

Supplementary materials

Recent Advances in Anti-Inflammatory Compounds from Marine Microorganisms

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Table S1. Recently reported marine microbial natural products with anti-inflammatory activity (January 2021 through December 2023)

Compounds	Producing Strains	Sources	Anti-inflammatory activity	Ref.
epiremisporines D–E (1–2)	<i>Penicillium citrinum</i> BCRC 09F458	waste water	fMLP-induced superoxide anion generation (human neutrophils)	[24, 25]
epiremisporine G (3)			IC ₅₀ : 6.4 ± 0.4 (1), 8.3 ± 0.3 (2), 31.7 ± 2.5 (3), 33.5 ± 0.4 (4), 3.6 ± 0.6 (5), 2.7 ± 0.1 (6)	
penicitrinone H (4)				
epiremisporine B (5)				
penicitrinone A (6)			μM	
epitetrahydrotrichodimer ether (7)	<i>Penicillium</i> sp. DM 815	the rhizosphere soil of <i>Hibiscus tiliaceus</i> Linn	LPS-induced the iNOS protein expression	[26]
tetrahydrotrichodimerol (8)				
4-carboxy-5-((1Z,3E)-1,3-heptadien1-yl)-1,3-benzenediol (9)	<i>Penicillium</i> sp. TW58-16	hydrothermal vent sediment	LPS-induced NO production (RAW 264.7)	[27]
decempyrone C (10)	<i>Fusarium decemcellulare</i>	seawater	LPS-induced NO production	[28]

decempyrone J (11)	SYSU-MS 6716		(RAW 264.7) IC ₅₀ : 22.4 ± 1.8 (10), 21.7 ± 1.1 (11) μM	
heterocornol T (12)	<i>Pestalotiopsis heterocornis</i>	the sponge <i>Phakellia fusca</i>	LPS-induced the iNOS protein expression	[29]
heterocornol X (13)	XWS 03F09			
fusarin K (14)	<i>Fusarium solani</i> 7227	seawater	LPS-induced NO production (RAW 264.7) IC ₅₀ : 21.9 ± 9.8 (14) μM	[30]
penicilazaphilone D (15)			LPS-induced NO production (BV2)	
penicilazaphilones F–G (16–17)	<i>Penicillium sclerotiorum</i> E23Y-1A	sponge	IC ₅₀ : 34.8 ± 1.9 (15), 31.7 ± 1.5 (16), 34.5 ± 1.4 (17), 25.3 ± 2.2 (18) μM	[31]
hypocrellone A (18)				
saccharothrixin G (19)	<i>Saccharothrix</i> sp. D09	sediment	inhibited the production of NO IC ₅₀ : 28 (19) μM	[32]
(+)-terrein (20)		the pneumatophores of mangrove plant <i>Acanthus ilicifolius</i>	exhibited IL-6 and TNF-α inhibition activity IC ₅₀ : 8.5 ± 0.7 (20) (IL-6), 15.8 ± 0.2 (20) (TNF-α), 12.0 ± 0.9 (21) (IL-6), 43.3 ± 0.8 μM (21) (TNF-α)	[33]
butyrolactone I (21)	<i>Aspergillus flavipes</i> (MTCC 5220)			
butyrolactone I (21)	<i>Aspergillus terreus</i> MT 273950	the annelide <i>Spirorbis</i> sp.	inhibited the release of neutrophil elastase IC ₅₀ : 2.3 ± 0.3 (21) μM	[34]
8a- <i>epi</i> -hypocrellone A (22)			inhibited the TNF-α-induced NF-κB phosphorylation	
hypocrellone A (23)	<i>Penicillium sclerotiorum</i> AI-27	alga <i>Grateloupia</i> sp.	IC ₅₀ : 20 (22–24) μM	[35]
isochromophilone IV (24)				
isochromophilone IV (24)	<i>Penicillium sclerotiorum</i> THSH-4 with <i>Penicillium sclerotiorum</i> ZJHJJ-18	a fresh flower of the marine mangrove <i>Aegiceras corniculatum</i>	LPS-induced NO production IC ₅₀ : 4.7–17.6 μM	[36]
WB (25)				
5,9-dihydroxy-2,4,6,8,10-pentamethyldodeca-	<i>Aspergillus ochraceopetalif</i>	the alga <i>Hypnea pannosa</i>	LPS-induced NO production (RAW 264.7)	[37]

