

Supporting Information

Tricyclic Sesquiterpenes from Marine Origin

Franck LE BIDEAU,^{*§} Mohammad KOUSARA,^{‡§} Li CHEN,[§] Lai WEI[§] and Françoise DUMAS^{*§}

[§] BioCIS, Faculty of Pharmacy, Université Paris-Sud, CNRS, Université Paris-Saclay, 92290,
Châtenay-Malabry, France

[‡] Faculty of Pharmacy, Al Andalus University, Tartus, Al Qadmus, P.O.Box 101, Syria

* These authors contributed equally to the work

Email: francoise.dumas@u-psud.fr

Table S1	S2
Figure S1	S18
Figure S2	S19

Table S1. Non halogenated and halogenated carbocyclic sesquiterpenes with their biological testing sorted by marine organisms

Organism	Location	Products NH	Products H	Skeleton type	Biological evaluation	Reference ^a
Marine invertebrates						
Sponges						
<i>Acanthella acuta</i>	Mediterranean sea, Banyuls, France	(-)- 188 (-)- 189 190*		Aromadendrane Aromadendrane Aromadendrane	T to fish non-T to fish non-T to fish	203 204 178,204
<i>Acanthella acuta</i>	Bay of Napoli	(-)- 188 (-)- 189		Aromadendrane Aromadendrane		205 205
<i>Acanthella cavernosa</i>	Hachijo-jima Island, Japan	(+)- 113 (+)- 192 (+)- 193 (-)- 194		Aristolane Alloaromadendrane Aromadendrane Aromadendrane	T to <i>Balanus amphitrite</i> larvae T to <i>Balanus amphitrite</i> larvae T to <i>Balanus amphitrite</i> larvae	126 126 214 126
<i>Acanthella cavernosa</i>	Heron Island, Great Barrier Reef, Australia	(+)- 128		Maaliane		144
<i>Acanthella cavernosa</i>	Eastern coastline of Australia+-	(-)- 188 (-)- 189 190* (-)- 194 (-)- 197		Aromadendrane Aromadendrane Aromadendrane Aromadendrane Alloaromadendrane		213 213 213 213 213
<i>Acanthella pulcherrima</i>	Weed Reef, Darwin, Australia	(-)- 128 (-)- 197		Maaliane Alloaromadendrane		139 139
<i>Acanthella</i> sp	Graham Islands, British Columbia, Northeastern Pacific	(+)- 127 (+)- 129		Maaliane Maaliane		138 138
<i>Acanthella</i> sp	Ximao Island, Hainan, China	(-)- 128 (+)- 192 (-)- 197 (+)- 199		Maaliane Alloaromadendrane Alloaromadendrane Alloaromadendrane		140 140 140 140
<i>Acanthella</i> sp	Yalong Bay, Hainan, China	(+)- 192		Alloaromadendrane	CTX (A549)	212
<i>Axinella cannabina</i>	Bay of Tarento, southern Italy	(-)- 124 (-)- 125 (+)- 126		Maaliane Maaliane Maaliane		136 136 136
<i>Axinella cannabina</i>	Bay of Tarento, southern Italy	(-)- 196 (-)- 197 198*		<i>Allo</i> -aromadendrane <i>Allo</i> -aromadendrane <i>Allo</i> -aromadendrane		211 211 211
<i>Axinyssa aculeata</i>	Pramuka Island, Indonesia	230 231		Pupukeanane Pupukeanane		237 237

<i>Axinyssa aplysinoides</i>	Ant Atoll, Pohnpei, Federated States of Micronesia	(-)- 88 (-)- 189 (+)- 227 (-)- 233		Cubebane Alloaromadendrane Pupukeanane Neopupukeanane		95 95 95 95
<i>Axinyssa aplysinoides</i>	Palau	(+)- 220 (-)- 221 (-)- 222		Trachyopsane Trachyopsane Trachyopsane		229,230 229,230 229,230
<i>Axinyssa isabela</i>	Isla Isabel, Gulf of California, Mexico	(+)- 114 (+)- 115 (+)- 116 (-)- 117 (+)- 118		Aristolane Aristolane Aristolane Aristolane Aristolane		130 130 130 130 130
<i>Axinyssa</i> sp.	One Tree or Heron Islands, Great Barrier Reef, Australia	(-)- 128 (-)- 224 (-)- 232 (-)- 233		Maaliane Pupukeanane Pupukeanane Pupukeanane		141 141 141 141
<i>Axinyssa</i> sp.	Tsushima Island, Japan	(-)- 128 (-)- 189 (-)- 197		Maaliane Aromadendrane Alloaromadendrane		142 142 142
<i>Axinyssa</i> sp.	Gulf of California	(+)- 111 (-)- 128		Aristolane Maaliane		145 145
<i>Axinyssa</i> sp.	Heron island, Great Barrier Reef, Australia	(-)- 224 (-)- 232		Pupukeanane Pupukeanane		245,246 245,246
<i>Axinyssa</i> sp.	Gun beach, Guam	(+)- 234		Pupukeanane	Fail to deter feeding in fish	241
<i>Ciocalypta</i> sp.	Ala Moana, O'ahu island, Hawaii	225*		Pupukeanane		236
<i>Ciocalypta</i> sp.	O'ahu island, Hawaii	(+)- 236		Neopupukeanane		244
<i>Cymbastela hooperi</i>	Kelso reef, Great Barrier Reef, Australia	(-)- 1		Bourbonane	nCTX (KB), nAM	325
<i>Cymbastela hooperi</i>	Australia	(+)- 6		Kelsoane	CTX (HT-29, P-388), nCTX (KB)	30,325
<i>Epipolasis kushimotoensis</i>	Not described	(+)- 128 (+)- 130 (+)- 199 200*		Maaliane Maaliane Allo-aromadendrane Allo-aromadendrane	CTX (L1210) CTX (L1210),	143 143 143 143
<i>Eurypon</i> sp.	New Zealand	(-)- 273 (-)- 274 (-)- 275		Caryolane Caryolane Caryolane		272 272 272
<i>Eurypon</i> sp.	Mercury Islands, New Zealand	(-)- 273 (-)- 274		Caryolane Caryolane		273 273

