Review

Isolation and Potential Biological Applications of Haloaryl Secondary Metabolites from Macroalgae

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Table S1. Haloaryl secondary metabolites isolated from macroalgae and biological activities.

Secondary Metabolite	Specie/Family	Biological Activity
Red Alga (Phylo Rhodophyta)		
Family: Cystocloniaceae		
1–14	*Rhodophyllis membranaceae* [5]	Cytotoxic and antifungal activity [5] (**1**) IC_{50} = 38 μM (HL-60) IC_{50} = 69 μM (S. *cerevisiae)* (**2**, **5**, **7–10**, **12–14**) IC_{50} > 10 μM (similar for both activities tested) (**3**) IC_{50} = 78 μM (HL-60) IC_{50} = >83 μM (S. *cerevisiae*) (**4**) IC_{50} = 61 μM (HL-60) IC_{50} = 63 μM (S. *cerevisiae*) (**6**) IC_{50} = 28 μM (HL-60) IC_{50} = 23 μM (S. *cerevisiae*) (**11**) IC_{50} = 49 μM (HL-60) IC_{50} = 39 μM (S. *cerevisiae*)
Family: Halymeniaceae		
15	*Grateloupia elliptica* [6]	α-glucosidase inhibitory activity [6] IC_{50} = 60.3 μM (*S. cerevisiae* α-glucosidase) IC_{50} = 130.3 μM (*B. stearoyhermophilus* α-glucosidase) IC_{50} = 4.2 mM and 5.0 mM (rat intestinal sucrase and maltase)
16	*Grateloupia elliptica* [6]	α-glucosidase inhibitory activity [6] IC_{50} = 110.4 μM (*S. cerevisiae* α-glucosidase) IC_{50} = 230.3 μM (*B. stearoyhermophilus* α-glucosidase)

		IC_{50} = 3.6 mM and 4.8 mM (rat intestinal sucrase and maltase)
17. BDDE	*Polyopes lancifolia* [7]	α-glucosidase inhibitory activity [7] IC_{50} = 0.098 and 0.120 μM (*S. cerevisiae* and *B. stearothermophilus*) IC_{50} = 1.00 and 1.20 mM (rat intestinal sucrase and maltase) Antifungal activity [14] % inhibition = 80.0 ± 7.2; 77.1 ± 5.3; 75.0 ± 8.5; 67.7 ± 5.9 (*V. mali, F. graminearum, C. diplodiella* and *C. gloeosporioides)* Antitumor activity [16] IC_{50} = 13.9 μg/mL (K562) Anti-angiogenesis (HUVEC) [13]
	Family: Lithothamniaceae	
18. Lithothamnin A	*Lithothamnion fragilissimum* [17]	Antitumor activity [17] IC_{50} = 9.5 μM (LOX) IC_{50} = 7.6 μM (SNB-19) IC_{50} = 7.6 μM (OVCAR-3) IC_{50} = 19.0 μM (COLO-205) IC_{50} = 19.0 μM (MOLT-4)
	Family: *Rhodomelaceae*	
	***Callophycus* genus**	
19–22	*Callophycus sp.* [3]	----
	***Laurencia* genus**	
23–26	(**23–26**) *Laurencia brongniartii* [18] (**24–26**) *Laurencia decumbens* [20] (**24**, **25**) *Laurencia similis* [19] (**24–26**) *Laurencia complanata* [21] (**23**) *Laurencia sp.* [22]	Antitumor activity (L1210)[18] ID_{50} of 3.6 μg/mL (**25**) Antimicrobial activity for *B. subtillus* and *S. cerevisiae* at 100 μg [18] (Ø inhibition = 16mm and 14mm respectively) (**25**) Antibacterial activity [22] MIC = 300 μg/mL (*Staphylococcus sp.*) (**24**) Antimicrobial activity [21] Ø inhibition = 11mm; 12mm; 12mm and 8.5 mm (*B. cereus*, *S. aureus*, *S. pneumoniae* and *C. albicans*) (**25**)
27–30	(**27–29**) *Laurencia similis* [19]	----

