (45°01, 5N, 147°00, 3E), Russia	Not mentioned.	[3]
31	Cerebroside 1c	Glucocerebroside	Glass sponge <i>Aulosaccus sp.</i>	Kuril Islands (45°01, 5N, 147°00, 3E), Russia	Not mentioned.	[3]
32	Cerebroside 1d	Glucocerebroside	Glass sponge <i>Aulosaccus sp.</i>	Kuril Islands (45°01, 5N, 147°00, 3E), Russia	Not mentioned.	[3]

33	Cerebroside 2a	Glucocerebroside	Glass sponge <i>Aulosaccus sp.</i>	Kuril Islands (45°01, 5N, 147°00, 3E), Russia	Not mentioned.	[3]
34	Cerebroside 2b	Glucocerebroside	Glass sponge <i>Aulosaccus sp.</i>	Kuril Islands (45°01, 5N, 147°00, 3E), Russia	Not mentioned.	[3]
35	Cerebroside 3a	Glucocerebroside	Glass sponge <i>Aulosaccus sp.</i>	Kuril Islands (45°01, 5N, 147°00, 3E), Russia	Not mentioned.	[3]
36	Cerebroside 3b	Glucocerebroside	Glass sponge <i>Aulosaccus sp.</i>	Kuril Islands (45°01, 5N, 147°00, 3E), Russia	Not mentioned.	[3]
37	Cerebroside 3c	Glucocerebroside	Glass sponge <i>Aulosaccus sp.</i>	Kuril Islands (45°01, 5N, 147°00, 3E), Russia	Not mentioned.	[3]
38	Cerebrosides 1	Glucocerebroside	Sponge <i>Oceanapia sp.</i>	Kuril Islands (45°01, 5N, 147°00, 3E), Russia	Not mentioned.	[4]
39	Cerebrosides 2	Glucocerebroside	Sponge <i>Oceanapia sp.</i>	Kuril Islands (45°01, 5N, 147°00, 3E), Russia	Not mentioned.	[4]
40	Halicylindroside A1	<i>N</i> -Acetyl-glucosaminyl ceramide	Sponge <i>Halichondria cylindrata</i>	Atami, southwest of Tokyo, Japan	- Moderate antifungal activity against <i>Mortierella remanniana</i> at 250 µg/disk. - Cytotoxic against P388 murine leukemia cells at 6.8 µg/mL.	[5]
41	Halicylindroside A2	<i>N</i> -Acetyl-glucosaminyl ceramide	Sponge <i>Halichondria cylindrata</i>	Atami, southwest of Tokyo, Japan	- Moderate antifungal activity against <i>Mortierella remanniana</i> at 250 µg/disk. - Cytotoxic against P388 murine leukemia	[5]

					cells at 6.8 µg/mL.	
42	Halicylindroside A3	<i>N</i> -Acetyl-glucosaminyl ceramide	Sponge <i>Halichondria cylindrata</i>	Atami, southwest of Tokyo, Japan	- Moderate antifungal activity against <i>Mortierella remanniana</i> at 250 µg/disk. - Cytotoxic against P388 murine leukemia cells at 6.8 µg/mL.	[5]
43	Halicylindroside A4	<i>N</i> -Acetyl-glucosaminyl ceramide	Sponge <i>Halichondria cylindrata</i>	Atami, southwest of Tokyo, Japan	- Moderate antifungal activity against <i>Mortierella remanniana</i> at 250 µg/disk. - Cytotoxic against P388 murine leukemia cells at 6.8 µg/mL.	[5]
44	Halicylindroside B1	<i>N</i> -Acetyl-glucosaminyl ceramide	Sponge <i>Halichondria cylindrata</i>	Atami, southwest of Tokyo, Japan	- Moderate antifungal activity against <i>Mortierella remanniana</i> at 250 µg/disk. - Cytotoxic against P388 murine leukemia cells at 6.8 µg/mL.	[5]
45	Halicylindroside B2	<i>N</i> -Acetyl-glucosaminyl ceramide	Sponge <i>Halichondria cylindrata</i>	Atami, southwest of Tokyo, Japan	- Moderate antifungal activity against <i>Mortierella remanniana</i> at 250 µg/disk. - Cytotoxic against P388 murine leukemia cells at 6.8 µg/mL.	[5]
46	Halicylindroside B3	<i>N</i> -Acetyl-glucosaminyl ceramide	Sponge <i>Halichondria cylindrata</i>	Atami, southwest of Tokyo, Japan	- Moderate antifungal activity against <i>Mortierella remanniana</i> at 250 µg/disk. - Cytotoxic against P388 murine leukemia cells at 6.8 µg/mL.	[5]
47	Halicylindroside B4	<i>N</i> -Acetyl-glucosaminyl ceramide	Sponge <i>Halichondria cylindrata</i>	Atami, southwest of Tokyo, Japan	- Moderate antifungal activity against <i>Mortierella remanniana</i> at 250 µg/disk. - Cytotoxic against P388 murine leukemia cells at 6.8 µg/mL.	[5]
48	Halicylindroside B5	<i>N</i> -Acetyl-glucosaminyl ceramide	Sponge <i>Halichondria cylindrata</i>	Atami, southwest of Tokyo, Japan	- Moderate antifungal activity against <i>Mortierella remanniana</i> at 250 µg/disk. - Cytotoxic against P388 murine leukemia	[5]