		(-)-276 (-)-277 (-)-278		Caryolane Caryolane Caryolane		273 273 273
<i>Halichondria</i> sp.	Unten Port, Okinawa, Japan	(+)-185		Aromadendrane and eudesmane dimer		200
<i>Halichondria</i> sp.	Unten Port, Okinawa, Japan	(+)-187		Aromadendrane		202
<i>Halichondria</i> sp.	Thailand	(+)-195		Aromadendrane	Weak CTX (MDA-MB231, MOLT-3, HepG2, HeLa) No CTX (A549, HuCCA-1)	216
<i>Hymeniacion</i> sp	Pupukea, north shore of Oahu, Hawaii	(-)-224 225* (-)-226 (+)-227		Pupukeanane Pupukeanane Pupukeanane Pupukeanane	L to fish and crustaceans L to fish and crustaceans	233 234 235 235
<i>Phycopsis terpnis</i> (<i>Axinyssa terpnis</i>)	Okinawa, Japan	(-)-233 (-)-235		Neopupukeanane Neopupukeanane		242 242
<i>Stylissa</i> sp	Iriomote Island, Japan	(-)-87		Cubebane	Weak CTX (HeLa)	94
Corals						
<i>Alcyonium paessleri</i>	South Georgia Islands (antartic)	262* 263*		Paesslerane Paesslerane	mCTX (Human tumor cell lines) mCTX (Human tumor cell lines)	260,261 260
<i>Alertigorgia</i> sp.	Joseph Bonaparte Gulf, Northern Territories, Australia	(+)-253 (+)-261		Suberosane/Quadrane Suberosane/Quadrane	CTX (MCF7, A549, HOP-92, SF-295, SF539, SNB19, LOX, M14, MALME-31, OVCAR-3) wCTX (MCF7, A549, HOP-92, SF-295, SF539, SNB19, M14, MALME-31, OVCAR-3), nCTX (LOX)	258 258
<i>Capnella imbricata</i>	off Maluku, Leti Island, Indonesia	(-)-29 (+)-30 (+)-31 (+)-32 33* (+)-36		Capnellane Capnellane Capnellane Capnellane Capnellane Capnellane	CTX (WiDr, K562, HeLa), wCTX (HT115, MCF7, HL-60), AI	51 52,53 54 54,55,58, 59 54 56
<i>Capnella imbricata</i>	Molucca Sea (Mayu Island)	(+)-32		Capnellane	CTX (K562,A2780), Weak	55

		(+)-34		Capnellane	CTX (MCF7, HT115, HL-60, G402)	55
		(+)-35		Capnellane	CTX (K562, G402), Non CTX (MCF7, HT115, G402), Weak CTX (HL-60)	55
<i>Capnella imbricata</i>	Green Island, Taiwan	(+)-32		Capnellane	AI (iNOS, COX-2)	61
		(+)-34		Capnellane	nAI (iNOS, COX-2)	61
		(-)-41		Capnellane	AI (iNOS, COX-2), AG (mouse)	61,326
		(+)-49		Capnellane	nAI (iNOS, COX-2)	61
		(+)-50		Capnellane	nAI (iNOS, COX-2)	61
		(+)-51		Capnellane	nAI (iNOS, COX-2)	61
		(+)-52		Capnellane	nAI (iNOS, COX-2)	61
		(+)-53		Capnellane	nAI (iNOS, COX-2)	61
		(+)-54		Capnellane	AI (iNOS)	61
<i>Capnella</i> sp.	Mantanani Island, Sabah, Malaysia	(+)-153		Aromadendrane		180
<i>Capnella</i> sp.	Green Island, Taiwan	(+)-32		Capnellane	CTX (WiDr, KB, HeLa)	59
<i>Clavularia inflata</i>	Laing Island, Papua-New Guinea	(-)-219		Sinularane		199
<i>Clavularia inflata</i> var. <i>luzoniana</i>	Green Island, Taiwan	(+)-160		Aromadendrane	Non CTX (P-388, HT29)	186,110
		(+)-161		Aromadendrane	Non CTX (P-388, HT29)	186
		(+)-162		Aromadendrane	Non CTX (P-388, HT29)	186
		(-)-326		Inflatane	Non CTX (P-388, HT29)	186
<i>Clavularia koellikeri</i>	Ishigaki Island, Okinawa, Japan	(+)-132		Maaliane		146
		(+)-133		Maaliane		146
<i>Clavularia koellikeri</i>	Okinawa, Japan	(+)-156		Aromadendrane		146
		(-)-157		Aromadendrane		146
<i>Clavularia koellikeri</i>	Papua New Guinea	(-)-184		Aromadendrane		199
<i>Cespitularia subviridis</i>	Ishigaki Island, Okinawa, Japan	(+)-167		Aromadendrane		179
<i>Cespitularia</i> sp	Orpheus Island, Townsville, Australia	(+)-79		Cubebane		86
<i>Cespitularia subviridis</i>	Albatros Rocks, Seychelles Islands	(+)-153		Aromadendrane		177,178
		(-)-154		Aromadendrane		179
		(+)-155		Aromadendrane		179
<i>Dendronephthya rubeola</i>	Bali, Indonesia	(+)-32		Capnellane	CTX (HeLa, L929)	58
		(-)-41		Capnellane	CTX (HeLa), wCTX (L929)	58
		(+)-45		Capnellane	nCTX (HeLa)	58
		(+)-46		Capnellane	nCTX (HeLa)	58