	(**30**) *Laurencia decumbens* [20]	
31–33	*Laurencia brongniartii* [23,24]	----
34–39	*Laurencia brongniartii* [23]	----
40	*Laurencia brongniartii* [23]	----
41–43	*Laurencia brongniartii* [23]	
44–49	*Laurencia brongniartii* [23]	----
50	*Laurencia brongniartii* [24]	----
51, **52**	*Laurencia brongniartii* [24]	Cytotoxic against [24] (**51**) HT-29 and P-388 cell lines (**52**) P-388 cell line
53	*Laurencia similis* [25]	----
54. Cupalaurenol	*Laurencia sp.* [22]	Antibacterial activity [22] MIC = 125, 125, 125 and 200 μg/mL (*S. aureus*, *Staphylococcus sp.*, *Salmonella sp.* and *V. cholerae*)
55. Laurinterol	*Laurencia okamurai* [26] *Laurencia microcladia* [27] *Laurencia tristicha* [28]	Antitumor activity [27] IC_{50} = 128.3 μM (K562) IC_{50} = 67.2 μM (MC7) IC_{50} =76.6 μM (PC3) IC_{50} = 83.9 μM (HeLa) IC_{50} = 74.6 μM (A431) IC_{50} = 165.8 μM (CHO)
56. Isolaurinterol	*Laurencia okamurai* [26] *Laurencia tristicha* [28]	----
57. Dibromophenol **58. Neolaurinterol**	(**57**, **58**) *Laurencia okamurai* [26] (**57**) *Laurencia tristicha* [28]	----
59. Aplysin **60. Aplysinol** **61**	(**59–61**) *Laurencia okamurai* [26] (**60**) *Laurencia tristicha* [28]	----
62	*Laurencia okamurai* [26]	----
63. Allolaurinterol	*Laurencia okamurai* [26]	----
64–66	*Laurencia okamurai* [26]	----
67. Bromolaurenisol	*Laurencia microcladia* [27]	Antitumor activity [27] IC_{50} = 112.7 μM (K562) IC_{50} = 78.3 μM (MC7)

		IC_{50} =92.4 μM (PC3) IC_{50} = 105.8 μM (HeLa) IC_{50} = 81.6 μM (A431) IC_{50} = > 200 μM (CHO)
68	*Laurencia tristicha* [28]	-----
69	*Laurencia tristicha* [28]	-----
70	*Laurencia microcladia* [27] *Laurencia tristicha* [28]	Antitumor activity [27] IC_{50} = 153.5 μM (A549)
71	*Laurencia sp.* [29]	----
72–74	*Laurencia similis* [30]	PTP1B inhibitory activity [30] IC_{50} = 102 μg/mL (**72**) IC_{50} = 65.3 μg/mL (**73**) IC_{50} = 69.8 μg/mL (**74**)
5	*Laurencia similis* [30]	PTP1B inhibitory activity [30] IC_{50} = 2.66 μg/mL
76	*Laurencia similis* [30]	PTP1B inhibitory activity [30] IC_{50} = 2.97 μg/mL
	***Odonthalia* genus**	
17. BDDE	*Odonthalia corymbifera* [8]	Inhibition of yeast α-glucosidase reaction [8] IC_{50} = 0.098 μM
77. Lanosol	*Odonthalia corymbifera* [8]	α-glucosidase inhibitory activity [31] IC_{50} = 89 μM (yeast α-glucosidase) IC_{50} = 2.4 and 2.5 mM (rat- intestinal sucrase and maltase) Antimicrobial activity (ICL inhibitors) [32] IC_{50} = 92.6 ± 5.8 μM
78-80	*Odonthalia corymbifera* [31]	α-glucosidase inhibitory activity [31] IC_{50} = 25 μM (yeast α-glucosidase) (**78**) IC_{50} = 3.5 and 3.1 mM (rat intestinal sucrase and maltase α-glucosidase) (**78**) IC_{50} = 53 μM (yeast α-glucosidase) (**79**)
81	*Odonthalia corymbifera* [31]	α-glucosidase inhibitory activity [31] IC_{50} = 170 μM (yeast α-glucosidase)

