Bacterial Terpenome

Supplementary Information

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1 Introduction

The Supplementary Information associated with this review article consists of two parts. The first file is a spreadsheet that contains a comprehensive table of all bacterial terpenoids that were found in NP databases or primary literature. Along with the names and associated compound numbers, this spreadsheet contains additional information including molecular formulas and weights, accurate masses, chemical identifiers (SMILES, InChlKey, InChl), genus and species names, isolation reference DOI or URL, discovery year, and what NP database, if any, these compounds were found in. This spreadsheet was also submitted for deposition into the Natural Products Atlas.

The second file is this document and contains the structures of all of the bacterial terpenoids. In the main review document, only selected structures are shown. Compound numbers are shown under each NP; their names are fully listed in the accompanying spreadsheet. A list of abbreviations used in the main review document is also included in this file.

1.1 Abbreviations

ADHBA; 3-amino-2,4-dihydrobenzoic acid
ADHBSH; thiocarboxylic acid analogue of ADHBA
ATP; adenosine triphosphate
BChl; bacteriochlorophyll
BGC; biosynthetic gene cluster
CDPS; cyclodipeptide synthase
Chl; chlorophyll
CLPP; cyclolavandulyl diphosphate
CPP; copalyl diphosphate
DKP; 2,5-diketopiperazine
DMAPP; dimethylallyl diphosphate
DMK; dimethylmenaquinone
FPP; farnesyl diphosphate
FMN; flavin mononucleotide
GA; gibberellins
GAPDH; glyceraldehyde-3-phosphate dehydrogenase
GFPP; geranylfarnesyl diphosphate
GGPP; geranylgeranyl diphosphate
GPP; geranyl diphosphate
HIF; hypoxia-induced factor
Hsp; heat shock protein
IL; interleukin
IPP; isopentenyl diphosphate
KG; ketoglutarate
LPP; linalyl diphosphate
MAPK; mitogen-activated protein kinase
MEP; methylerythritol phosphate
MIB; methylisoborneol
MIC; minimum inhibitory concentration
MK; menaquinone
MRSA; methicillin-resistant *Staphylococcus aureus*
MT; methyltransferase
MVA; mevalonate
NO; nitric oxide
NP; natural products
NPP; nerolidyl diphosphate
NRPS; non-ribosomal peptide synthetase
PABA; *p*-aminobenzoic acid
PCA; phenazinecarboxylic acid
PG; phosphoglycerate
PKC; protein kinase C
PKS; polyketide synthase
PNT; pentalenolactone
PQ; plastoquinone
PT; prenyltransferase
PTM; platensimycin
PTN; platencin
RiPP; ribosomally-synthesized and posttranslationally-modified peptide
ROS; reactive oxygen species
RQ; rhodoquinone
SAM; *S*-adenosylmethionine
SAR; structure-activity relationship
SARS–CoV2; severe acute respiratory syndrome–coronavirus 2
THF; tetrahydrofuran
THN; 1,3,6,8-tetrahydroxynaphthalene
TIM; triosephosphate isomerase
TNF; tumor necrosis factor
TQ; tocopherolquinone
TRX; thioredoxin
TS; terpene synthase
VHPO; vanadium-dependent haloperoxidases
VOC; volatile organic compound
VRE; vancomycin-resistant Enterococci
WT; wild-type

2 Terpenoids

2.1 Hemiterpenoids

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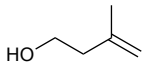

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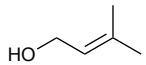

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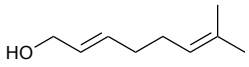

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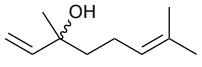

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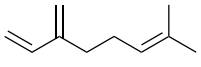

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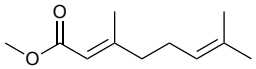

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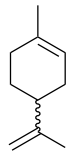

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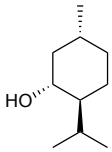

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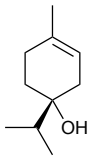

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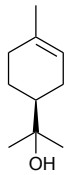

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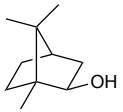