2,6,10-trienal (26)	<i>ormis</i> SCSIO			
	41020			
(3 <i>R</i> , 4 <i>S</i>) -(-)-4-hydroxymellein (27)				
(3 <i>R</i> , 4 <i>R</i>) -(-)-4-hydroxymellein (28)				
12-deacetylphomoxanthone A (29)				
phomoxanthone A–B (30–31)	<i>Diaporthe</i> sp. SYSU-MS	the ascidian <i>Styela plicata</i>	LPS-induced NO production (RAW 264.7)	[38]
dicerandrol B–C (32–33)	4722		IC ₅₀ : 6.3–8.0 (29–34) μ M	
deacetylphomoxanthone B (34)				
trypacidin (35)	<i>Talaromyces helicus</i> SCSIO	a cold seep sediment	LPS-induced NO production (BV2)	[39]
fumiquinone B (36)	41311		IC ₅₀ : 38.6 (35), 15.5 (36) μ M	
(4 <i>S</i>)-4,10-dihydroxy-10-methyl-11-oxo-dodec-2-en-1,4-olide (37)				
(4 <i>S</i>)-4,10-dihydroxy-10-methyl-undec-2-en-1,4-Olide (38)				
(4 <i>S</i>)-4,10-dihydroxy-10-methyl-dodec-2-en-1, 4-olide (39)				
(4 <i>S</i> ,10 <i>R</i> ,11 <i>S</i>)-4,11-dihydroxy-10-methyl-dodec-2-en-1,4-olide (40)	<i>Streptomyces</i> sp. 13G036	the marine sediment	inhibited the production of NO, TNF- α and IL-6 in LPS-stimulated macrophages	[40]
(4 <i>S</i>)-4-hydroxy-10-methyl-11-oxo-dodec-2-en-1,4-olide (41)				
(4 <i>S</i> ,10 <i>S</i> ,11 <i>S</i>)-4,10,11-trihydroxy-10-methyl-dodec-2-en-1,4-olide (42)				
aspulvinone V (43)	<i>Aspergillus terreus</i> Thom	alga <i>Ulva lactuca</i> L.	LPS-induced NO production	[41]
(+)-terrein (20)				