					cells at 6.8 µg/mL.	
49	Halicylindroside B6	<i>N</i> -Acetyl-glucosaminyl ceramide	Sponge <i>Halichondria cylindrata</i>	Atami, southwest of Tokyo, Japan	- Moderate antifungal activity against <i>Mortierella remanniana</i> at 250 µg/disk. - Cytotoxic against P388 murine leukemia cells at 6.8 µg/mL.	[5]
50	(4E,8E)- <i>N</i> -13'-Methyl-tetradecanoyl-1- <i>O</i> -β-D-glucopyranosyl-4-sphingadiene	Galacto-cerebroside	Sponge <i>Halichondria panicea</i> (Pallas 1766)	Strawberry Hill on the Oregon Coast, USA	Not mentioned.	[6]
51	(4E)- <i>N</i> -Docosanoyl-1- <i>O</i> -β-D-glucopyranosyl-4-hexadeca-sphinganine	Galacto-cerebroside	Sponge <i>Halichondria panicea</i> (Pallas 1766)	Strawberry Hill on the Oregon Coast, USA	Not mentioned.	[6]
52	Renieroside A1	Gluco-cerebroside	Sponge <i>Haliclona (Reniera) sp.</i>	Ulleung Island, Korea (20 m depth)	No cytotoxic activity against five human solid tumor cell lines [human lung cancer (A549), human ovarian cancer (SK-OV-3), human skin cancer (SK-MEL-2), human CNS cancer (XF498), and human colon cancer (HCT15) cell line].	[7]
53	Renieroside A2	Gluco-cerebroside	Sponge <i>Haliclona (Reniera) sp.</i>	Ulleung Island, Korea (20 m depth)	No cytotoxic activity against five human solid tumor cell lines [human lung cancer (A549), human ovarian cancer (SK-OV-3), human skin cancer (SK-MEL-2), human CNS cancer (XF498), and human colon cancer (HCT15) cell line].	[7]
54	Renieroside A3	Gluco-cerebroside	Sponge <i>Haliclona (Reniera) sp.</i>	Ulleung Island, Korea (20 m depth)	No cytotoxic activity against five human solid tumor cell lines [human lung cancer (A549), human ovarian cancer (SK-OV-3),	[7]

					human skin cancer (SK-MEL-2), human CNS cancer (XF498), and human colon cancer (HCT15) cell line].	
55	Renieroside A4	Glucocerebroside	Sponge <i>Haliclona</i> (<i>Reniera</i>) <i>sp.</i>	Ulleung Island, Korea (20 m depth)	No cytotoxic activity against five human solid tumor cell lines [human lung cancer (A549), human ovarian cancer (SK-OV-3), human skin cancer (SK-MEL-2), human CNS cancer (XF498), and human colon cancer (HCT15) cell line].	[7]
56	Renieroside A5	Glucocerebroside	Sponge <i>Haliclona</i> (<i>Reniera</i>) <i>sp.</i>	Ulleung Island, Korea (20 m depth)	No cytotoxic activity against five human solid tumor cell lines [human lung cancer (A549), human ovarian cancer (SK-OV-3), human skin cancer (SK-MEL-2), human CNS cancer (XF498), and human colon cancer (HCT15) cell line].	[7]
57	Renieroside B1	Glucocerebroside	Sponge <i>Haliclona</i> (<i>Reniera</i>) <i>sp.</i>	Ulleung Island, Korea (20 m depth)	No cytotoxic activity against five human solid tumor cell lines [human lung cancer (A549), human ovarian cancer (SK-OV-3), human skin cancer (SK-MEL-2), human CNS cancer (XF498), and human colon cancer (HCT15) cell line].	[7]
58	Renieroside B2	Glucocerebroside	Sponge <i>Haliclona</i> (<i>Reniera</i>) <i>sp.</i>	Ulleung Island, Korea (20 m depth)	No cytotoxic activity against five human solid tumor cell lines [human lung cancer (A549), human ovarian cancer (SK-OV-3), human skin cancer (SK-MEL-2), human CNS cancer (XF498), and human colon cancer (HCT15) cell line].	[7]
59	Renieroside B3	Glucocerebroside	Sponge <i>Haliclona</i>	Ulleung Island,	No cytotoxic activity against five human	[7]