		Antimicrobial activity (ICL inhibitors) [32] IC_{50} = 125.6 ± 8.6 μM
82	*Odonthalia corymbifera* [32]	Antimicrobial activity (ICL inhibitors) [32] IC_{50} = 116.1 ± 7.3 μM
83, **84**	*Odonthalia corymbifera* [32]	Antimicrobial activity (ICL inhibitors) [32] (**83**) IC_{50} = 2.1 ± 0.1 μM (**84**) IC_{50} = 2.8 ± 0.2 μM
85. BDDPM	*Odonthalia corymbifera* [32]	Antimicrobial activity (ICL inhibitor) [32] IC_{50} = 2.0±0.1 μM
86. Odonthadione	*Odonthalia corymbifera* [33]	DPPH and ABTS radical scavenging activity [33] EC_{50} = 24.7 μM (DPPH) EC_{50} = 17.3 μM (ABTS) Tyrosinase inhibition [33] IC_{50} = 17.3 μM
87. Odonthalol	*Odonthalia corymbifera* [33]	DPPH and ABTS radical scavenging activity [33] EC_{50} = 13.5 μM (DPPH) EC_{50} =6.7 μM (ABTS) Tyrosinase inhibition [33] IC_{50} = 31.0 μM
	***Osmundaria* genus**	
77. Lanosol	*Osmundaria colensoi* [34]	---
81	*Osmundaria colensoi* [34]	Antibacterial activity (*Mycobacterium smegmatis*) [34] IC_{50} = 7.8 μM
88. Colensolide A	*Osmundaria colensoi* [34]	----
89	*Osmundaria colensoi* [34]	----
90	*Osmundaria colensoi* [34]	Antibacterial activity (*Mycobacterium smegmatis*) [34] IC_{50} = 26.2 μM Antitumor activity [34] IC_{50} = 8.0 μM (HL-60)
91. Rhodomelol	*Osmundaria colensoi* [34]	Antibacterial activity (*Mycobacterium smegmatis*) [34] IC_{50} = 28.1 μM
	***Polysiphonia* genus**	
77. Lanosol	*Polysiphonia lanosa* [35]	Antitumor activity [35]

		IC_{50} = 18.3 ± 0.94 μM (DLD-1) and 20.4 ± 2.9 μM (HCT-116)
81	*Polysiphonia lanosa* [35]	Antitumor activity [35] IC_{50} = 14.6 ± 3.1 μM (DLD-1) and 14.1 ± 2.5 μM (HCT-116)
89	*Polysiphonia lanosa* [35]	Antitumor activity [35] IC_{50} = 30.9 ± 2.7 μM (DLD-1)
92, **93**	*Polysiphonia morrowii* [31]	α-glucosidase inhibitory activity [31] IC_{50}= 100 μM (yeast α-glucosidase) (**92**) IC_{50} = 3.6 and 4.8 mM (rat intestinal sucrase and maltase α-glucosidase) (**92**) IC_{50} = > 1000 μM (yeast α-glucosidase) (**93**)
94, **95**	*Polysiphonia lanosa* [35]	Antitumor activity [35] (**94**) IC_{50} = 13.5 ± 2.3 μM (DLD-1) and 2.51 ± 0.95 μM (HCT-116) (**95**) IC_{50} = 12.4 ± 1.1 μM (DLD-1) and 1.32 ± 0.3 μM (HCT-116)
96	*Polysiphonia urceolata* [36]	DPPH radical scavenging activity [36] IC_{50} = 16.11 ± 0.06 μM
97	*Polysiphonia urceolata* [36]	DPPH radical scavenging activity [36] IC_{50} = 21.90 ± 0.1 μM
98	*Polysiphonia urceolata* [36]	DPPH radical scavenging activity [36] IC_{50} = 9.67 ± 0.04 μM
99, **100**	*Polysiphonia urceolata* [37]	DPPH radical scavenging activity [37] IC_{50} = 6.8 μM (**99**) IC_{50} = 6.1 μM (**100**)
101	*Polysiphonia urceolata* [37]	DPPH radical scavenging activity [37] IC_{50} = 8.1 μM
102. Urceolatin	*Polysiphonia urceolata* [38]	DPPH radical scavenging activity [38] IC_{50}=7.9 μM
103	*Polysiphonia urceolata* [36]	DPPH radical scavenging activity [36] IC_{50} = 19.64 ± 0.09 μM
104. Urceolatol	*Polysiphonia urceolata* [37]	DPPH radical scavenging activity [37] IC_{50} = 15.1 μM
105, **106**	(**105**, **106**) *Polysiphonia urceolata* [37] (**106**) *Polysiphonia morrowii* [41]	DPPH radical scavenging activity [37] IC_{50} = 20.3 μM (**105**) IC_{50} = 35.8 μM (**106**) Antiviral activity [41]