butyrolactone I (21)	(Trichocoma ceae) strain NTU243		(BV2)	
saadamysin (44)	<i>Aspergillus flavus</i> GXIMD 02503	a coral <i>Porites lutea</i>	inhibitory activities of NF- κB activation IC ₅₀ : 10.7 ± 1.3 (44) μM	[42]
pestaloketide A (45)	<i>Pestalotiopsis</i> sp. SWMU- WZ04-2	the sponge	LPS-induced NO production IC ₅₀ : 23.6 (45), 14.5 (46) μM	[43]
isorhodoptilometrin (47)	<i>Penicillium</i> <i>oxalicum</i> CLC-MF05	marine sponge	inhibited NO and PGE ₂ overproduction and iNOS and COX-2 overexpression in both LPS-stimulated BV2 and rat primary microglia	[44]
5-hydroxy-7-(2'- hydroxypropyl)-2- methyl-chromone (48)				
penicillixanthone A (49)	<i>Aspergillus Sclerotiorum</i> SCSIO 41036	a soft coral BH6	LPS-induced NO production	[45]
streptoglycerides E- H (50–53)	<i>Streptomyces specialis</i> 208DD-067	a sediment sample	LPS-induced NO production (RAW 264.7) IC ₅₀ : 10.9 (50), 5.9 (51), 4.7 (52), 3.5 (53) μM	[46]
eschscholein B (54)	<i>Daldinia eschschooltzii</i> KBJYZ-1	the root of <i>Pluchea indica</i> Less.	LPS-induced NO production (RAW 264.7) IC ₅₀ : 19.3 (54), 12.9 (55) μM	[47]
daldilene A (55)				
amphichopyrones A- B (56–57)	<i>Amphichorda felina</i> SYSU- MS 7908	a marine ascidian	LPS-induced NO production (RAW 264.7) IC ₅₀ : 18.09 ± 4.83 (56), 7.18 ± 0.93 (57) μM	[48]
nectriapyrone (58)	<i>Diaporthe</i> sp. SYSU-MS 4722	the ascidian	LPS-induced NO production IC ₅₀ : 35.4 (58), 40.8 (59) μM	[49]
monodictyphenone (59)				
aspergillusidone H (60)	<i>Aspergillus unguis</i>	a coral <i>Pocillopora damicornis</i>	LPS-induced NF-κB activation (RAW 264.7)	[50]
aspergillusether J				

(61)	GXIMD 02505				
aspergillus ether F					
(62)					
nornidulin (63)					
aspergillus idone B					
(64)					
guisinol (65)					
1-(2,6-dihydroxy-4-methoxy-3,5-dimethylphenyl)-2-methylbutan-1-one					
(66)					
4,8-dihydroxy-6-methoxy-4,5-dimethyl-3-methyleneisochroman-1-one (67)	<i>Eutypella scoparia</i> HBU-91	collected from the Bohai Sea	LPS-induced NO production (RAW 264.7)	[51]	
banksialactone A (68)	<i>Streptomyces massiliensis</i> 213DD-128	a sediment sample	suppressed the production of NO, PGE ₂ , and pro-inflammatory cytokines such as TNF- α , IL-6, and IL-1 β , by inhibiting the TLR-mediated NF- κ B	[52]	
streptinone (69)					
lithocarol F (70)					
isoprenylisobenzofuran A (71)					
anhydromevalonolactone (72)					
stagonospones A–B (73–74)	<i>Phomopsis lithocarpus</i> FS 508	a deep-sea sediment sample	LPS-induced NO production (RAW 264.7) IC ₅₀ : 22.8 (70), 27.2 (71), 24.1 (72) μ M	[53]	
stapyrone E (75)					
stapyrone G (76)					
stagonospora A–B (73–74)					
stapyrone E (75)					
stapyrone G (76)	<i>Stagonospora</i> sp. SYSU-MS 7888	a sponge	LPS-induced NO production IC ₅₀ : 3.6 \pm 1.0 (73), 9.4 \pm 1.8 (74), 21.9 \pm 3.5 (75), 22.8 \pm 3.9 (76) μ M	[54]	
penicilazaphilone N (77)					
chlomophenol A (78)					
7-chloro-3,4-dihydro-6,8-dihydroxy-3-					
	<i>Penicillium sclerotiorum</i> E23Y-1A	the marine sponge <i>Holoxea</i> sp.	LPS-induced NO production IC ₅₀ : 22.6 \pm 3.0 (77) μ M	[55]	
	<i>Amorosia</i> sp. SCSIO 41026	the leaf of <i>Avicennia marina</i> (Forsk.)	possessed inhibitory effects against the excessive production of NO and pro-	[56]	