		cerebroside	(<i>Reniera</i>) <i>sp.</i>	Korea (20 m depth)	solid tumor cell lines [human lung cancer (A549), human ovarian cancer (SK-OV-3), human skin cancer (SK-MEL-2), human CNS cancer (XF498), and human colon cancer (HCT15) cell line].	
60	Renieroside C1	Glucocerebroside	Sponge <i>Haliclona</i> (<i>Reniera</i>) <i>sp.</i>	Ulleung Island coast, Korea	Not mentioned.	[8]
61	Renieroside C2	Glucocerebroside	Sponge <i>Haliclona</i> (<i>Reniera</i>) <i>sp.</i>	Ulleung Island coast, Korea	Not mentioned.	[8]
62	Renieroside C3	Glucocerebroside	Sponge <i>Haliclona</i> (<i>Reniera</i>) <i>sp.</i>	Ulleung Island coast, Korea	Not mentioned.	[8]
63	Renieroside C4	Glucocerebroside	Sponge <i>Haliclona</i> (<i>Reniera</i>) <i>sp.</i>	Ulleung Island coast, Korea	Not mentioned.	[8]
64	Renieroside C5	Glucocerebroside	Sponge <i>Haliclona</i> (<i>Reniera</i>) <i>sp.</i>	Ulleung Island coast, Korea	Not mentioned.	[8]
65	Renieroside C6	Glucocerebroside	Sponge <i>Haliclona</i> (<i>Reniera</i>) <i>sp.</i>	Ulleung Island coast, Korea	Not mentioned.	[8]
66	Renieroside C7	Glucocerebroside	Sponge <i>Haliclona</i> (<i>Reniera</i>) <i>sp.</i>	Ulleung Island coast, Korea	Not mentioned.	[8]
67	Renieroside C8	Glucocerebroside	Sponge <i>Haliclona</i> (<i>Reniera</i>) <i>sp.</i>	Ulleung Island coast, Korea	Not mentioned.	[8]
68	Renieroside C9	Glucocerebroside	Sponge <i>Haliclona</i> (<i>Reniera</i>) <i>sp.</i>	Ulleung Island coast, Korea	Not mentioned.	[8]
69	Renieroside C10	Glucocerebroside	Sponge <i>Haliclona</i> (<i>Reniera</i>) <i>sp.</i>	Ulleung Island coast, Korea	Not mentioned.	[8]
70	Renieroside C11	Glucocerebroside	Sponge <i>Haliclona</i> (<i>Reniera</i>) <i>sp.</i>	Ulleung Island coast, Korea	Not mentioned.	[8]

71	Renieroside C12	Glucocerebroside	Sponge <i>Haliclona (Reniera) sp.</i>	Ulleung Island coast, Korea	Not mentioned.	[8]
72	Renieroside C13	Glucocerebroside	Sponge <i>Haliclona (Reniera) sp.</i>	Ulleung Island coast, Korea	Not mentioned.	[8]
73	Renieroside C14	Glucocerebroside	Sponge <i>Haliclona (Reniera) sp.</i>	Ulleung Island coast, Korea	Not mentioned.	[8]
74	Halicerebroside A	Glucocerebroside	Sponge <i>Haliclona sp.</i>	Straits of the Gulf of Eilat (the Red Sea), Egypt	Not mentioned.	[9]
75	Amphicerebroside B	Glucocerebroside	Sponge <i>Amphimedon viridis</i>	Straits of the Gulf of Eilat (the Red Sea), Egypt	The hepta-acetyl derivative has moderate antifungal activity against <i>C. albicans</i> with MIC = 12.5 µg/mL	[9]
76	Amphicerebroside C	Glucocerebroside	Sponge <i>Amphimedon viridis</i>	Straits of the Gulf of Eilat (the Red Sea), Egypt	The hepta-acetyl derivative has moderate antifungal activity against <i>C. albicans</i> with MIC = 12.5 µg/mL	[9]
77	Amphicerebroside D	Glucocerebroside	Sponge <i>Amphimedon viridis</i>	Straits of the Gulf of Eilat (the Red Sea), Egypt	The hepta-acetyl derivative has moderate antifungal activity against <i>C. albicans</i> with MIC = 12.5 µg/mL	[9]
78	Amphicerebroside E	Glucocerebroside	Sponge <i>Amphimedon viridis</i>	Straits of the Gulf of Eilat (the Red Sea), Egypt	The hepta-acetyl derivative has moderate antifungal activity against <i>C. albicans</i> with MIC = 12.5 µg/mL	[9]
79	Amphicerebroside F	Glucocerebroside	Sponge <i>Amphimedon viridis</i>	Straits of the Gulf of Eilat (the Red Sea), Egypt	The hepta-acetyl derivative has moderate antifungal activity against <i>C. albicans</i> with MIC = 12.5 µg/mL	[9]
80	Plakoside A	Galactocerebroside	Sponge <i>Plakortis simplex</i>	Coast of Little San Salvador Island, Italy	Immunosuppressive activity inhibiting the proliferative response of lymph node cells to Con A (0.5 µg/mL) at doses from 0.01	[10]