		(+)-47 (-)-48		Capnellane Capnellane	nCTX (HeLa) nCTX (HeLa)	58 58
<i>Dendronephthya</i> sp.	coast of Hurghada, Egypt	(-)-215 (-)-216 (-)-217		Ylangane Ylangane Ylangane	CTX (L5178Y) nCTX (HeLa) nCTX (HeLa) CTX (L5178Y) nCTX (HeLa)	227 227 227
<i>Echinogorgia pseudosassapo</i>	South China Sea	(-)-56		Subergorane/ Silphiperfolane		65
<i>Eunicea succinea</i>	St. Croix island (US) South Caicos island (UK)	(+)-211		Copaane		224
<i>Gersemia rubiformis</i>	Atlantic Ocean, New Foundland, Canada	(+)-85 (+)-86		Cubebane Cubebane		93 93
<i>Isis hippuris</i>	Green Island, Taiwan	(-)-56 (-)-254 (-)-255 (-)-256 (-)-257 (+)-258		Subergorane/ Silphiperfolane Suberosane/Quadrane Suberosane/Quadrane Suberosane/Quadrane Suberosane/Quadrane Suberosane/Quadrane	wCTX (P-388, A549) CTX (P-388, A549) CTX (P-388, A549) CTX (P-388, A549) CTX (P-388, A549) CTX (P-388, A549)	66 66 66 66 66 66
<i>Lemnalia humesi</i>	nd	(+)-120 (+)-121		Aristolane Aristolane		133 133
<i>Lemnalia africana</i>	Pohnpei, Micronesia	(-)-123		Aristolane		135
<i>Lemnalia africana</i>	Leti Island, Maluku, Indonesia	(+)-142		Africanane		154,155
<i>Lemnalia africana</i>	south Kenya	(-)-290		Lemnafricanane	T to brine shrimp	279
<i>Lemnalia cervicorni</i>	Green Island, Taiwan	(-)-206 (+)-208 (-)-209 (+)-210		Ylangane Ylangane Ylangane Ylangane	CTX (P-388, HT-29) No CTX (P-388, HT-29) No CTX (P-388, HT-29) No CTX (P-388, HT-29)	221 221 221 221
<i>Lemnalia flava</i>	Green Island, Taiwan	(-)-206 (-)-207 (+)-208		Ylangane Ylangane Ylangane	AI (iNOS, COX-2) AI (iNOS, COX-2) AI (iNOS, COX-2)	60 60 60
<i>Lemnalia philippinensis</i>	Lanyu, Taiwan	(-)-206 (-)-213 (+)-214		Ylangane Ylangane Ylangane	No CTX (MDA-MB-231, A549, HepG2), AI (iNOS, COX-2) wCTX (MDA-MB-231, A549, HepG2), n AI (iNOS, COX-2) nCTX (MDA-MB-231, A549, HepG2), AI (iNOS, COX-2)	223 223 223
<i>Lemnalia tenuis</i>	Okinawa, Japan	(-)-206		Ylangane		220

<i>Lobophytum pauciflorum</i>	Havlock Island, Indian Ocean	(+)-144		Africanane		167
<i>Lobophytum strictum</i>	Andaman and Nicobar islands	(+)-144		Africanane		168
<i>Melitodes squamata</i>	South China Sea	(-)-163		Aromadendrane		188
		(+)-164		Aromadendrane		188
		(+)-201		Aromadendrane		188
		(-)-202		Alloaromadendrane		188
<i>Menella</i> sp.	Meishan Island, South China Sea	(-)-56		Subergorane/ Silphiperfolane	CTX (HeLa)	67
		(-)-57		Subergorane/ Silphiperfolane		67,314
		(-)-58		Subergorane/ Silphiperfolane		67
		(-)-254		Suberosane/Quadrane		256
<i>Nephthea erecta</i>	Green Island, Taiwan	(+)-4		Bourbonane	nCTX (P-388, HT-29)	32
		(+)-5		Bourbonane	CTX (P-388, HT-29)	32
		(+)-6		Bourbonane	CTX (P-388, HT-29)	32
					nCTX (KB)	323
<i>Nephthea erecta</i>	Green Island, Taiwan	(-)-8		Kelsoane	CTX (P-388, HT-29)	38
		9		Kelsoane		38
<i>Nephthea erecta</i>	Green Island, Taiwan	(-)-111		Aristolane		116
<i>Nephthea chabrolii</i>	Pingtung County, Taiwan	(+)-111		Aristolane		117
<i>Nephthea chabrolii</i>	Sinyaru Island, Indonesia	(+)-158		Aromadendrane		184
<i>Nephthea</i> sp	Andaman and Nicobar group of islands, Indian Ocean	(-)-113		Aristolane		127
<i>Nephthea</i> sp.	Andaman and Nicobar Islands, Indian Ocean	(+)-158		Aromadendrane		184
		(+)-159		Aromadendrane		184
<i>Paralemnalia thyrsoides</i>	Green Island, Taiwan	(-)-141		Paralemnane	nCTX (KB, Daoy, Hepa59T/VGH, HeLa), AI (iNOS) nAI (COX-2)	153
		(-)-291		Isoparalemnane	nCTX (KB, Daoy, Hepa59T/VGH, HeLa), AI (iNOS, COX-2)	153
		(+)-292		Isoparalemnane	nCTX (KB, Daoy, Hepa59T/VGH, HeLa)), AI (iNOS, COX-2)	153
<i>Parerythropodium fulvum</i> <i>fulvum</i>	Gulf of Eilat, Red Sea	(-)-112		Aristolane		120
		(-)-180		Aromadendrane		120
<i>Parerythropodium fulvum</i>	Phantom Island, North Queensland,	176		Aromadendrane		196

	Australia	(-)- 178 179		Aromadendrane Aromadendrane		196 196
<i>Pseudopterogorgia americana</i> (<i>Antillologorgia americana</i>)	(Bermuda and Florida Keys)	(-)- 112 (+)- 113 (+)- 131		Aristolane Aristolane Maaliane		121 121 121
<i>Pseudopterogorgia rigida</i> (<i>Antillologorgia rigida</i>)	Caribbean Sea, USA	(+)- 268 (-)- 269		Cedrane Cedrane		269 269
<i>Pseudoplexaura porosa</i>	Bermuda	(+)- 84		Cubebane		91
<i>Rumphella antipathies</i>	Taiwan	(+)- 205		Norantipathane		218
<i>Rumphella antipathies</i>	Pingtung, Taiwan	(-)- 266		Rumphellane		266
<i>Rumphella antipathies</i>	Pingtung, Taiwan	(+)- 279		Isocaryolane	IM (elastase)	274
<i>Rumphella antipathies</i>	Southern coast, Taiwan	(-)- 283 (-)- 284 (-)- 285 (-)- 286 (+)- 287		Clovane Clovane Clovane Clovane Clovane	IM (elastase), nIM (O ₂ -) wIM (O ₂ -) IM (O ₂ -)	275 276,277 276 276 277
<i>Sarcophyton angulatum</i>	Ishigaki Island, Okinawa, Japan	(+)- 167		Alloaromadendrane		190
<i>Sarcophyton trocheliophorum</i>	Red Sea	(+)- 153		Aromadendrane	CTX (EAC)	181
<i>Sarcophyton glaucum</i>	Red Sea	(+)- 153		Aromadendrane		182
<i>Sinularia capillosa</i>	Sanya Bay, South China Sea	(+)- 144 (+)- 204		Africanane Capillosanane	CTX (EAC, DLAT)	160,159 160
<i>Sinularia conferta</i>	Andaman and Nicobar Islands	(+)- 144		Africanane		163
<i>Sinularia dissecta</i>	Madapam Coast, India	(+)- 144 (+)- 145 146 147 148		Africanane Africanane Africanane Africanane Africanane		171 172 173 173 173
<i>Sinularia erecta</i>	Gulf of Eliat, Red Sea	(+)- 144		Africanane		157
<i>Sinularia hirta</i>	Andaman and Nicobar islands, at the juncture of the Bay of Bengal and Andaman Sea	(+)- 144		Africanane		164
<i>Sinularia intacta</i>	Moyli Island (Gulf of Mannar, Indian Ocean)	(+)- 148 (-)- 149 (+)- 150 (-)- 151		Africanane Africanane Africanane Africanane		174 174 174 174
<i>Sinularia leptocladus</i>	Coast of Mandapam, Mannar Island	(+)- 144		Africanane	CTX (EAC, DLAT)	159
<i>Sinularia lochmodes</i>	Taiwan	(-)- 168		Aromadendrane	nCTX (SK-Hep1, HeLa), nAI (iNOS, COX-2)	192