		(**106**) EC_{50} = 45.0 ± 9.1 μM (IHNV) and 57.0 ± 10.6 μM (IPNV)
107. (±) Polysiphenol	*Polysiphonia ferulacea* [39]	------
108	*Polysiphonia morrowii* [41]	Antiviral activity [41] EC_{50} = 27.0 ± 6.3 μM (IHNV) and 22.0 ± 0.6 μM (IPNV)
	***Rhodomela* genus**	
17. BDDE	*Rhodomela confervoides* [9]	DPPH and ABTS radicals scavenging activity [11] IC_{50} = 17.61 ± 0.08 μM (DPPH) TEAC = 3.05 ± 0.13 nM (ABTS) Antibacterial activity [15] MIC = 35 μg/mL (*Staphylcoccus epidermidis* ATCC12228) MIC = 70 μg/mL (*Staphylcoccus aureus* ATCC29213, *Staphylcoccus aureus* 02-60, *Pseudomonas aeruginosa* ATCC27853 and *Pseudomonas aeruginosa* 02-29) MIC = 140 μg/mL (*Staphylcoccus epidermidis* 02-4 and *Escherichia coli* ATCC25922) MIC < 140 μg/mL (*Escherichia coli* 02-26) PTP1B inhibitory activity [12] IC_{50} = 1.5 μmol/mL Antitumor activity [42] IC_{50} = 4.19 μg/mL (KB) IC_{50} = 7.94 μg/mL (Bel 7402) IC_{50} = > 10 μg/mL (A549) IC_{50} = 7.41 μg/mL (HELF)
77. Lanosol	*Rhodomela confervoides* [9,45]	DPPH and ABTS radical scavenging activity [45] IC_{50} = 42.33 ± 0.25 μM (DPPH) TEAC = 1.56 ± 0.02 mM (ABTS)
81	*Rhodomela confervoides* [9,45]	DPPH and ABTS radical scavenging activity [45] IC_{50} = 40.50 ± 0.20 μM (DPPH) TEAC = 1.62 ± 0.03 mM (ABTS)
83	*Rhodomela confervoides* [45]	DPPH and ABTS radical scavenging activity [45] IC_{50} = 32.01 ± 0.12 μM TEAC = 1.09 ± 0.01 mM

		DPPH and ABTS radical scavenging activity [11] IC_{50} = 14.32 ± 0.12 μM (DPPH) TEAC = 3.00 ± 0.13 mM (ABTS) Antibacterial activity [15] MIC = 70 μg/mL (*S. aureus* ATCC29213, Staphylcoccus aureus 02-60, Staphylcoccus epidermidis ATCC12228 and Staphylcoccus epidermidis 02-4)
84	*Rhodomela confervoides* [9]	DPPH and ABTS radical scavenging activity [11] (**84**) IC_{50} = 19.60 ± 0.11 μM (DPPH) TEAC = 3.16 ± 0.14 mM (ABTS)
85. BDDPM	*Rhodomela confervoides* [9]	DPPH and ABTS radical scavenging activity [11] IC_{50} = 16.91 ± 0.10 μM TEAC = 3.18 ± 0.13 mM PTP1B inhibitory activity [12] IC_{50} = 2.4 μmol/L Antibacterial activity [15] MIC = 140 μg/mL (S. aureus ATCC29213, *S. aureus* 02-60, *S. epidermidis* ATCC12228, *S. epidermidis 02-4, Escherichia coli ATCC25922, P. aeruginosa* ATCC27853 and *Pseudomonas aeruginosa* 02-29*)* Antitumor activity [44] IC_{50} = 17.63 μg/mL (HeLa) IC_{50} = 11.37 μg/mL (RKO) IC_{50} = 10.58 μg/mL (HCT-116) IC_{50} = 8.7 μg/mL (Bel 7402) IC_{50} = 23.69 μg/mL (U87) IC_{50} = 30.15 μg/mL (HUVEC)
90	*Rhodomela confervoides* [45]	DPPH and ABTS radical scavenging activity [45] IC_{50} = 7.62 ± 0.01 μM (DPPH) TEAC = 3.45 ± 0.12 mM (ABTS)
92	*Rhodomela confervoides* [45]	----
94	*Rhodomela confervoides* [45]	DPPH and ABTS radical scavenging activity [45] IC_{50} = 38.42 ± 0.23 μM