methylocoumarin (79)			inflammatory cytokines in LPS-challenged RAW 264.7 macrophages	
α -acetylornitin (80)				
(S)-5,7-dichloro-6- methoxy-2-methyl- 2,3- dihydrobenzofuran- 4-carboxylic acid (81)				
5-chloro-6- hydroxymellein (82)				
3-methyl-6-hydroxy- 8-methoxy-3,4- dihydroisocoumarin (83)				
kojic acid (84)				
orsaldehydins A–B (85–86)				
ethyl orsellinate (87)				
5-chlororsellinic acid (88)	<i>Acremonium</i>		LPS-induced NF- κ B activation (RAW 264.7)	[57]
ornitin (89)	<i>sclerotigenum</i>	coral-derived		
O-methylornitin (90)	GXIMD			
aryl bromide (91)	02501			
ethyl 4- hydroxyphenylacetat e (92)				
necatriatone C (93)				
diaporphochromanone s B–C (94–95)	<i>Diaporthe</i> sp. XW12–1	the mangroves	LPS-induced NO production IC ₅₀ : 19.1 \pm 3.6 (94), 9.6 \pm 0.2 (95) μ M	[58]
streptothricin E (96)		a rhizosphere sediment of		
S-methyl (4R,5S)-2,3- dimethyl-4- hydroxy- 4- isopropyl-1- oxocyclopent-3-ene- 5-carboxylate (97)	<i>Streptomyces</i> sp. DS-27	coastal cordgrass <i>Spartina</i> <i>alterniflora</i>	LPS-induced NO production	[59]
suncheonins E–F (98–99)	<i>Streptomyces</i>	a sediment	inhibited LPS-induced NO production	[60]
suncheonin J (100)	sp. ZSN 77	sample		

S-Methyl 4-hydroxy-6-isopropyl-2-methoxy-3,5-dimethylbenzothioate (101)				
S-methyl 2,4-dihydroxy-6-isopropyl-3,5-dimethylbenzothioate (102)				
(4S,5S,6S,7R)-4-(3-chloro-1,2-dihydroxybutyl)-butyrolactone (103)	<i>Neofusicoccum parvum</i> Y2NBKZG 1016	the fruits of the mangrove plant <i>Sonneratia glauca</i>	LPS-induced NO production	[61]
talacyanol B (104)	<i>Talaromyces cyanescens</i> 168	the seaweed <i>Caulerpa</i> sp.	inhibited NO production and LPS-induced expression of COX-2 and iNOS in BV2 cells	[62]
eurothiocin A (105)	ST-51.1			
asperpropanols A–D (106–109)				
2,4-dihydroxy-6-((3E,5E)-nona-3,5-dien-1-yl)-benzoic acid (110)	<i>Aspergillus puniceus</i> SRRC 2155	the deep-sea sediment	reduced NO, TNF- α , and IL-6 production	[63]
5-[(3E,5E)-3,5-nonadienyl]-1,3-benzenediol (111)				
chiayiflavans D–E (112–113)	<i>Isoptericola chiayiensis</i> BCRC 16888	mangrove soil	LPS-induced NO production (RAW 264.7) IC ₅₀ : 17.1 (112), 9.4 (113) μ M	[64]
diaporpyrone A (114)	<i>Diaporthe</i> sp. QYM12	the mangrove	LPS-induced NO production (RAW 264.7) IC ₅₀ : 12.5 (114) μ M	[65]
alternariol (115)	<i>Pleosporales</i> sp. SF-7343	moss	inhibited the secretion of interleukin-8 and -6 in TNF- α /interferon- γ -treated HaCaT cells	[66]
guhypoxylnol A (116)		the mangrove	against the production of NO	[67]