		(-)-169		Aromadendrane	nCTX (SK-Hep1, HeLa), nAI (iNOS), AI (COX-2)	192
		(-)-170		Aromadendrane	nCTX (SK-Hep1, HeLa), nAI (iNOS), AI (COX-2)	192
		(-)-171		Aromadendrane	nCTX (SK-Hep1, HeLa), nAI (iNOS, COX-2)	192
		(-)-172		Aromadendrane	nCTX (SK-Hep1, HeLa), nAI (iNOS, COX-2)	192
<i>Sinularia maxima</i>	Havelock Island, Indian Ocean	(-)-163 (-)-173 (-)-174 (-)-175		Aromadendrane Aromadendrane Aromadendrane Aromadendrane		193 193 193 193
<i>Sinularia mayi</i>	Eastern reef of Telukdalan, Nias Island, Indonesia	(+)-163 (-)-164 (-)-165 (-)-166 (+)-211 (+)-212 (-)-218		Aromadendrane Aromadendrane Aromadendrane Aromadendrane Copaane Copaane Sinularane		189 189 189 189 189 189 228
<i>Sinularia numerosa</i>	South China Sea	(+)-144 (+)-146 (+)-148 (+)-150		Africanane Africanane Africanane Africanane		175 175 175 175
<i>Sinularia polydactyla</i>	Laing Island, Papua-New Guinea	(+)-144		Africanane		158
<i>Subergorgia suberosa</i>	Sanya, Hainan Province, South China Sea	(-)-56 (-)-58 (-)-59 (-)-60 (-)-61 62 (-)-63 (-)-254		Silphiperfolane Silphiperfolane Silphiperfolane Silphiperfolane Silphiperfolane Silphiperfolane Silphiperfolane Suberosane/Quadrane	nATB (<i>B. subtilis</i> , <i>S. aureus</i> , <i>P. lachrymans</i> , <i>X. vesicatoria</i> , <i>A. tumafeciens</i> , <i>R. solanacearum</i> , <i>B. thuringiensis</i> , <i>S. haemolyticus</i>) nATB (idem) nATB (idem) nATB (idem) nATB (idem) wATB (idem) wATB (<i>B. subtilis</i> , <i>S. aureus</i> , <i>X. vesicatoria</i> , <i>A. tumafeciens</i> , <i>R. solanacearum</i> , <i>B.</i>	63,70 70 70 70 70 70 70,71 70, 255

		(+)-259		Suberosane/Quadrane	<i>thuringiensis</i> , <i>S. haemolyticus</i> , nATB (<i>P. lachrymans</i>) mCTX (MDA-MB-231), wCTX (A435)	255
<i>Subergorgia suberosa</i>	Mandapam coast, Tamil Nadu, India	(-)-56		Silphiperfolane	AF <i>Rhizopus oryzae</i>	64
<i>Subergorgia suberosa</i>	Indian Ocean	(-)-56 (-)-57 (-)-58 (-)-59 (-)-60		Silphiperfolane Silphiperfolane Silphiperfolane Silphiperfolane Silphiperfolane		68 68 68 68 68
<i>Subergorgia suberosa</i>	Taiwan	(-)-56 (-)-57 (-)-59 (-)-60 (-)-61 62		Silphiperfolane Silphiperfolane Silphiperfolane Silphiperfolane Silphiperfolane Silphiperfolane		69 69 69 69 69 69
<i>Subergorgia suberosa</i>	Darwin Harbor, Northwestern Australia	(+)-253		Suberosane/Quadrane		254
<i>Subergorgia suberosa</i>		(+)-260		Suberosane/Quadrane	wCTX (MDA-MB-231, A435)	256
Undescribed octocoral	South Georgia Islands, Antarctic	(-)-72 (+)-73		Shagane Shagane	AL (<i>L. donovani</i>) nAL (<i>L. donovani</i>)	85 85
Mollusks						
Nudibranch						
<i>Acanthodoris nanaimoensis</i>	Barkley Sound, British Columbia	(+)-250		Acanthodorane		247
<i>Cadlina luteomarginata</i>	Scripps Canyon, La Jolla and Point Loma, San Diego, Southern California	(+)-127 (+)-128		Maaliane Maaliane	T for <i>Carassius auratus</i> and antifeedant to <i>C. auratus</i>	137 137
<i>Cadlina luteomarginata</i>	Graham Islands, British Columbia	(+)-127 (+)-128 (+)-129		Maaliane Maaliane Maaliane		138 138 138
<i>Hexabranthus sanguineus</i>	South China Sea	(+)-191 (+)-195		Aromadendrane Aromadendrane		206 206
<i>Leminda millecra</i>	Algoa Bay, South Africa	(+)-85 (+)-86 (+)-181		Cubebane Cubebane Aromadendrane		92 92 92
<i>Leminda millecra</i>	Coffee Bay, South Africa	(+)-181		Aromadendrane		197
<i>Phyllidia bourguini</i>	Hachijo-jima Island, Japan	(-)-224 (+)-229		Pupukeanane Pupukeanane		239 239