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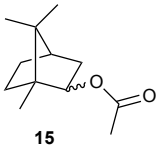

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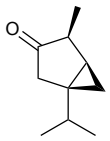

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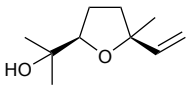

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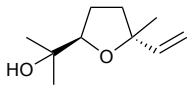

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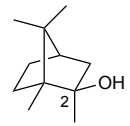

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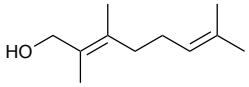

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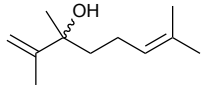

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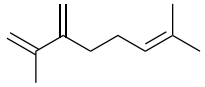

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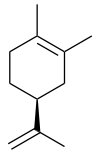

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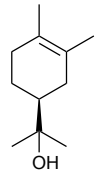

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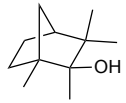

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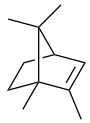

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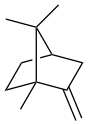

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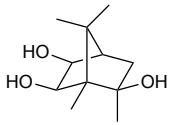

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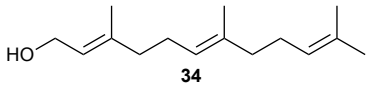

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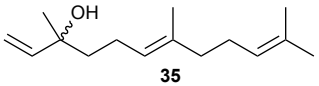

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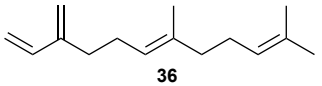

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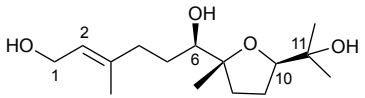

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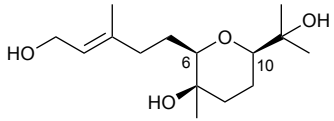

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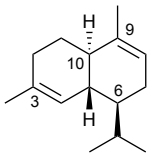

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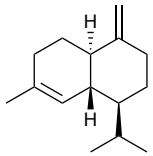

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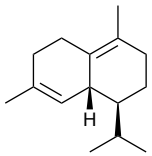

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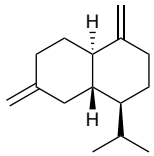

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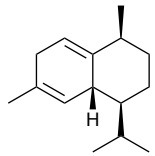

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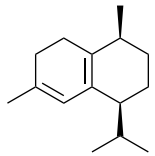

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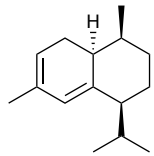

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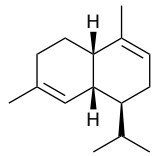

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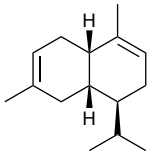

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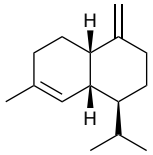

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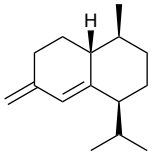

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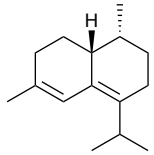

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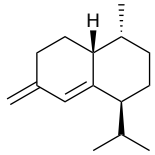

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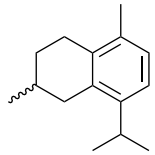

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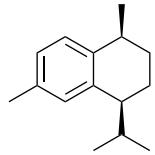

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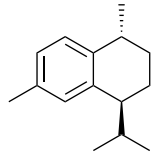

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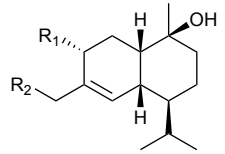

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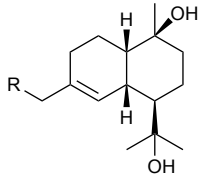
56 (R_1 = OH, R_2 = H)
57 (R_1 = H, R_2 = OH)



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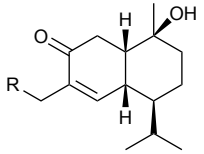

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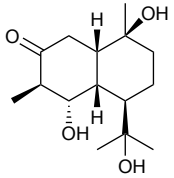