					to 10 µg/mL.	
81	Plakoside B	Galacto-cerebroside	Sponge <i>Plakortis simplex</i>	Coast of Little San Salvador Island, Italy	Immunosuppressive activity inhibiting the proliferative response of lymph node cells to Con A (0.5 µg/mL) at doses from 0.01 to 10 µg/mL.	[10]
82	Acanthacerebroside A	Glucocerebroside	- Starfish <i>Acanthaster planci</i> - Starfish <i>Astropecten latespinosus</i>	Hakata Bay in Fukuoka, Japan	Not mentioned.	[11]
83	Acanthacerebroside B	Glucocerebroside	- Starfish <i>Acanthaster planci</i> - Starfish <i>Luidia maculata</i>	Hakata Bay in Fukuoka, Japan	Not mentioned.	[11]
84	Acanthacerebroside C	Glucocerebroside	- Starfish <i>Acanthaster planci</i> - Starfish <i>Asterias amurensis versicolor</i> <i>Sladen</i>	Hakata Bay in Fukuoka, Japan	Not mentioned.	[11] [12]
85	Acanthacerebroside D	Glucocerebroside	Starfish <i>Acanthaster planci</i>	Hakata Bay in Fukuoka, Japan	Not mentioned.	[11]
86	Acanthacerebroside E	Glucocerebroside	Starfish <i>Acanthaster planci</i>	Hakata Bay in Fukuoka, Japan	Not mentioned.	[11]
87	Acanthacerebroside F	Glucocerebroside	Starfish <i>Acanthaster planci</i>	Hakata Bay in Fukuoka, Japan	Not mentioned.	[11]
88	Asteriacerebroside A	Glucocerebroside	Starfish <i>Asterias amurensis versicolor</i> <i>Sladen</i>	Hakata Bay in Fukuoka, Japan	Not mentioned.	[12]

89	Asteriacerebroside B	Glucocerebroside	Starfish <i>Asterias amurensis versicolor</i> Sladen	Hakata Bay in Fukuoka, Japan	Not mentioned.	[12]
90	Asteriacerebroside C	Glucocerebroside	Starfish <i>Asterias amurensis versicolor</i> Sladen	Hakata Bay in Fukuoka, Japan	Not mentioned.	[12]
91	Asteriacerebroside D	Glucocerebroside	Starfish <i>Asterias amurensis versicolor</i> Sladen	Hakata Bay in Fukuoka, Japan	Not mentioned.	[12]
92	Asteriacerebroside E	Glucocerebroside	Starfish <i>Asterias amurensis versicolor</i> Sladen	Hakata Bay in Fukuoka, Japan	Not mentioned.	[12]
93	Asteriacerebroside F	Glucocerebroside	Starfish <i>Asterias amurensis versicolor</i> Sladen	Hakata Bay in Fukuoka, Japan	Not mentioned.	[12]
94	Astrocerebroside A	Glucocerebroside	- Starfish <i>Astropecten latespinosus</i> - Starfish <i>Asterias amurensis versicolor</i> Sladen.	Hakata Bay in Fukuoka, Japan	Not mentioned.	[13] [12]
95	Astrocerebroside B	Glucocerebroside	- Starfish <i>Astropecten latespinosus</i> - Starfish <i>Luidia maculata</i>	Hakata Bay in Fukuoka, Japan	Not mentioned.	[13] [14]
96	Astrocerebroside C	Glucocerebroside	Starfish <i>Astropecten latespinosus</i>	Hakata Bay in Fukuoka, Japan	Not mentioned.	[13]

97	S-1-3 1- <i>O</i> -(β -D-Glucopyranosyl)- (2S,3R,4E,8E, 10E)-2- [(2R)-2-hydroxy- docosanoylamino]-9- methyl-4,8,10-octa- decatriene-1,3-diol	Glucocerebroside	Starfish <i>Stellaster equestris</i>	East China Sea, China	Not mentioned.	[15]
98	S-1-4 1- <i>O</i> -(β -D-Glucopyranosyl)- (2S,3R,4E,8E,10E)-2- [(2R)-2-hydroxy- tricosanoylamino]-9- methyl-4,8,10-octa- decatriene-1,3-diol	Glucocerebroside	Starfish <i>Stellaster equestris</i>	East China Sea, China	Not mentioned.	[15]
99	S-1-5 1- <i>O</i> -(β -D-Glucopyranosyl)- (2S,3R,4E,8E,10E)-2- [(2R)-2-hydroxy- tetracosanoylamino]- 9-methyl-4,8,10-octa- decatriene-1,3-diol	Glucocerebroside	Starfish <i>Stellaster equestris</i>	East China Sea, China	Not mentioned.	[15]
100	S-2a-3 1- <i>O</i> -(β -D-Glucopyranosyl)-	Glucocerebroside	Starfish <i>Stellaster equestris</i>	East China Sea, China	Not mentioned.	[15]