guhypoxytonols C–D (117–118)	<i>Aspergillus</i> sp. GXNU- Y45		IC ₅₀ : 14.4 ± 0.1 (116), 18.0 ± 0.1 (117), 16.7 ± 0.2 (118), and 21.1 ± 0.1 (119) μM	
hypoxytonol B (119)				
homogentisic acid (120)				
methyl (2,5- dihydroxyphenyl) acetate (121)	<i>Aspergillus</i> sp. IMBC- FP2.05	the marine sponge	against NO overproduction IC ₅₀ : 28.2 (120), 14.2 (121), 41.8 (122) μM	[68]
3-chloro-2,5- dihydroxybenzyl alcohol (122)				
penicillol B (123)	<i>Penicillium</i> sp. BJR-P2	the mangrove	LPS-induced NO production (RAW 264.7) IC ₅₀ : 12.0 (123) μM	[69]
bisorbicillchaetone B (124)	<i>Penicillium</i> sp. SCSIO06868	sediment	LPS-induced NO production (RAW 264.7) IC ₅₀ : 38.4 ± 3.3 (124) μM	[70]
ochrathinols A–B (125–126)	<i>Aspergillus</i> <i>ochraceopetalif</i> <i>ormis</i> SCSIO 05702	soil	LPS-induced NO production (RAW 264.7)	[71]
(3 <i>R</i> *,4 <i>S</i> *)-6,8- dihydroxy-3,4,7- trimethylisocouma- rin (127)	<i>Penicillium</i> citrinum W17	sediment	LPS-induced NO production (BV2)	[72]
sclerotinin C (128)				
asperbiphenyl (129)				
spiromaterpenes D–F (130–132)	<i>Spiromastix</i> sp. MCCC 3A00308	deep-sea sediment	LPS-induced NO production (BV2) IC ₅₀ : 26.0 ± 2 (130), 9.0 ± 1 (131), 20.0 ± 1 (132) μM	[73]
decumbenone A (133)	<i>Aspergillus</i> <i>austroafricanu</i> <i>s</i> Y32-2	seawater	sulfate-induced zebrafish inflammation model	[74]
paraconulones B–E (134–137)	<i>Paraconiothyri</i> <i>um</i> <i>sporulosum</i>	coastal sediment	LPS-induced NO production (BV2)	[75]
paraconulone G (138)	DL-16		IC ₅₀ : 6.9 ± 2.6 (134), 7.7 ±	

4- <i>epi</i> - microsphaeropsisin (139)			2.0 (135), 2.8 ± 0.5 (136), 8.1 ± 2.9 (137), 8.1 ± 3.5 (138), 4.6 ± 3.5 (139) µM	
eutypeterpenes B–C (140–141)			LPS-induced NO production (RAW 264.7)	
eutypeterpenes M–N (142–143)				
eutypeterpenes P–Q (144–145)	<i>Eutypella</i> sp. MCCC 3A00281	deep-sea sediment	IC ₅₀ : 13.4 ± 0.8 (140), 16.8 ± 1.0 (141), 11.8 ± 1.0 (142), 8.6 ± 1.0 (143), 14.3 ± 1.1 (144), 11.5 ± 1.2 (145), 18.3 ± 1.0 (146), 17.1 ± 1.0 (147) µM	[76]
eudesma-3-en-11,15- diol (146)				
eudesma-4-en-11,15- diol (147)				
nigerin (148)			LPS-induced NO production (RAW 264.7)	
ochracene J (149)	<i>Aspergillus</i> <i>niger</i> 164117	marine sponge <i>Dysidea</i> sp.	IC ₅₀ : 8.5 (148), 4.6 (149) µM	[77]
(2 <i>R</i> ,4 <i>R</i> ,5 <i>S</i> ,5 <i>aR</i> ,7 <i>R</i> ,9 <i>aS</i> ,10 <i>S</i>)-10- (hydroxymethyl)- 5,5 <i>a</i> ,8-trimethyl- 3,4,5,5 <i>a</i> ,6,7- hexahydro-2,5- methanobenzo[<i>b</i>]oxe pine-4,7,9 <i>a</i> ,10(2 <i>H</i>)- tetraol (150)				
(2 <i>S</i> ,2' <i>R</i> ,4' <i>R</i> ,5' <i>S</i> ,5 <i>a'R</i> ,9 <i>a</i> ' <i>R</i>)-8'- (hydroxymethyl)- 5',5 <i>a'</i> -dimethyl- 2',3',4',5',5 <i>a'</i> ,6',7',9 <i>a'</i> - octahydrospiro[oxira ne-2,10'- [2,5]methanobenzo[<i>b</i>]oxepin]-4'-ol (151)	<i>Trichoderma</i> <i>brevicompactum</i> NTU 439	<i>M. rosea</i> marine alga	LPS-induced NO production IC ₅₀ : 10 (150), 10 (151), 10 (152), 10 (153), 10 (154), 5.2 ± 0.4 (155), 10 (156) µM	[78]
2 <i>S</i> ,2' <i>R</i> ,4' <i>R</i> ,5' <i>S</i> ,5 <i>a'R</i> ,9 <i>a'</i> <i>R</i>)-8'- (hydroxymethyl)- 5',5 <i>a'</i> - dimethyldecahydros piro[oxirane-2,10'- [2,5] methanobenzo[<i>b</i>]oxe pin]-4'-ol (152)				