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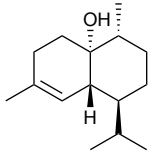

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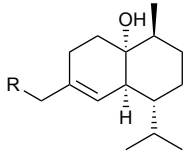
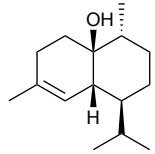
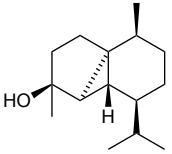


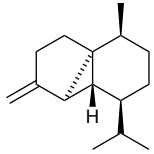
64 (R = H)
65 (R = OH)



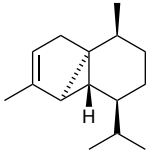
66



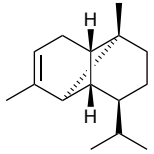
67



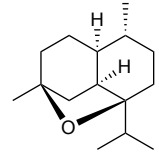
68



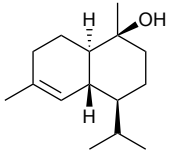
69



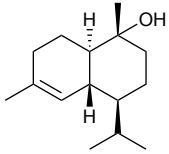
70



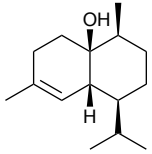
71



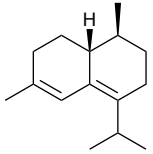
72



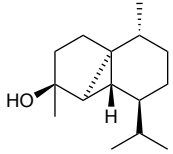
73



74

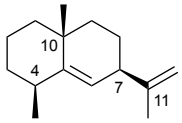


75

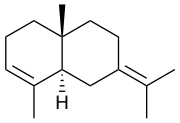


76

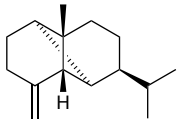
2.3.3 Sesquiterpenoids: Eudesmanes



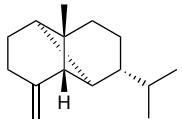
77



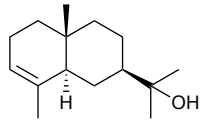
78



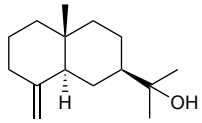
79



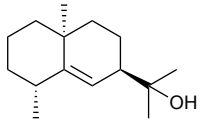
80



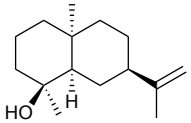
81



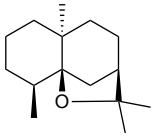
82



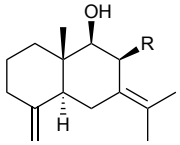
83



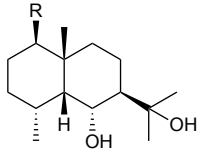
84



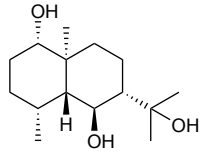
85



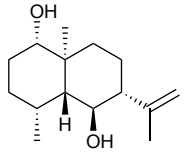
86 (R = H)
87 (R = OH)



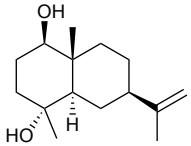
88 (R = H)
89 (R = OH)



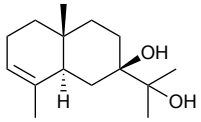
90



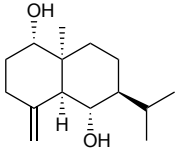
91



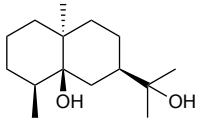
92



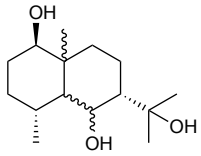
93



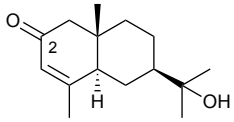
94



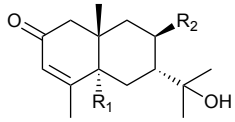
95



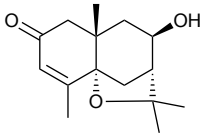
96



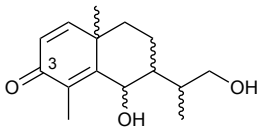
97



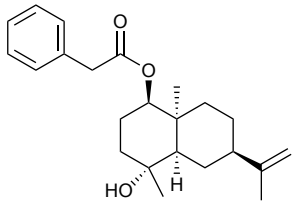
98 (R_1 = H, R_2 = OH)
99 (R_1 = R_2 = OH)
100 (R_1 = OOH, R_2 = OH)
101 (R_1 = OOH, R_2 = H)