	(2S,3S,4R)-2-[(2R)-2-hydroxy-docosanoylamino]-15-methylhexa-decane-1,3,4-triol					
101	S-2a-11 1- <i>O</i> -(β -D-Glucopyranosyl)-(2S,3S,4R)-2-[(2R)-2-hydroxytetra-cosanoylamino]-16-methylheptadecane-1,3,4-triol	Glucocerebroside	Starfish <i>Stellaster equestris</i>	East China Sea, China	Not mentioned.	[15]
102	S-2b-2 1- <i>O</i> -(β -Galactopyranosyl)-(2S,3S,4R)-2-[(2R)-2-hydroxydocosanoyl-amino]-hexadecane-1,3,4-triol	Galactocerebroside	Starfish <i>Stellaster equestris</i>	East China Sea, China	Not mentioned.	[15]
103	S-2b-4 1- <i>O</i> -(β -Galactopyranosyl)-(2S,3S,4R)-2-[(2R)-2-hydroxydocosanoylamino]-15-methylhexadecane - 1,3,4-triol	Galactocerebroside	Starfish <i>Stellaster equestris</i>	East China Sea, China	Not mentioned.	[15]
104	S-2b-16	Galacto-	Starfish <i>Stellaster</i>	East China Sea,	Not mentioned.	[15]

	1- <i>O</i> -(β -Galactopyranosyl)-(2 <i>S</i> ,3 <i>S</i> ,4 <i>R</i>)-2-[(2 <i>R</i>)-2-hydroxy-tetracosanoylamino]-16-methyl-heptadecane-1,3,4-triol	cerebroside	<i>equestris</i>	China		
105	Ophidiacerebroside A	Glucocerebroside	Sea star <i>Ophidiaster ophidiamus</i>	Islote Dragonera, Balearic Islands, Spain	Antileukemic against L1210 murine leukemic cells at 2 μ g/mL.	[16]
106	Ophidiacerebroside B	Glucocerebroside	Sea star <i>Ophidiaster ophidiamus</i>	Islote Dragonera, Balearic Islands, Spain	Antileukemic against L1210 murine leukemic cells at 2 μ g/mL.	[16]
107	Ophidiacerebroside C	Glucocerebroside	- Sea star <i>Ophidiaster ophidiamus</i> - Sea Star <i>Oreaster reticulatus</i>	- Islote Dragonera, Balearic Islands, Spain - Coast of Grand Bahama Island, Bahamas (23 m depth)	Antileukemic against L1210 murine leukemic cells at 2 μ g/mL.	[16]
108	Ophidiacerebroside D	Glucocerebroside	- Sea star <i>Ophidiaster ophidiamus</i> - Sea star <i>Oreaster reticulatus</i>	- Islote Dragonera, Balearic Islands, Spain - Coast of Grand Bahama Island, Bahamas (23 m depth)	Antileukemic against L1210 murine leukemic cells at 2 μ g/mL.	[16]
109	Ophidiacerebroside E	Glucocerebroside	- Sea star	- Islote Dragonera,	Antileukemic against L1210 murine	[16]

		cerebroside	<i>Ophidiaster ophidiamus</i> - Sea star <i>Oreaster reticulatus</i>	Balearic Islands, Spain - Coast of Grand Bahama Island, Bahamas (23 m depth)	leukemic cells at 2 µg/mL. - Significant cytotoxic activity against rat glioma C6 cells, with 37.3 % inhibition.	
110	Oreacerebroside A	Glucocerebroside	Sea star <i>Oreaster reticulatus</i>	The coast of Grand Bahama Island, Bahamas (23 m depth)	- Significant cytotoxic activity against rat glioma C6 cells, with 41.3 % inhibition.	
111	Oreacerebroside B	Glucocerebroside	Sea star <i>Oreaster reticulatus</i>	Coast of Grand Bahama Island, Bahamas (23 m depth)	Not mentioned.	[17]
112	Oreacerebroside C	Glucocerebroside	Sea star <i>Oreaster reticulatus</i>	Coast of Grand Bahama Island, Bahamas (23 m depth)	Not mentioned.	[17]
113	Oreacerebroside D	Galactocerebroside	Sea star <i>Oreaster reticulatus</i>	Coast of Grand Bahama Island, Bahamas (23 m depth)	Significant cytotoxic activity against rat glioma C6 cells, with 25.3 % inhibition.	[17]
114	Oreacerebroside E	Galactocerebroside	Sea star <i>Oreaster reticulatus</i>	Coast of Grand Bahama Island, Bahamas (23 m depth)	Not mentioned.	[17]
115	Oreacerebroside F	Galactocerebroside	Sea star <i>Oreaster reticulatus</i>	Coast of Grand Bahama Island,	Not mentioned.	[17]