trichoderminol (153)				
trichodermarin A (154)				
trichodermarin E (155)				
trichodermol (156)				
ustusolates H–I (157–158)	<i>Aspergillus insuetus</i> SYSU 6925	a seagrass-derived	LPS-induced NO production (RAW 264.7) IC ₅₀ : 21.5 ± 1.1 (157), 32.6 ± 1.2 (158) μM	[79]
hazianol J (159)	<i>Trichoderma</i> sp. SCSIOW 21	the deep-sea sediment-derived	LPS-induced NO production (RAW 264.7)	[80]
libertellenone Z (160)	<i>Eutypella</i> sp. D-1	the soil	LPS-induced NO production (RAW 264.7)	[81]
libertellenone A (161)				
libertellenone C (162)				
peniscmeroterpenoid A (163)	<i>Penicillium sclerotiorum</i> GZU-XW03-2	the intestinal tract of the <i>Onchidium</i> sp.	LPS-induced NO production (RAW 264.7) IC ₅₀ : 26.6 ± 1.2 (163), 8.8 ± 1.2 (164), 48.1 ± 2.5 (165) μM	[82, 83]
peniscmeroterpenoid D (164)				
peniscmeroterpenoid L (165)				
soyasapogenols B1–B11 (166–176)	<i>Nonomuraea</i> sp. MYH522	a marine actinomycete	suppressing the STING/TBK1/NF-κB pathway	[84]
decurencylic B (177)	<i>Turbinaria decurrens</i>	the algae	against COX-2 and 5-lipoxygenase IC ₅₀ : 14.0 (COX-2), 3.0(5-lipoxygenase)μM	[85]
aspermeroterpenes D–H (178–182)	<i>Aspergillus terreus</i> GZU-31-1	the intestinal tract of the <i>Onchidium</i> sp.	LPS-induced NO production (RAW 264.7) IC ₅₀ : 6.7 ± 0.8 (178), 29.6 ± 3.9 (179), 22.2 ± 0.9 (180), 25.9 ± 3.1 (181), 26.5 ± 1.0 (182) μM	[86]
aspechinulins B–C (183–184)	<i>Aspergillus</i> sp. FS 445	the deep-sea sediment	effected in LPS-induced mouse macrophages RAW 264.7. IC ₅₀ : 20.0–90.0 (183–188) μM	[87]
isoechinulins A–B (185–186)				
neoechinulin B (187)				
cryptoechinuline G				