		TEAC = 1.36 ± 0.01 mM
109,110. BPN	*Rhodomela confervoides* [9]	Antibacterial activity [15] (**109**) MIC = 140 μg/mL (*S. aureus* ATCC29213, *S. aureus* 02-60 and *S. epidermidis* ATCC12228 MIC < 140 μg/mL (*E. coli* ATCC25922 and *P. aeruginosa* ATCC27853 Antibacterial activity [15] (**110**) MIC = 70 μg/mL (*S. aureus* ATCC29213) MIC = 140 μg/mL (*S. aureus* 02-60, *S. epidermidis* ATCC12228, *S. epidermidis 02-4 and Escherichia coli ATCC25922*) DPPH and ABTS radical scavenging activity [11] (**110**) IC_{50} = 13.81 ± 0.08 μM (DPPH) TEAC = 2.78 ± 0.12 mM (ABTS) PTP1B inhibitory activity [12] (**110**) IC_{50} = 0.84 μM
111	*Rhodomela confervoides* [9]	----
112–114	(**112**) *Rhodomela confervoides* [9] (**112–114**) *Rhodomela confervoides* [42]	Antitumor activity [42] (**112**) IC_{50} = 3.09 μg/mL (KB) IC_{50} = 3.18 μg/mL (Bel 7402) IC_{50} = 3.54 μg/mL (A549) IC_{50} = 6.39 μg/mL (HELF) (**113**) IC_{50} = 6.26 μg/mL (KB) IC_{50} = 3.33 μg/mL (Bel 7402) IC_{50} = 7.08 μg/mL (A549) IC_{50} = 2.65 μg/mL (HELF) (**114**) IC_{50} = 8.71 μg/mL (KB) IC_{50} = 5.36 μg/mL (Bel 7402)

		IC_{50} = 7.56 μg/mL (A549) IC_{50} = > 10 μg/mL (HELF)
115	*Rhodomela confervoides* [43]	----
116	*Rhodomela confervoides* [43]	----
117	*Rhodomela confervoides* [43]	----
118	*Rhodomela confervoides* [43]	----
119–121	*Rhodomela confervoides* [43,45]	Antitumor activity [43] (**119**) IC_{50} = 19.7 μM (A549) IC_{50} = 19.9 μM (A2780) IC_{50} = 19.4 μM (Bel7402) IC_{50} = 20.2 μM (BGC-823) IC_{50} = 15.4 μM (HCT-8) (**120**) IC_{50} = 14.7 μM (A549) IC_{50} = 9.4 μM (A2780) IC_{50} = 14.8μM (Bel7402) IC_{50} = 24.0 μM (BGC-823) IC_{50} = 14.6 μM (HCT-8) (**121**) IC_{50} = 18.5 μM (A549) IC_{50} = 20.8 μM (A2780) IC_{50} = 20.4 μM (Bel7402) IC_{50} = 19.1μM (BGC-823) IC_{50} = 18.8 μM (HCT-8) DPPH and ABTS radical scavenging activity [45] (**119**) IC_{50} = 30.91 ± 0.12 μM (DPPH) TEAC = 1.98 ± 0.01 mM (ABTS)
122	*Rhodomela confervoides* [43]	Antitumor activity [43] IC_{50} = 14.5 μM (A549) IC_{50} = > 16.9 μM (A2780) IC_{50} = 13.5 μM (Bel7402) IC_{50} = 15.1 μM (BGC-823)

		IC_{50} = 12.1 μM (HCT-8)
123. BDB	*Rhodomela confervoides* [11,12]	DPPH and ABTS radical scavenging activity [11] IC_{50} = 8.90 ± 0.04 μM (DPPH) TEAC = 3.58 ± 0.13 mM (ABTS) PTP1B inhibitory activity[12,61] IC_{50} = 1.7 μmol/L
124	*Rhodomela confervoides* [45]	DPPH and ABTS radical scavenging activity [45] IC_{50} = 7.43 ± 0.10 μM (DPPH) TEAC = 2.11 ± 0.04 mM (ABTS)
125–132	*Rhodomela confervoides* [45]	DPPH and ABTS radical scavenging activity [45] (**125**) IC_{50} = 20.47 ± 0.07 μM (DPPH) TEAC = 1.87 ± 0.02 mM (ABTS) (**126**) IC_{50} = 19.84 ± 0.06 μM (DPPH) TEAC = 2.87 ± 0.11 mM (ABTS) (**127**) IC_{50} = 50.58 ± 0.23 μM (DPPH) TEAC = 1.60 ± 0.04 mM (ABTS) (**128**) IC_{50} = 26.28 ± 0.21 μM (DPPH) TEAC = 2.35 ± 0.02 mM (ABTS) (**129**) IC_{50} = 30.24 ± 0.20 μM (DPPH) TEAC = 2.07 ± 0.12 mM (ABTS) (**130**) IC_{50} = 58.15 ± 0.39 μM (DPPH) TEAC = 1.32 ± 0.02 mM (ABTS) (**131**) IC_{50} = 9.52 ± 0.04 μM (DPPH) TEAC = 2.06 ± 0.08 mM (ABTS) (**132**) IC_{50} = 50.31 ± 0.34 μM (DPPH)