				Bahamas (23 m depth)		
116	Oreacerebroside G	Galacto- cerebroside	Sea star <i>Oreaster reticulatus</i>	Coast of Grand Bahama Island, Bahamas (23 m depth)	Not mentioned.	[17]
117	Oreacerebroside H	Galacto- cerebroside	Sea star <i>Oreaster reticulatus</i>	Coast of Grand Bahama Island, Bahamas (23 m depth)	Not mentioned.	[17]
118	Oreacerebroside I	Galacto- cerebroside	Sea star <i>Oreaster reticulatus</i>	Coast of Grand Bahama Island, Bahamas (23 m depth)	- Significant cytotoxic activity against rat glioma C6 cells, with 24 % inhibition. - Proangiogenic activity and enhancing VEGF-induced human endothelial cell proliferation.	[17]
119	Luidiacerebroside A	Gluko- cerebroside	Starfish <i>Luidia maculata</i>	Hakata Bay in Fukuoka, Japan	Not mentioned.	[14]
120	Luidiacerebroside B	Gluko- cerebroside	Starfish <i>Luidia maculata</i>	Hakata Bay in Fukuoka, Japan	Not mentioned.	[14]
121	Reguloside A	Gluko- cerebroside	Starfish <i>Pentaceraster regulus</i>	Rameshwaram on the Southern Coast of India	Moderate wound-healing activity.	[18]
122	Reguloside B	Gluko- cerebroside	Starfish <i>Pentaceraster regulus</i>	Rameshwaram on the Southern Coast of India	Not mentioned.	[18]
123	Reguloside C	Gluko- cerebroside	Starfish <i>Pentaceraster regulus</i>	Rameshwaram on the Southern Coast, India	Not mentioned.	[18]

124	CE-2b	Glucocerebroside	- Sea cucumber <i>Cucumaria echinata</i> - Starfish <i>Luidia maculata</i>	- Ariake Sea, Japan - Hakata Bay in Fukuoka, Japan	Not mentioned.	[19] [14]
125	CE-2c	Glucocerebroside	- Sea cucumber <i>Cucumaria echinata</i> - Sea cucumber <i>Pentacta australis</i>	Ariake Sea, Japan	Not mentioned.	[19] [20]
126	CE-2d	Glucocerebroside	Sea cucumber <i>Cucumaria echinata</i>	Ariake Sea, Japan	Not mentioned.	[19]
127	PA-0-1	Glucocerebroside	Sea cucumber <i>Pentacta australis</i>	Ariake Sea, Japan	Not mentioned.	[20]
128	PA-0-5	Glucocerebroside	- Sea cucumber <i>Pentacta australis</i> - Sea cucumber <i>Cucumaria echinata</i>	- Ariake Sea, Japan - Sea of Genkai, Japan	Moderate lethal activity towards brine shrimps at 30 ppm.	[20] [21]
129	PA-2-5	Glucocerebroside	Sea cucumber <i>Pentacta australis</i>	Ariake Sea, Japan	Not mentioned.	[20]
130	PA-2-6	Glucocerebroside	Sea cucumber <i>Pentacta australis</i>	Ariake Sea, Japan	Not mentioned.	[20]
131	CF-3-1	Glucocerebroside	Sea cucumber <i>Cucumaria frondosa</i> (<i>Gunnerus</i>)	Russia	Not mentioned.	[22]
132	CF-3-2	Glucocerebroside	Sea cucumber <i>Cucumaria frondosa</i> (<i>Gunnerus</i>)	Russia	Not mentioned.	[22]

133	CF-3-3	Glucocerebroside	Sea cucumber <i>Cucumaria frondosa</i> (<i>Gunnerus</i>)	Russia	Not mentioned.	[22]
134	CE-1-2	Glucocerebroside	Sea cucumber <i>Cucumaria echinata</i>	Sea of Genkai, Japan	Moderate lethal activity towards brine shrimps at 30 ppm.	[21]
135	CE-1-3	Glucocerebroside	Sea cucumber <i>Cucumaria echinata</i>	Sea of Genkai, Japan	Moderate lethal activity towards brine shrimps at 30 ppm.	[21]
136	CE-3-1	Glucocerebroside	Sea cucumber <i>Cucumaria echinata</i>	Sea of Genkai, Japan	Moderate lethal activity towards brine shrimps at 30 ppm.	[21]
137	CE-3-2	Glucocerebroside	Sea cucumber <i>Cucumaria echinata</i>	Sea of Genkai, Japan	Moderate lethal activity towards brine shrimps at 30 ppm.	[21]
138	1- <i>O</i> -(β -D-Glucopyranosyl)-(2 <i>S</i> ,3 <i>R</i> ,4 <i>E</i>)-2-(heptadecanoylamino)-4-octadecene-1,3-diol	Glucocerebroside	Marine bryozoan <i>Bugula neritina</i>	South China Sea (Daya Bay, Shenzhen, Guangdong Province, China)	Not mentioned.	[23]
139	1- <i>O</i> -(β -D-Glucopyranosyl)-(2 <i>S</i> ,3 <i>R</i> ,4 <i>E</i> ,8 <i>E</i>)-2-(hexadecanoylamino)-4,8-octadecadiene-1,3-diol	Glucocerebroside	Marine bryozoan <i>Bugula neritina</i>	South China Sea (Daya Bay, Shenzhen, Guangdong Province, China)	Not mentioned.	[23]
140	1- <i>O</i> -(β -D-Glucopyranosyl)-(2 <i>S</i> ,3 <i>R</i> ,4 <i>E</i>)-2-(hexadecanoylamino)-4-octadecene-1,3-diol	Glucocerebroside	Marine bryozoan <i>Bugula neritina</i>	South China Sea (Daya Bay, Shenzhen, Guangdong Province, China)	Cytotoxic activity against murine P388 lymphocytic leukemia and a panel of human cancer cell lines (GI ₅₀ 0.15 to 2.6 μ g/mL).	[23]