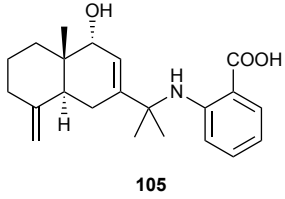
102



103

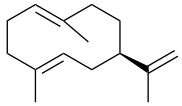


104

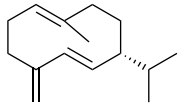


105

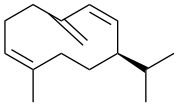
2.3.4 Sesquiterpenoids: Germacranes



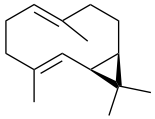
106



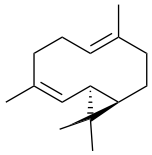
107



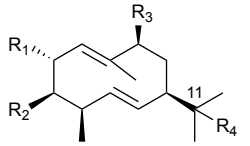
108



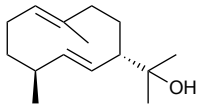
109



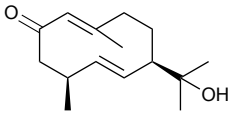
110



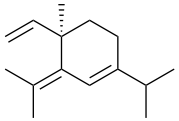
111 ($R_1 = R_2 = R_3 = H$, $R_4 = OH$)
112 ($R_1 = R_4 = OH$, $R_2 = R_3 = H$)
113 ($R_1 = R_3 = H$, $R_2 = R_4 = OH$)
114 ($R_1 = R_2 = H$, $R_3 = R_4 = OH$)



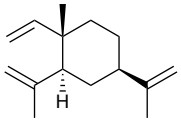
115



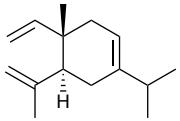
116



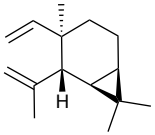
117



118

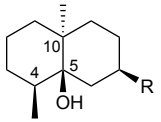


119

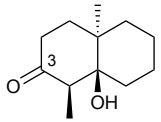


120

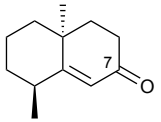
2.3.5 Sesquiterpenoids: Geosmins



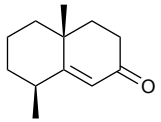
121 (R = H)
129 (R = OH)



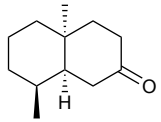
122



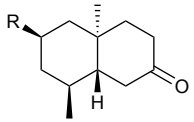
123



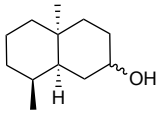
124



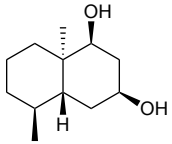
125



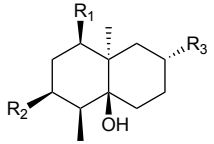
126 (R = H)
130 (R = OH)



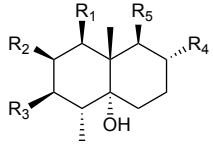
127/128



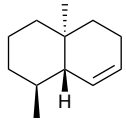
131



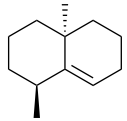
132 (R_1 = OH, R_2 = R_3 = H)
133 (R_1 = R_3 = H, R_2 = OH)
134 (R_1 = R_3 = OH, R_2 = H)



135 (R_1 = R_3 = R_4 = OH, R_2 = R_5 = H)
136 (R_1 = R_3 = R_4 = H, R_2 = R_5 = OH)