<i>Phyllidia codestis</i>	Koh-Ha Islets, Krabi Province, Thailand	(-)-226 (+)-228		Pupukeanane Abeopupukeanane		238 238
<i>Phyllidia ocellata</i>	Mudjimba Island, Mooloolaba, Australia	(+)-89 188 (-)-280 (-)-281 (-)-282		Cubebane Aromadendrane Caryolane Clovane Clovane	AM (Dd2, 3D2) AM (Dd2, 3D2)	96 96 96 96 96
<i>Phyllidia varicosa</i>	Shimokoshiki-jima Island, Japan	(+)-223		Trachyopsane		231
<i>Phyllidia varicosa</i>		(-)-224 225		Pupukeanane Pupukeanane		233 234
<i>Phyllidia varicosa</i>	Pramuka Island, Indonesia	230/231		Pupukeananes	wATB (<i>B. subtilis</i> , <i>C. albicans</i>), T to brine shrimp	240
<i>Phyllidiella pustulosa</i>	Vietnam	(-)-188 (-)-189 (+)-192		Aromadendrane Aromadendrane Allo-aromadendrane	T to <i>Lebistes reticulatus</i> nT to <i>Lebistes reticulatus</i> nT to <i>Lebistes reticulatus</i>	207 207 207
<i>Phyllidiella pustulosa</i>	Offshore, Vietnam	230/231		Pupukeananes		207
<i>Phyllidiella pustulosa</i>	Hachijo-jima Island, Japan	(+)-193 (-)-224 (+)-229 (+)-239		Aromadendrane Pupukeanane Pupukeanane Allo-pupukeanane		215 215 215 215
<i>Phyllodesmium magnum</i>	South China Sea	(+)-144 (+)-145		Africanane Africanane		169 169
<i>Phyllidia varicosa</i>	Shimokoshiki-jima Island, Japan	(+)-223		Trachyopsane		231
<i>Phyllidia varicosa</i>	Pupukea, north shore of Oahu, , Hawaii	(-)-224 225		Pupukeanane Pupukeanane		233 234
<i>Phyllidia varicosa</i>	Pramuka Island, Indonesia	230 231		Pupukeanane Pupukeanane		234 234
Sea hare						
<i>Aplysia punctata</i>	Porto San Paolo (Olbia, Sardinia, Italy)		(+)-101 (-)-102	Perforatane Perforatane		107 107
<i>Aplysia californica</i>	La Jolla and Cardiff, California		(+)-311	Cyclolaurane		307
<i>Aplysia dactylomela</i>	Kohama Island, Okinawa, Japan	(-)-314	(-)-315 (-)-316	Cyclolaurane Cyclolaurane Cyclolaurane		296 296 296
<i>Aplysia dactylomela</i>	La Gomera, Canary Islands		(-)-309	Güimarane/Omphalane		288
<i>Aplysia kurodai</i>	Toyama Bay, Japan	(-)-310		Cyclolaurane	wCTX (HeLa), ATB (<i>B. subtilis</i> , <i>S. aureus</i> , <i>M.</i>	301,319

		(-)-318	(+)-311	Cyclolaurane	<i>smegmatis</i> , <i>C. albicans</i>), nATB (<i>S. choleraesuis</i>)	301
				Cyclolaurane	nCTX (HeLa), ATB (<i>B. subtilis</i>)	301
			(+)-319	Cyclolaurane		301
Marine fungi						
Unidentified, separated from an <i>Haliclona</i> sponge	Tomini Bay, North Sulawesi, Indonesia	(-)-15		Hirsutane	CTX (B16), nATB (<i>B. subtilis</i> , <i>S. Aureus</i> , <i>E. coli</i>)	41,44
		16*		Hirsutane		41
		(+)-17		Hirsutane		41
		(-)-18		Hirsutane	nATB (<i>B. subtilis</i>)	41
<i>Chondrostereum</i> sp from a soft coral <i>Sarcophyton tortuosum</i>	South China Sea	(-)-15		Hirsutane	CTX (SW480, SW620, LoVo, MCF7, MDA-MB231, MDA-MB-435, MDA-MB-453, CNE1, CNE2, SUNE1, A549, Hep3B, HepG2, Bel-7402, HeLa), wCTX (B16)	42,44
		(-)-18		Hirsutane	nCTX (MCF7, MDA-MB-231, MDA-MB-435, MDA-MB-453, CNE1, CNE2, SUNE1, A549, Hep3B, HepG2, Bel7402, HeLa)	42
		(+)-19		Hirsutane	nCTX (MCF7, MDA-MB-231, MDA-MB-435, MDA-MB-453, CNE1, CNE2, SUNE1, A549, Hep3B, HepG2526, Bel7402, HeLa)	42
<i>Chondostereum</i> sp. from the soft coral <i>Sarcophyton tortuosum</i>	South China Sea	(+)-17		Hirsutane	nCTX (LoVo)	45,50
		(+)-20		Hirsutane	CTX (LoVo, CNE2, A549)	45
		(+)-21		Hirsutane		45
		(-)-22		Hirsutane	nCTX (LoVo)	45,50
		(-)-23		Hirsutane	nCTX (LoVo)	45,50
		(+)-24		Isohirsutane	nCTX (LoVo)	45,50
		(-)-25		Isohirsutane		48
		(-)-26		Isohirsutane		48
		(+)-27		Hirsutane	CTX (LoVo, Bel-7402, MCF7, CNE1, CNE2,	50,44,49

		(-)-28		Hirsutane	SUNE1, A549), wCTX (KB, B16, Bel-7402), w or nATB (<i>S. aureus</i>), nATB (<i>P. aeruginosa</i> , <i>E. coli</i>)	50
<i>Drechslera dematioidea</i> from the red alga <i>Liagora viscida</i>	Mediterranean Sea, Moraira, Spain	(-)-237 (-)-238		Sativane Isosativane		245 245
<i>Geniculosporium</i> sp associated with <i>Polysiphonia</i> red alga	Ahrenshoop, Germany	(+)-ALG		Probotryane	ALG (<i>C. fusca</i>)	107
<i>Hansfordia sinuosae</i> (from <i>Niphates</i> sp.)	Southern China Sea	(-)-91 (+)-92		Punctaporane Punctaporane	nCTX (A549, Bel 7402, A2780), nATB (<i>B. subtilis</i> , <i>S. aureus</i> , <i>B. thuringiensis</i> , <i>E. coli</i>) nCTX (A549, Bel 7402, A2780), nATB (<i>B. subtilis</i> , <i>S. aureus</i> , <i>B. thuringiensis</i> , <i>E. coli</i>)	98,314 98,314
<i>Kallichroma tethys</i>		(+)-264		Longibornane		262
<i>Ophioceras venezuelense</i>	Heredia, Costa Rica	(+)-152		Africanane		176
<i>Penicillium bilaiae</i> MA-267 from <i>Lumnitzera racemosa</i>	Hainan Island, China	(+)-288 (+)-289		Penicibilane Penicibilane	AF <i>C. gloeosporioides</i> nAF <i>F. graminearum</i> , <i>G. graminis</i>	278 278
Marine bacteria						
<i>Streptomyces</i> sp GWS-BW-H5	North sea	(-)-1 (+)-6 (-)-112		Bourbonane Kelsoane Aristolane	nCTX (KB) nCTX (KB)	39,325 39,325 39
<i>Streptomyces</i> sp. SCSIO 10355	Bay of Bengal, Indian Ocean	(+)-267		Strepsesquitriane	mAI (TNF α , COX-2, iNOS)	267
Algae						
<i>Red</i>						
<i>Amphiroa zonata</i>	Cape Omaezaki, Shizuoka Prefecture, Japan		(+)-311	Cyclolaurane		303
<i>Chondria oppositoclada</i>	Puerto Penasco, Mexico	(-)-69		Cycloeudesmane		80
<i>Laurencia complanata</i>	southwest coast of Madagascar	(-)-119		Aristolane	mCTX (P-388), ATB (<i>B. cereus</i> , <i>S. pneumoniae</i>)	131,132
<i>Laurencia decumbens</i>	Weizhou Island, South China Sea	(-)-112		Aristolane		121
<i>Laurencia dendroidea</i>	southeastern Brazilian coast	(-)-64		Silphiperfolane	AL (promastigote, amastigote), wALG (<i>C. fusca</i>), nAF (<i>U. violacea</i> , <i>M.</i>	75