(188)				
peniazaphilone A (189)	<i>Penicillium sclerotiorum</i> THSH-4	a fresh flower of the marine	LPS-induced NO production	[36]
isochromophilone VI (190)	with <i>Penicillium sclerotiorum</i> ZJHJJ-18	mangrove <i>Aegiceras corniculatum</i>	IC ₅₀ : 4.7–17.6 (189–190) μM	
fumigaclavine C (191)				
isotryptoquivaline F (192)				
fumiquinazoline F (193)				
12,13- dihydroxyfumitremor- gin C (194)	<i>Talaromyces helicus</i> SCSIO 41311	a cold seep sediment	LPS-induced NO production (BV2)	[39]
cyclotryprostatin B (195)			IC ₅₀ : 23.5 (191), 26.5 (192), 21.4 (193), 25.0 (194), 29.6 (195), 9.7 (196), 32.4 (197), 32.2 (198) μM	
azaspirofurane A (196)				
14-norpseurotin A (197)				
11-O- methylpseurotin A (198)				
asperorydine Q (199)				
asperorydine O (200)	<i>Aspergillus flavus</i> GXIMD 02503	a coral <i>Porites lutea</i>	inhibitory activities of NF- κB activation	[42]
asperorydine J (201)			IC ₅₀ : 14.1 ± 1.5 (199), 21.8 ± 1.9 (200), 8.6 ± 1.3 (201), 17.4 ± 1.7 (202), 11.3 ± 2.0 (203), 6.5 ± 1.4 (204) μM	
speradine H (202)				
cyclopiamide A (203)				
pyrazinemethanol (204)				
terreusinones B–C (205–206)	<i>Aspergillus tamaraii</i> MCCF102	a marine sponge sample	inhibited NO production in a dose-dependent manner	[88]
terreusinone (207)				
phenazostatin J (208)	<i>Cystobasidium laryngis</i> IV17-028	a deep sea sediment	LPS-induced NO production (BV2) IC ₅₀ : 0.3 (208) μM	[89]
lecanicilliumins A–B (209–210)	<i>Lecanicillium fusisporum</i>	sample sediment	against NF-κB production using LPS	[90]

lecanicilliumins E–G (211–213)	GXIMD 00542		induced RAW 264.7 cells (RAW 264.7) IC ₅₀ : 18.5 ± 1.2 (209), 25.8 ± 1.3 (210), 23.1 ± 1.3 (211), 24.7 ± 1.2 (212), 26.5 ± 1.1 (213) µM	
marinacarboline glucuronide (214)	<i>Actinoalloteic hus cyanogriseus</i> LHW 52806	the marine sponge <i>Phakellia fusca</i>	decreased the expressions of IL-6	[91]
marinacarboline L (215)				
cyanogramide (216)				
benzomalvin E (217)	<i>Metarhizium</i> sp. P2100	seawater	LPS-induced NO production IC ₅₀ : 37.1 (217), 37.5 (218) µM	[92]
methylviridicatin (218)				
sclerotiamide J (219)	<i>Aspergillus sclerotiorum</i> LZDX-33-4	a gorgonian coral (LZDX- 33)	inhibited NLRP3 inflammasome activation and blocked NLRP3 inflammasome-induced pyroptosis <i>via</i> amelioration of mitochondria damage	[93]
(+)-asperazepanone B (220)	<i>Aspergillus candidus</i> (CHNSCLM- 0393)	the gorgonian coral-derived	inhibited LPS-induced expression of TNF- α and IL-6 displayed anti- inflammatory activity in a CuSO ₄ -induced zebrafish	[94]
cyclopenol (221)	<i>Aspergillus</i> <i>austroafricanus</i>	seawater	inflammation model induced human monocyte cell line (THP-1)	[74]
cyclopenin (222)				
viridicatol (223)	Y32-2			
asperthrin A (224)	strain <i>Aspergillus</i> sp. YJ191021	sample soil		[95]
oxaline (225)	<i>Penicillium oxalicum</i> CLC-MF 05	marine sponge	inhibited NO and PGE ₂ overproduction and iNOS and COX-2 overexpression in both LPS-stimulated BV2 and rat primary microglia	[44]
<i>epi</i> -aszonalenin A (226)	<i>Aspergillus</i> <i>terreus</i> C23-3	the coral <i>Pectinia paeonia</i>	ox-LDL-induced inflammatory factors (IL-6, IL-1 β , and TNF- α)	[96]
aszonalenin (227)				
cyclo (N ⁸ -(α , α -	<i>Penicillium</i>	hydrothermal	LPS-induced production	[97]