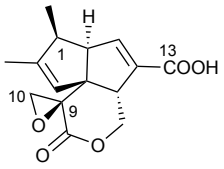


137

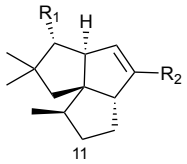


138

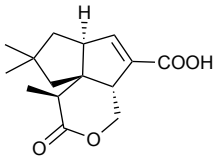
2.3.6 Sesquiterpenoids: Pentalenolactones



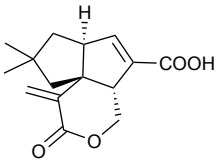
139



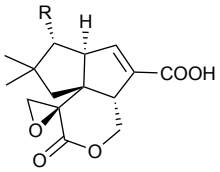
140 (R_1 = R_2 = H)
144 (R_1 = OH, R_2 = COOH)



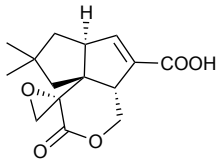
141



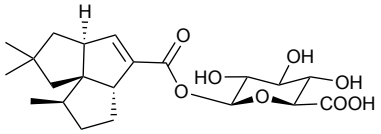
142



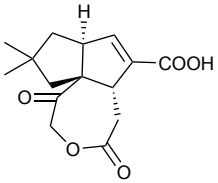
143 (R = H)
149 (R = OH)



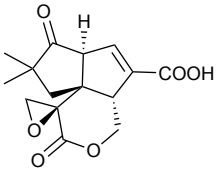
145



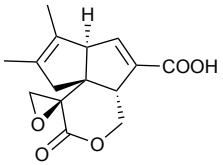
146



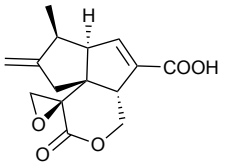
147



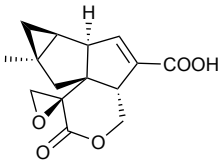
148



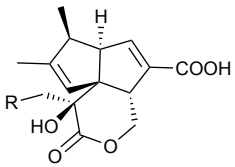
150



151

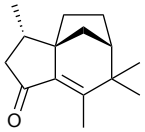


152

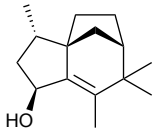


153 (R = Cl)
154 (R = OH)

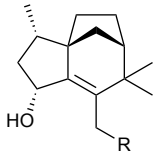
2.3.7 Sesquiterpenoids: Zizaanes



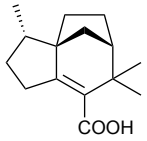
155



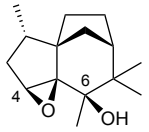
156



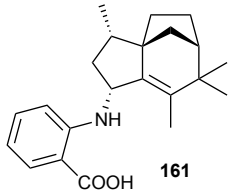
157 (R = H)
158 (R = OH)



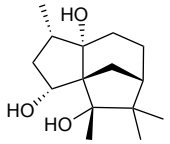
159



160

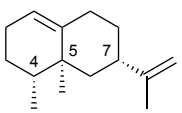


161

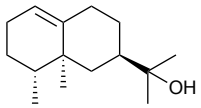


162

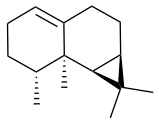
2.3.8 Sesquiterpenoids: Miscellaneous polycyclic sesquiterpenoids



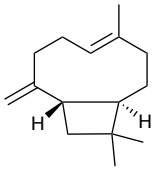
163



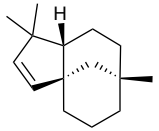
164



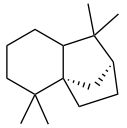
165



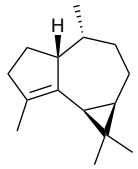
166



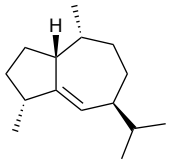
167



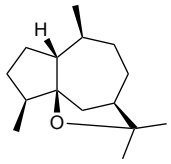
168



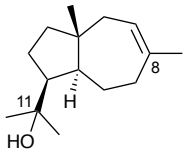
169



170



171



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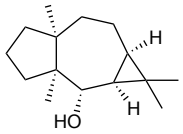