					<i>microspora, E. Repens, F. oxysporum</i>)		
<i>Laurencia filiformis</i>	Australia	(-)-166			Aromadendrane	191	
<i>Laurencia flexilis</i>	Barrio Pangil, Curimao, Llocos Nortes, Philippines	(-)-310			Cyclolaurane	mCTX (ZR-75-1, P-388, A431, Mel-2), nCTX (Col2, KB, Lu1, LnCaP, KB-V1, U-373), nAM (D6, W2)	295,312
<i>Laurencia majuscula</i>	North Queensland (Australia)	(-)-64 (-)-65			Silphiperfolane	nCTX (Col2, ZR-75-1, BC1, P-388, KB, A431, Lu1, Mel-2, LnCaP, KB-V1), nAM (D6, W2)	72,312
					Silphiperfolane	wCTX (Col2, ZR-75-1, P-388, KB, A431, Mel-2) nCTX (BC1, Lu1, LnCaP) CTX (KB-V1),), nAM (D6, W2)	73,312
					Rhodolaurane	nCTX (Col2, ZR-75-1, KB, A431, Lu1, U-373, LnCaP, KB-V1) CTX (P-388, Mel-2), nAM (D6, W2)	72,312
<i>Laurencia mariannensis</i>	Hainan and Weizhou Islands, China	(+)-143			Africanane	156	
<i>Laurencia microcladia</i>	Elba Island, Mediterranean sea	(-)-70			Rhodolaurane	156	
					Calenzanane	83	
<i>Laurencia microcladia</i>	Chios Island, North Aegean Sea, Greece				Calenzanane	84	
					Cyclolaurane	106	
<i>Laurencia microcladia</i>	Chios Island, North Aegean Sea, Greece				Cyclolaurane	106	
					Cyclolaurane	106	
					Cyclolaurane	310	
<i>Laurencia microcladia</i>	Chios Island, North Aegean Sea, Greece				wCTX (HT-29, MCF7, A431, PC3, HeLa)	310	
					wCTX (HT-29, MCF7, A431, PC3, HeLa)	310	
					nCTX (HT-29, MCF7, A431, PC3, HeLa)	310	
<i>Laurencia nidifica</i>	Goza, Japan	(-)-310 (-)-321 (+)-322			Cyclolaurane	nCTX (Col2, BC1, KB), CTX (A431)	297,312
					Cyclolaurane		297
					Cyclolaurane		297
<i>Laurencia nidifica</i>	Kahala Reef, Oahu island, Hawaii				Cyclolaurane dimer	297	
<i>Laurencia nipponica</i>	Hokkaido, Japan	(-)-69			Cyclolaurane	302	
					Cycloeudesmane	81	

<i>Laurencia obtusa</i>	Milos Island (Aegean Sea, Greece)	(+)-95 (-)-97 (-)-98	(+)-94 (-)-96	Perforetane Perforetane Perforetane Perforetane Perforetane	nAV (HIV-1 (IIIB), HIV-2 (ROD)], HPV-1 (KOS), HPV-2 (G), VV, TK2 HPV-1 KOS (ACVr), VSV, Coxsackie virus B4, RSV, parainfluenza-3 virus, reovirus-1, Sindbis virus, Punta Toro virus	102 102 102 102 102
<i>Laurencia obtusa</i>	coastal rocks of Serifos, Aegean Sea, Greece		(+)-101 (-)-102	Perforetane Perforetane		106 106
<i>Laurencia obtusa</i>	Castelluccio, Eastern Sicily	(+)-135		Laurobtusane		149
<i>Laurencia obtusa</i>	Lanzarote, Canary Islands		299 (+)-300	Rhodolaurane Rhodolaurane		283 283
<i>Laurencia obtusa</i>	Cayo Coco, Cuba		(+)-327	Cyclococane		309
<i>Laurencia okamurai</i> (formerly misidentified as <i>Laurencia intermedia</i>)	Oshoro Bay, Hokkaido, Japan	(-)-310	(+)-311 (+)-312	Cyclolaurane Cyclolaurane Cyclolaurane		289–291 289–291 289–291
<i>Laurencia okamurai</i>	Hakata-Shima, Inland Sea of Japan	(-)-310	(+)-311	Cyclolaurane Cyclolaurane		293 293
<i>Laurencia okamurai</i>	Nyudogatane, Okino-shima, Tosa Province, Japan	(-)-310	(+)-311 (+)-313	Cyclolaurane Cyclolaurane Cyclolaurane		294 294 294
<i>Laurencia okamurai</i>	Nanji Island (East China Sea	(-)-310 (+)-317 (-)-318	(+)-311 (+)-319	Cyclolaurane Cyclolaurane Cyclolaurane Cyclolaurane Cyclolaurane		308,312 306,308 308 308 308
<i>Laurencia pacifica</i>			(+)-311	Cyclolaurane		304
<i>Laurencia perforata</i>	Corralejos, Fuerteventura (Canary Islands)	(+)-95	(+)-94	Perforetane		100–102 100,101
<i>Laurencia perforata</i>	Magnetic Island, Australia	(-)-251	(-)-252	Isotenerane Isotenerane		252 252
<i>Laurencia rigida</i>	Cape Banks, Sydney, Australia	(-)-64		Silphiperfolane	nATB (<i>B. megaterium</i> , E. coli), wATB (<i>M. bovis</i> BCG)	76,320
<i>Laurencia similis</i>	Hainan Island, China	(+)-31 (+)-104 (+)-105 106 107		Aristolane Aristolane Aristolane Aristolane Aristolane		111 108 108 108 110