		TEAC = 1.86 ± 0.02 mM (ABTS)
133	*Rhodomela confervoides* [45]	DPPH and ABTS radical scavenging activity [45] IC_{50} = 8.72 ± 0.05 μM (DPPH) TEAC = 3.68 ± 0.12 mM (ABTS)
134, **135**	*Rhodomela confervoides* [45]	DPPH and ABTS radical scavenging activity [45] (**134**) IC_{50} = 18.62 ± 0.08 μM (DPPH) TEAC = 2.11 ± 0.11 mM (ABTS) (**135**) IC_{50} = 50.87 ± 0.32 μM (DPPH) TEAC = 1.63 ± 0.01 mM (ABTS)
136	*Rhodomela confervoides* [11]	DPPH and ABTS radicals scavenging activity [11] IC_{50} = 13.60 ± 0.03 μM (DPPH) TEAC = 3.21 ± 0.13 mM (ABTS)
137–139	*Rhodomela confervoides* [11]	DPPH and ABTS radicals scavenging activity [11] (**137**) IC_{50} = 15.90 ± 0.09 μM (DPPH) TEAC = 2.68 ± 0.11 mM (ABTS) (**138**) IC_{50} = 18.50 ± 0.18 μM (DPPH) TEAC = 2.21 ± 0.12 mM (ABTS) (**139**) IC_{50} = 5.22 ± 0.04 μM (DPPH) TEAC = 2.87 ± 0.10 mM (ABTS)
140, **141**	*Rhodomela confervoides* [11]	DPPH and ABTS radicals scavenging activity [11] (**140**) IC_{50} = 5.43 ± 0.02 μM (DPPH) TEAC = 2.31 ± 0.11 mM (ABTS) (**141**) IC_{50} = 5.70 ± 0.03 μM (DPPH) TEAC = 2.14 ± 0.08 mM (ABTS)
142, **143**	*Rhodomela confervoides* [11]	DPPH and ABTS radicals scavenging activity [11] (**142**) IC_{50} = 23.60 ± 0.10 μM (DPPH)

		TEAC = 2.11 ± 0.04 mM (ABTS) (**143**) IC_{50} = 20.81 ± 0.08 μM (DPPH) TEAC = 2.36 ± 0.08 mM (ABTS)
	***Symphyocladia* genus**	
81	*Symphyocladia latiuscula* [48]	PTP1B inhibitory activity [48] IC_{50} = 39.0 ± 4.0 μmol/l
144	*Symphyocladia latiuscula* [31,49]	α-glucosidase inhibitory activity [31] IC_{50} = 11 μM (yeast α-glucosidase) IC_{50} = 4.2 mM and > 5.0 mM (rat intestinal sucrase and maltase) DPPH radical scavenging activity [49] IC_{50} = 7.5 μM
145, **146**	*Symphyocladia latiuscula* [31,47,50]	α-glucosidase inhibitory activity [31] IC_{50} = 0.030 μM (yeast α-glucosidase) (**145**) IC_{50} = 2.4 mM and 3.2 mM (rat intestinal sucrase and maltase) (**145**) Aldose inhibitory activity [47] IC_{50} = 0.40 μg/mL (**145**) IC_{50} = 0.40 μg/mL (**146**) DPPH radical scavenging activity [50] (**145**) IC_{50} = 8.1 μM PTP1B inhibitory activity [48] (**145**) IC_{50} = 4.3 ± 0.1 μmol/L
147	*Symphyocladia latiuscula* [47]	Aldose inhibitory activity [47] IC_{50} = 0.11 μmol/mL
148	*Symphyocladia latiuscula* [48]	DPPH radical scavenging activity [50] IC_{50} = 10.2 μM PTP1B inhibitory activity [48] IC_{50} = 3.5 ± 0.2 μmol/L
149–**151**	*Symphyocladia latiuscula* [47,48]	Aldose inhibitory activity [47] (**150**) IC_{50} = 1.15 μg/mL