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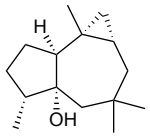

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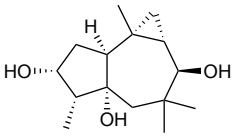
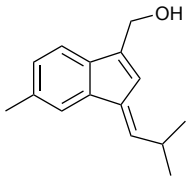
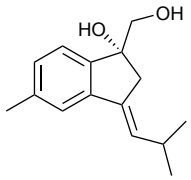


175



176



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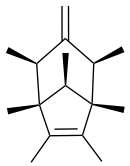
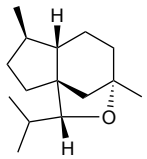
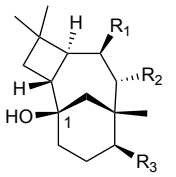


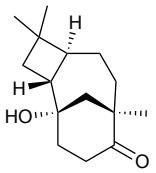
178



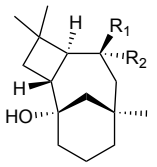
179



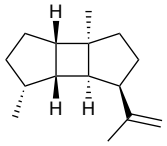
180 (R_1 = R_2 = R_3 = H)
181 (R1 = OH, R2 = R3 = H)
182 (R_1 = R_3 = H, R_2 = OH)
183 (R_1 = R_2 = H, R_3 = OH)



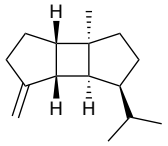
184



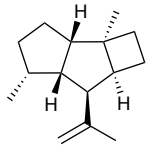
185 (R_1 = OH, R_2 = H)
186 (R_1 = H, R_2 = OH)



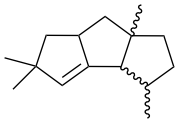
187



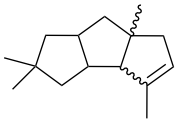
188



189

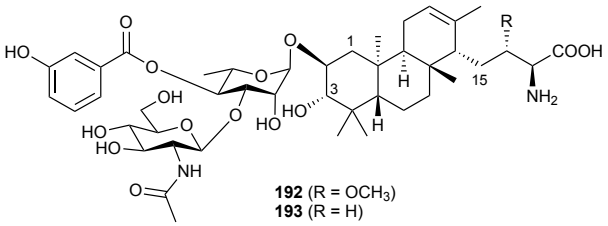


190

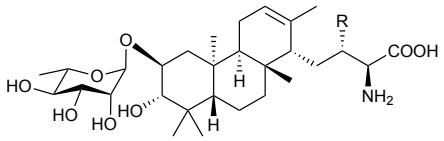


191

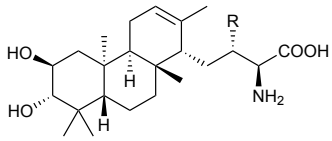
2.4.1 Diterpenoids: Basilicardins, phenalinolactones, and tiancilactones



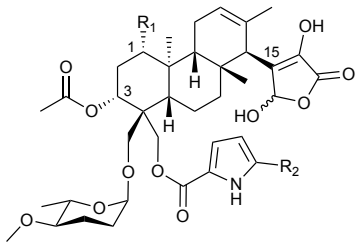
192 (R = OCH_3)
193 (R = H)



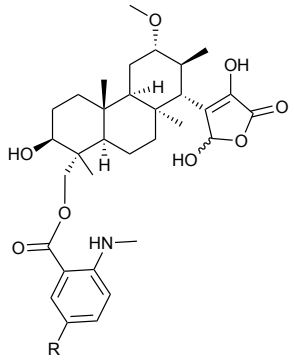
194 (R = OCH_3)
195 (R = H)



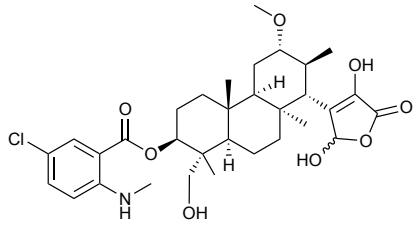
196 (R = OCH_3)
197 (R = H)