		108		Aristolane		110
		109		Aristolane		111
<i>Laurencia similis</i>	Hainan Islands, China	(+)- 105		Aristolane		112
		(+)- 110		Aristolane		112
		(-)- 111		Aristolane		112
<i>Laurencia similis</i>	Sanya Bay, Hainan, China	(+)- 104		Aristolane	nCTX (Bel7402)	124
		(+)- 105		Aristolane	nCTX (Bel7402)	124
		106		Aristolane	nCTX (Bel7402)	124
		107		Aristolane	nCTX (Bel7402)	124
		108		Aristolane	nCTX (Bel7402)	124
		109		Aristolane	nCTX (Bel7402)	124
		(+)- 110		Aristolane	nCTX (Bel7402)	124
		(-)- 111		Aristolane	nCTX (Bel7402)	124
<i>Laurencia similis</i>	Borneo	(+)- 110		Aristolane	wCTX (MCF7, ATL, P-388)	134
		(+)- 111		Aristolane	nCTX (MCF7, ATL, P-388)	134
		(+)- 115		Aristolane	nCTX (MCF7, ATL, P-388)	134
		(+)- 122		Aristolane	wCTX (MCF7, ATL, P-388)	134
<i>Laurencia subopposita</i>	La Jolla, San Diego, USA	(-)- 182		Aromadendrane		198
		(-)- 183		Aromadendrane		198
<i>Laurencia tenera</i>	Florence Bay (Magnetic Islands)		(-)- 99	Perforetane		103
			(-)- 252	Isotenerane		103
<i>Laurencia tenera</i>	Townsville region of the Great Barrier Reef, Australia		(-)- 100	Perforetane		104
<i>Laurencia tristicha</i>	Shanwei, Guangdong Province, China	(-)- 310	(+)- 311	Cyclolaurane		309
			(+)- 312	Cyclolaurane		309
			(-)- 323	Cyclolaurane		309
				Cyclolaurane		309
<i>Laurencia tristicha</i>	Pingyu Island, South China Sea	(-)- 310	(+)- 312	Cyclolaurane		300
			(-)- 316	Cyclolaurane		300
		(-)- 318		Cyclolaurane		300
			(+)- 319	Cyclolaurane		300
			(-)- 323	Cyclolaurane dimer		300
<i>Laurencia tristicha</i>	Naozhou Island, Zhanjiang City, China	(+)- 317		Cyclolaurane		299
		(+)- 322		Cyclolaurane dimer		299
<i>Laurencia viridis</i>	nd	(+)- 90		Viridiane		97
<i>Laurencia sp.</i>	South China Sea	(+)- 110		Aristolane		125
		(-)- 111		Aristolane		125

<i>Laurencia</i> sp.	Tsubota, Miyake-jima Island, Tokyo		(+)- 311	Cyclolaurane		304
<i>Laurencia</i> sp	Baia di Calenzana, Elba Island		(+)- 66	6,8-Cycloeuodesmane		78
<i>Laurencia</i> sp	nd		299 (+)- 300	Rhodolaurane Rhodolaurane		282 282
<i>Laurencia</i> sp.	Güimar, Tenerife, Canary Islands		(+)- 308			287
<i>Marginisporum aberrans</i>	Cape Omaezaki, Shizuoka Prefecture, Japan		(+)- 311	Cyclolaurane		303
<i>Brown</i>						
<i>Dictyopteris divaricata</i>	Okanamura, Japan	(-)- 80 (-)- 81 (-)- 82 (-)- 83 (-)- 84		Cubebane Cubebane Cubebane Cubebane Cubebane		90
<i>Dictyopteris divaricata</i>		(-)- 212		Copaane		222
<i>Taonia atomaria</i>	Rovinj, Croatia	(-)- 79 (-)- 80		Cubebane Cubebane	antifeedant against <i>Locusta migratoria</i> , <i>Acusta despesta</i>	89,323 89
<i>Taonia lacheana</i>	Lachea Island, Italy	(-)- 163 (+)- 176 (+)- 177		Aromadendrane Aromadendrane Aromadendrane		194 194 194
<i>Calcareous</i>						
<i>Corallina pilulifera</i>	Cape Omaezaki, Japan		(+)- 311	Cyclolaurane		303
<i>Neomeris annulata</i>	Bermuda, North Atlantic Ocean		(-)- 134 (-)- 203	Maaliane Neomerane		148 148

^a correspond to the reference number in the review article, Nd: not described, *: not reported, NH: non-halogenated, H: halogenated, AF: antifungal, AG: analgesic, AI: anti-inflammatory, AL: antileishmanial, ALG: antialgal, AM: antimalarial; ATB: Antibiotic, AV: antiviral, CTX: Cytotoxic, T: Toxic, L: lethal, n non, w weak, m moderate.