		(**151**) IC_{50} = 0.25 μg/mL DPPH radical scavenging activity [50] (**149**) IC_{50} = 8.5 μM (**150**) IC_{50} = 14.0 μM (**151**) IC_{50} = 24.7 μM PTP1B inhibitory activity [48] (**149**) IC_{50} = 3.9 ± 0.2 μmol/L
152	*Symphocladia latiuscula* [48]	PTP1B inhibitory activity [48] IC_{50} = > 50 μmol/L
153	*Symphocladia latiuscula* [48,50]	DPPH radical scavenging activity [50] IC_{50} = 18.5 μM PTP1B inhibitory activity [48] IC_{50} = 25.6 ± 4.8 μmol/L
154	*Symphyocladia latiuscula* [50]	DPPH radical scavenging activity [50] IC_{50} = 24.0 μM
155	*Symphyocladia latiuscula* [49]	DPPH radical scavenging activity [49] IC_{50} = 8.5 μM
156	*Symphyocladia latiuscula* [31,50]	DPPH radical scavenging activity [50] IC_{50} = 10.5 μM Antifungal Activity [51] MIC = 12.5 μg/mL (*C. albicans*)
157	*Symphyocladia latiuscula* [47]	DPPH radical scavenging activity [50] IC_{50} = 24.0 μM
158	*Symphyocladia latiuscula* [46]	DPPH radical scavenging activity [46] IC_{50} = 14.5 μg/mL
159	*Symphyocladia latiuscula* [46]	DPPH radical scavenging activity [46] IC_{50} = 20.5 μg/mL
160	*Symphyocladia latiuscula* [51]	Antifungal Activity [51]

		MIC = > 100 μg/mL (*C. albicans*)
161, 162	*Symphyocladia latiuscula* [51]	Antifungal activity [51] (**161**) MIC = > 100 μg/mL (*C. albicans*) (**162**) MIC = 25 μg/mL (*C. albicans*)
163	*Symphyocladia latiuscula* [52]	Antifungal activity [52] MIC = 37.5 μg/mL (*C. albicans*)
164. SL-1 **165. SL-2**	*Symphyocladia latiuscula* [53]	(**164-165**) Inhibitor of Taq DNA polymerase activity [53]
	***Vidalia* genus**	
166. Vidalol A	*Vidalia obtusaloba* [54]	Anti-inflammatory activity [54] (inhibition of phospholipase A_2)
167. Vidalol B	*Vidalia obtusaloba* [54]	Anti-inflammatory activity [54] (inhibition of phospholipase A_2)
	Brown Alga (Phylo Phaeophyta)	
	Family: Chordariaceae	
17. BDDE	*Leathesia nana* [10]	Antitumor activity [10] IC_{50} = 0.0054 μM/mL (A549) IC_{50} = 0.0180 μM/mL (BGC-823) IC_{50} = 0.0046 μM/mL (MCF-7) IC_{50} = 0.0074 μM/mL (Bel7402) IC_{50} = 0.0059 μM/mL (HCT-8)
77. Lanosol	*Leathesia nana* [10]	----
81	*Leathesia nana* [10]	----
83	*Leathesia nana* [10]	Antitumor activity [10] IC_{50} = > 0.0195 μM/mL (A549) IC_{50} = 0.0086 μM/mL (BGC-823) IC_{50} = 0.00214 μM/mL (MCF-7) IC_{50} = > 0.0019 μM/mL (Bel 7402) IC_{50} = > 0.0207 μM/mL (HCT-8) Antitumor activity [56] IC_{50} = > 10 μg/mL (A549)

		IC_{50} = 4.42 μg/mL (BGC-823) IC_{50} = 9.0 μg/mL (MCF-8) IC_{50} = 7.88 μg/mL (B16-L16) IC_{50} = 5.28 μg/mL (HT-1080) IC_{50} = > 10 μg/mL (A2780) IC_{50} = > 10 μg/mL (Bel7402) IC_{50} = 9.64 μg/mL (HCT-8)
85. BDDPM	*Leathesia nana* [10]	Antitumor activity [10] IC_{50} = 0.0018 μM/mL (A549) IC_{50} = 0.0038 μM/mL (BGC-823) IC_{50} = 0.0027 μM/mL (MCF-7) IC_{50} = > 0.0182 μM/mL (Bel 7402) IC_{50} = > 0.0022 μM/mL (HCT-8)
89	*Leathesia nana* [10]	----
94	*Leathesia nana* [10]	-----
110. BPN	*Leathesia nana* [10]	Antitumor activity [10] IC_{50} = > 0.0190 μM/mL (A549) IC_{50} = 0.0046 μM/mL (BGC-823) IC_{50} = 0.0034 μM/mL (MCF-7) IC_{50} = 0.0055 μM/mL (Bel 7402) IC_{50} = 0.0028 μM/mL (HCT-8) Antitumor activity [56] IC_{50} = > 10 μg/mL (A549) IC_{50} = 2.40 μg/mL (BGC-823) IC_{50} = 1.81 μg/mL (MCF-8) IC_{50} = 1.75 μg/mL (B16-L16) IC_{50} = 3.81 μg/mL (HT-1080) IC_{50} = 3.76 μg/mL (A2780) IC_{50} = 2.97 μg/mL (Bel7402) IC_{50} = 1.46 μg/mL (HCT-8) Moderate inhibitory activity against protein tyrosine kinase (PTK) [56]
168	*Leathesia nana* [10]	----