141	1- <i>O</i> -(β -D-Glucopyranosyl)- (2 <i>S</i> ,3 <i>R</i>)-2- (hexadecanoylamino)- octadecane-1,3-diol	Glucocerebroside	Marine bryozoan <i>Bugula neritina</i>	South China Sea (Daya Bay, Shenzhen, Guangdong Province, China)	Not mentioned.	[23]
142	Phalluside 1	Glucocerebroside	Ascidian <i>Phallusia fumigata</i>	Southern coast of Cádiz, Spain	Not mentioned.	[24]
143	Phalluside 2	Glucocerebroside	Ascidian <i>Phallusia fumigata</i>	Southern coast of Cádiz, Spain	Not mentioned.	[24]
144	Phalluside 3	Glucocerebroside	Ascidian <i>Phallusia fumigata</i>	Southern coast of Cádiz, Spain	Not mentioned.	[24]
145	Phalluside 4	Glucocerebroside	Ascidian <i>Phallusia fumigata</i>	Southern coast of Cádiz, Spain	Not mentioned.	[24]
146	Sarcoehrenoside A	Glucocerebroside	Octocoral <i>Sarcophyton ehrenbergi</i>	Dongsha Islands, Taiwan	- No antibacterial activity. - Anti-inflammatory activity reducing iNOS protein expression at 10 μ M.	[25]
147	Sarcoehrenoside B	Glucocerebroside	Octocoral <i>Sarcophyton ehrenbergi</i>	Dongsha Islands, Taiwan	- No antibacterial activity. - Anti-inflammatory activity reducing iNOS protein expression at 10 μ M.	[25]
148	Temnoside A	Glucocerebroside	Sea urchin <i>Temnopleurus toreumaticus</i>	Mandapam coast, Tamilnadu, India	Not mentioned.	[26]
149	Temnoside B	Glucocerebroside	Sea urchin <i>Temnopleurus toreumaticus</i>	Mandapam coast, Tamilnadu, India	Not mentioned.	[26]
150	Thraustochytroside A	Gluco-	Marine protist	Seagrass collected in	Not mentioned.	[27]

		cerebroside	<i>Thraustochytrium globosum</i>	the Bahamas Islands		
151	Thraustochytroside B	Glucocerebroside	Marine protist <i>Thraustochytrium globosum</i>	Seagrass collected in the Bahamas Islands	Not mentioned.	[27]
152	Thraustochytroside C	Glucocerebroside	Marine protist <i>Thraustochytrium globosum</i>	Seagrass collected in the Bahamas Islands	Not mentioned.	[27]
153	Chrysogeside A	Glucocerebroside	Fungus <i>Penicillium chrysogenum</i> PXP-55	Isolated from roots of the mangrove plant, <i>Rhizophora stylosa</i> collected in Wenchang, Hainan Province, China	- No cytotoxicity against P388 and HeLa cells. - No antimicrobial activity against <i>S. aureus</i> , <i>E. coli</i> , <i>E. aerogenes</i> , or <i>Bacillus subtilis</i> .	[28]
154	Chrysogeside B	Glucocerebroside	Fungus <i>Penicillium chrysogenum</i> PXP-55	Isolated from roots of the mangrove plant, <i>Rhizophora stylosa</i> collected in Wenchang, Hainan Province, China	- No cytotoxicity against P388 and HeLa cells. - No antimicrobial activity against <i>S. aureus</i> , <i>E. coli</i> , <i>E. aerogenes</i> , or <i>Bacillus subtilis</i> .	[28]
155	Chrysogeside C	Glucocerebroside	Fungus <i>Penicillium chrysogenum</i> PXP-55	Isolated from roots of the mangrove plant, <i>Rhizophora stylosa</i> collected in Wenchang, Hainan Province, China	No cytotoxicity against P388 and HeLa cells.	[28]
156	Chrysogeside D	Glucocerebroside	Fungus <i>Penicillium chrysogenum</i> PXP-55	Isolated from roots of the mangrove	No antimicrobial activity against <i>S. aureus</i> , <i>E. coli</i> , <i>E. aerogenes</i> , or <i>Bacillus subtilis</i> .	[28]