fused sesquiterpenes

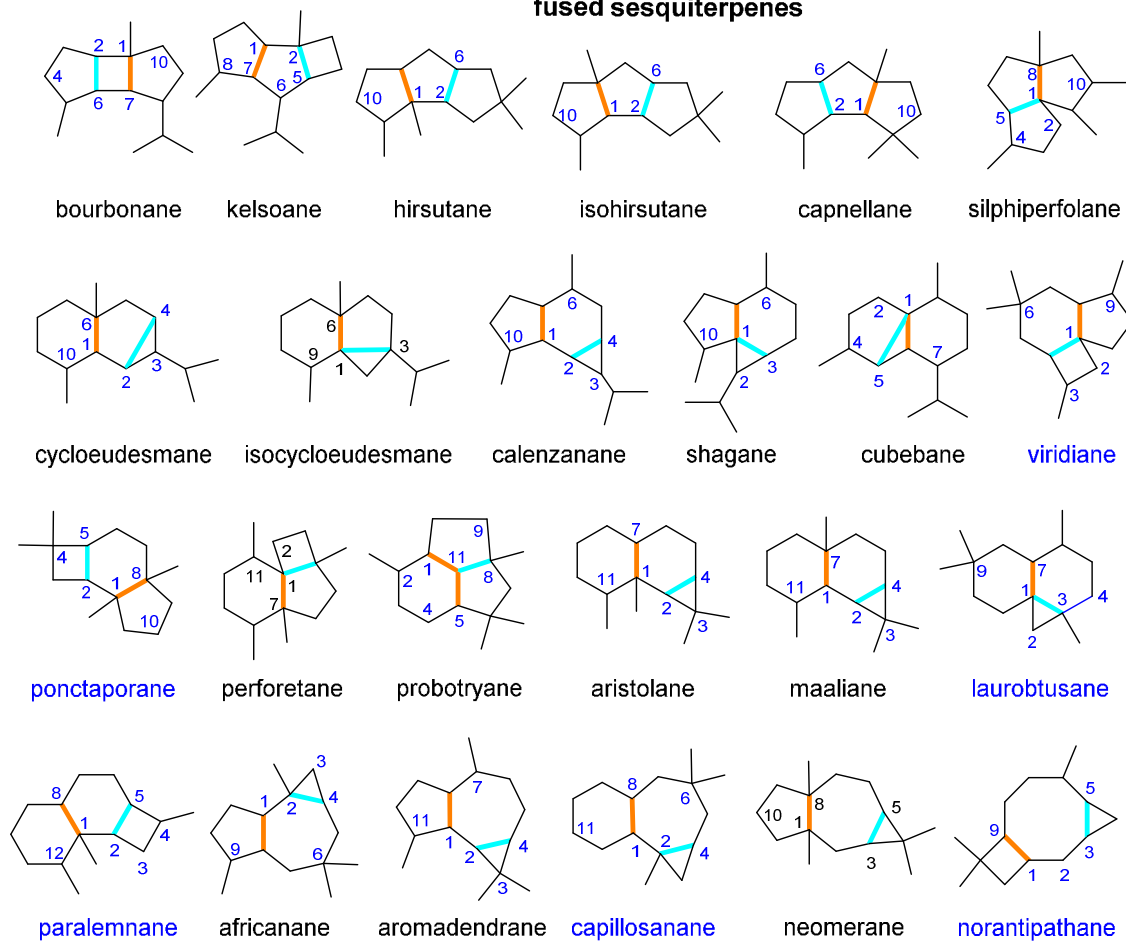
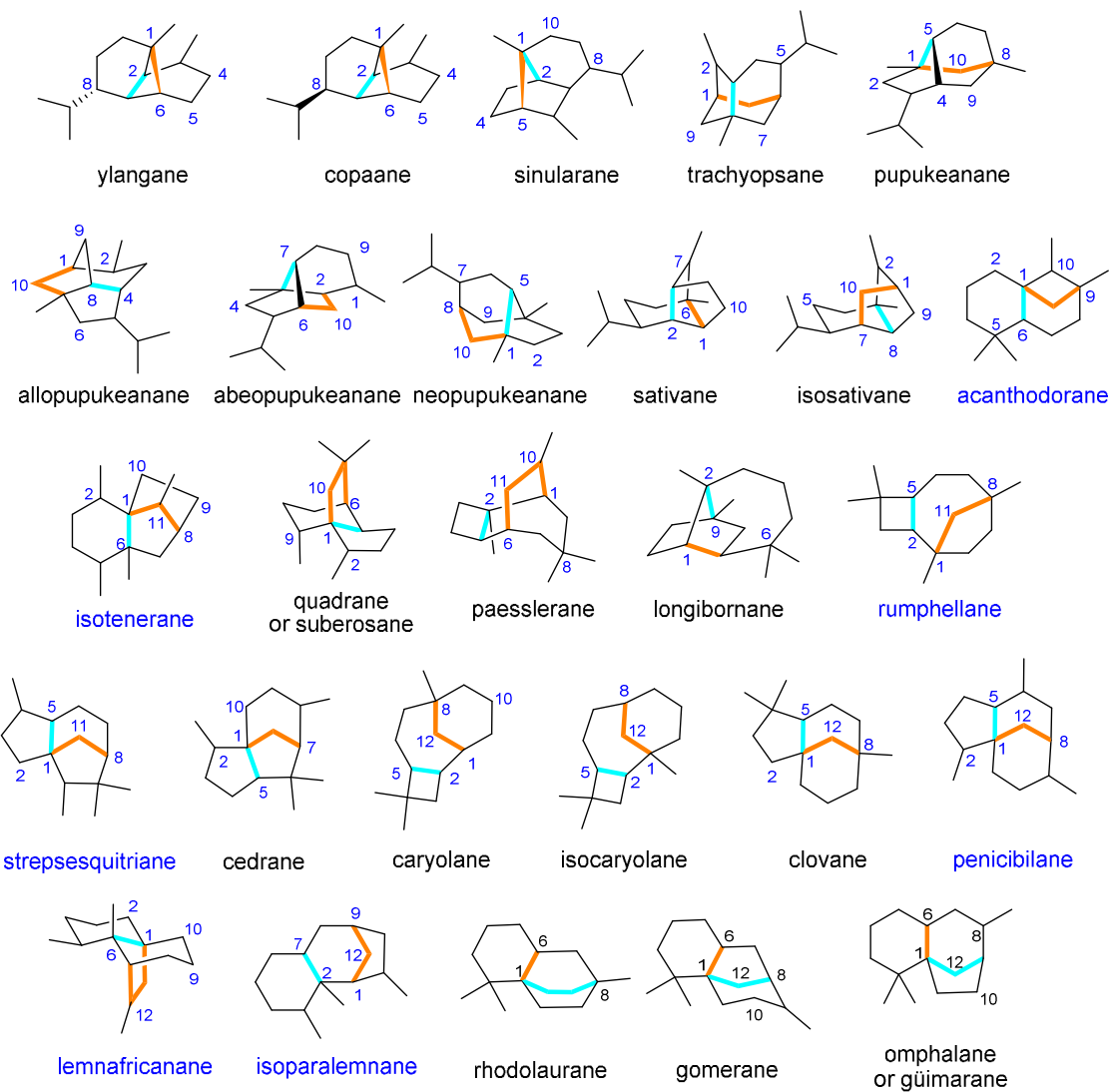


Figure S1. Fused skeletons with highlighted numbering and connective bonds symbolized in orange (main bond) and blue (second bond) according to IUPAC rules to name tricyclic skeletons.

bridged sesquiterpenes



miscellaneous sesquiterpenes

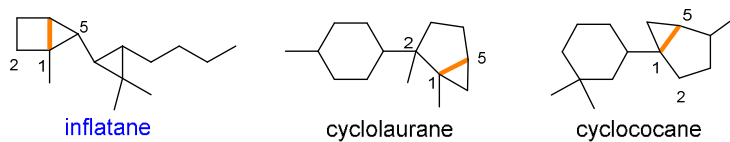


Figure S2. Bridged and miscellaneous skeletons with highlighted numbering and connective bonds symbolized in orange (main bond) and blue (second bond) according to IUPAC rules to name tricyclic skeletons..