169	*Leathesia nana* [10]	----
170	*Leathesia nana* [10]	Antitumor activity [10] IC_{50} = 0.0025 μM/mL (A549) IC_{50} = 0.0088 μM/mL (BGC-823) IC_{50} = 0.0027 μM/mL (MCF-7) IC_{50} = 0.0048 μM/mL (Bel 7402) IC_{50} = > 0.0168 μM/mL (HCT-8) Antitumor activity [56] IC_{50} = 1.49 μg/mL (A549) IC_{50} = 5.21 μg/mL (BGC-823) IC_{50} = 3.46 μg/mL (MCF-8) IC_{50} = 4.25 μg/mL (B16-L16) IC_{50} = 3.84 μg/mL (HT-1080) IC_{50} = 1.58 μg/mL (A2780) IC_{50} = 2.83 μg/mL (Bel7402) IC_{50} = > 10 μg/mL (HCT-8) Moderate inhibitory activity against protein tyrosine kinase (PTK) [56]
171	*Leathesia nana* [10]	----
172	*Leathesia nana* [10]	Antitumor activity [56] IC_{50} = > 10 μg/mL (A549, BGC-823, B16-L16, A2780, Bel7402 and HCT-8) IC_{50} = 8.27 μg/mL (MCF-8) IC_{50} = 6.36 μg/mL (HT-1080) Moderate inhibitory activity against protein tyrosine kinase (PTK) [56]
173	*Leathesia nana* [10]	----
174	*Leathesia nana* [10]	----
175	*Leathesia nana* [10]	----
176–178	*Leathesia nana* [10]	----
	Family: Dictyotaceae	
179	*Stypopodium flabeliforme* [57]	----
	Green Alga (Phylo *Clorophyta*)	
	Family: Cladophoraceae	
180	*Chaetomorpha bariretorsa* [58]	-----

Family: Dichotomosiphonaceae		
181. Avrainvilleol	*Avrainvillea nigricans* [60]	Antimicrobial activity [60] Ø inhibition = 10 mm at 25 μg; 12 mm at 50 μg and 14 mm at 100 μg for *Bacillus subtillus* Ø inhibition = 9 mm at 200 μg for *Serratia marcesens* Ø inhibition = 10 mm at 25 μg; 12 mm = 50 μg; 16 mm = 100 μg for *Staphylococcus aureus* Antitumor activity (KB) [60] ID_{50} = 10-100 μg/mL
182. 5'-Hydroxyisoavrainvilleol	*Avrainvillea nigricans* [60]	Antimicrobial activity[60] Ø inhibition = 9 mm at 25 μg; 10 mm at 50 μg and 11 mm at 100 μg for *Bacillus subtillus* Ø inhibition = 10 mm at 100 μg for *Staphylococcus aureus*
183	*Avrainvillea nigricans* [60]	Antitumor activity (KB) [60] ID_{50} = 8.9 μg/mL Antimicrobial activity [60] Ø inhibition = 8 mm at 25 μg; 10 mm at 50 μg and 12 mm at 100 μg for *Bacillus subtillus* Ø inhibition = 8 mm at 25 μg; 11 mm at 50 μg and 13 mm at 100 μg for *Staphylococcus aureus* Ø inhibition = 8 mm at 100 μg; 9 mm = 200 μg for *Pseudomonas aeruginosa* Ø inhibition = 10 mm at 200 μg for *Escherichia coli* Ø inhibition = 9 mm at 100 μg; 13 mm = 200 μg for *Serratia marcesens* Ø inhibition = 8 mm at 200 μg for *Candida albicans*
184. Rawsonol	*Avrainvillea rawsoni* [59]	HMG-CoA reductase inhibitory activity [59] IC_{50} = 5 μM