				plant, <i>Rhizophora stylosa</i> collected in Wenchang, Hainan Province, China		
157	Chrysogeside E	Glucocerebroside	Fungus <i>Penicillium chrysogenum</i> PXP-55	Isolated from roots of the mangrove plant, <i>Rhizophora stylosa</i> collected in Wenchang, Hainan Province, China	- No cytotoxicity against P388 and HeLa cells. - No antimicrobial activity against <i>S. aureus</i> , <i>E. coli</i> , <i>E. aerogenes</i> , or <i>Bacillus subtilis</i> .	[28]
158	LAMA-1	Glucocerebroside	Deep-sea sediment fungus <i>Penicillium chrysogenum</i>	Red Sea	Cytotoxic against (A-549), (DU-145), (MCF-7) and (HepG2), IC ₅₀ > 100 µM.	[29]
159	Penicilloside A	Glucocerebroside	Marine-derived fungus <i>Penicillium</i> sp.	Sharm El-Sheikh on the Egyptian Red Sea coast, Egypt.	- Antifungal activity against <i>Candida albicans</i> with inhibition zone of 23 mm. - Weak cytotoxic activity activity against HeLa cells.	[30]
160	Penicilloside B	Glucocerebroside	Marine-derived fungus <i>Penicillium</i> sp.	Sharm El-Sheikh on the Egyptian Red Sea coast, Egypt.	- Antifungal activity against <i>Candida albicans</i> with inhibition zone of 23 mm. - Weak cytotoxic activity activity against HeLa cells.	[30]
161	Asperiamide B	Glucocerebroside	Sea water-derived fungus <i>Aspergillus niger</i> (MF-16)	Sea water of Quanzhou Gulf, Fujian Province, China	No inhibitory activity against Tobacco Mosaic Virus (TMV) replication, at 0.2 mg/mL.	[31]
162	Asperiamide C	Glucocerebroside	Sea water-derived fungus <i>Aspergillus niger</i> (MF-16)	Sea water of Quanzhou Gulf, Fujian Province,	No inhibitory activity against Tobacco Mosaic Virus (TMV) replication, at 0.2 mg/mL.	[31]

				China		
163	Flavuside A	Glucocerebroside	Marine-derived fungus <i>Aspergillus flavus</i> , isolated from the edible green algae, <i>Codium fragile</i>	Algae collected in GeoMun Island, Yeosu, Korea	Antibacterial activity against methicillin-resistant <i>S. aureus</i> and multidrug-resistant <i>S. aureus</i> with MIC values of 15.6 µg/mL and 31.2 µg/mL, respectively.	[32]
164	Flavuside B	Glucocerebroside	Marine-derived fungus <i>Aspergillus flavus</i> , isolated from the edible green algae, <i>Codium fragile</i>	Algae collected in GeoMun Island, Yeosu, Korea	Antibacterial activity against methicillin-resistant <i>S. aureus</i> and multidrug-resistant <i>S. aureus</i> with MIC values of 15.6 µg/mL and 31.2 µg/mL, respectively.	[32]
165	Alternaroside A	Glucocerebroside	Sediment-derived fungus <i>Alternaria raphani</i>	Sediment from Hongdao sea salt, Qingdao, China	- Weak antimicrobial activity against <i>E. coli</i>, <i>Bacillus subtilis</i>, and <i>Candida albicans</i> with MIC values ranging from 70 to 400 µM. - No cytotoxicity against P388, A-549, BEL-7402, and HL-60 cells. - No radical scavenging activity.	[33]
166	Alternaroside B	Glucocerebroside	Sediment-derived fungus <i>Alternaria raphani</i>	Sediment from Hongdao sea salt, Qingdao, China	- Weak antimicrobial activity against <i>E. coli</i>, <i>Bacillus subtilis</i>, and <i>Candida albicans</i> with MIC values ranging from 70 to 400 µM. - No cytotoxicity against P388, A-549, BEL-7402, and HL-60 cells. - No radical scavenging activity.	[33]
167	Alternaroside C	Glucocerebroside	Sediment-derived	Sediment from	- Weak antimicrobial activity against <i>E.</i>	[33]

		cerebroside	fungus <i>Alternaria raphani</i>	Hongdao sea salt, Qingdao, China	<i>coli</i> , <i>Bacillus subtilis</i> , and <i>Candida albicans</i> with MIC values ranging from 70 to 400 μM. - No cytotoxicity against P388, A-549, BEL- 7402, and HL-60 cells. - No radical scavenging activity.	
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