dimethylallyl)-L-Trp-L-Trp) (228)	sp. LSH-3-1	vents sediment	of pro-inflammatory mediators, including NO, IL-6 and TNF- α	
meleag (229)	<i>Penicillium chrysogenum</i> strain S003	deep-sea sediment	modulated the Nrf-2/HO-1 cascade, downregulated NF- κ B, TLR4 and TNF- α gene expressions and lowered IL-6 and IFN- γ levels	[98]
undecatetraenoate (230)				
methyl (2E,3E,5E,7E,9E)-11-((3aS,6S,6aR)-3a,6-dihydroxy-5-oxohexahydro-2H-furo[3,2-b] pyrrol-6-yl)-2-ethylidene-11-hydroxy-4,10-dimethylundeca-3,5,7,9-tetraenoate (231)	<i>Fusarium solani</i> 7227	seawater	LPS-induced NO production (RAW 264.7) IC ₅₀ : 32.2 \pm 5.7 (230), 17.8 \pm 4.9 (231), 7.6 \pm 2.0 (232), 3.6 \pm 2.2 (233), 8.4 \pm 2.2 (234) μ M	[30]
4Z-lucilactaene (232)				
8Z-lucilactaene (233)				
lucilactaene (234)				
variotin B (235)	<i>Aspergillus unguis</i> IV17-109	a deep-sea shrimp sample	inhibited the production of NO and the expression of iNOS and IL-6 IC ₅₀ : 20.0 (235) μ M	[99]
hortacerebrosides A–B (236–237)	<i>Hortaea werneckii</i> HN-YPG-2-5	the surface of sponges	LPS-induced NO production (RAW 264.7) IC ₅₀ : 7.0 (236), 5.0 (237) μ M	[100]
methyl acetyl-D-valyl-D-phenylalaninate (238)	<i>Penicillium</i> sp. LSH-3-1	hydrothermal vents sediment	LPS-induced production of pro-inflammatory mediators, including NO, IL-6 and TNF- α	[97]
anteiso-C13-surfactin (IA-1) (239)	<i>Bacillus amyloliquefaciens</i> strain IA-LB	marine sediment	by decreasing neutrophil infiltration, reducing elastase release and oxidative stress in endotoxemic mice	[101]

flavuside B (240)	<i>Penicillium islandicum</i>	the sediment	treated of HaCaT cells with LPS	[102]
GKK1032 B (241)	<i>Penicillium citrinum</i> W17	the sediment	LPS-induced NO production (BV2) IC ₅₀ : 4.7 (241) μ M	[72]
arthriniumsteroids A–D (242–245)	<i>Simplicillium</i>	soft coral <i>Sinularia</i> sp.	LPS-induced NO production (RAW 264.7)	[103]
penicildione B (246)	<i>lanosoniveum</i>			
ganodermaside D (247)	SCSIO 41212			
ergosterol peroxide (248)	<i>Penicillium levitum</i> N33.2	the leaf of seagrass <i>Enhalus acoroides</i>	inhibited of NO production in RAW 264.7 macrophages (RAW 264.7)	[104]
aspersterols B–D (249–251)	<i>Aspergillus unguis</i> IV17-109	shrimp sample	LPS-induced NO production IC ₅₀ : 19.5 \pm 1.2 (249), 11.6 \pm 1.6 (250), 14.5 \pm 1.5 (251) μ M	[105]
(22 <i>E</i> , 24 <i>R</i>)- ergosta-5,7,22-trien-3 β -ol (252)	<i>Amorosia</i> sp. SCSIO 41026	the leaf of <i>Avicennia marina</i>	LPS-induced NO production (RAW 264.7)	[56]