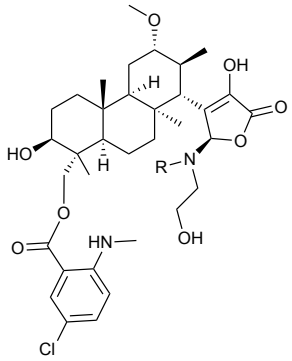
198 (R_1 = OH, R_2 = CH_3)
199 (R_1 = OH, R_2 = H)
200 (R_1 = OH, R_2 = CH_2OCH_3)
201 (R_1 = H, R_2 = CH_3)



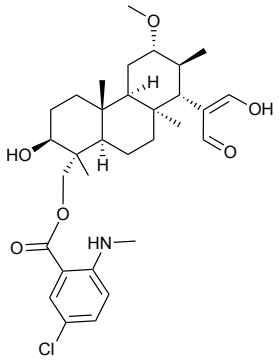
202 (R = Cl)
203 (R = H)



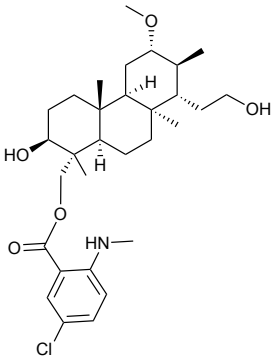
204



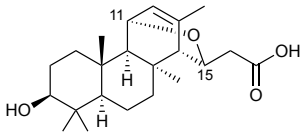
205 (R = H)
206 (R = CH_3)



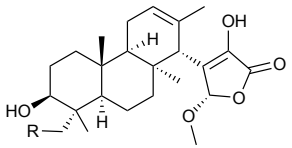
207



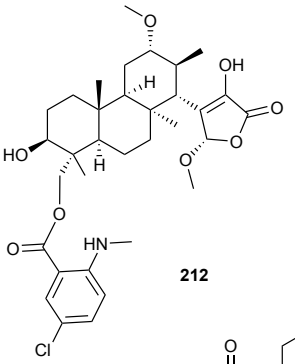
208



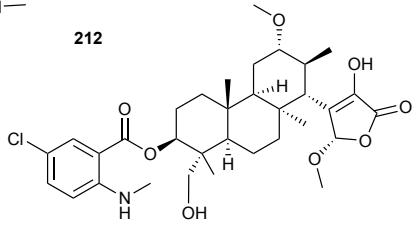
209



210 (R = H)
211 (R = OH)

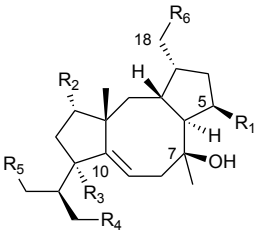


212

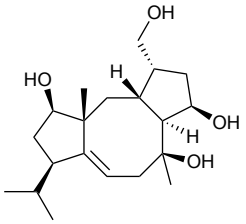


213

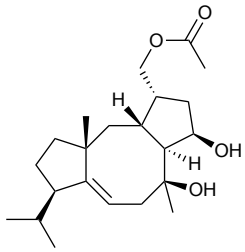
2.4.2 Diterpenoids: Cyclooctatins



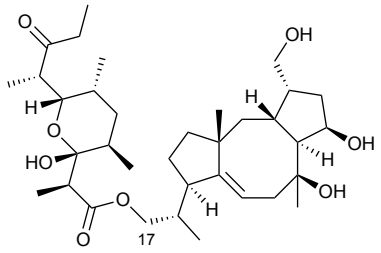
214 (R_1 = R_6 = OH, R_2 = R_3 = R_4 = R_5 = H)
215 (R_1 = R_3 = R_6 = OH, R_2 = R_4 = R_5 = H)
216 (R_1 = R_2 = R_6 = OH, R_3 = R_4 = R_5 = H)
217 (R_1 = R_4 = R_6 = OH, R_2 = R_3 = R_5 = H)
218 (R_1 = R_4 = R_5 = R_6 = OH, R_2 = R_3 = H)
219 (R_1 = R_2 = R_3 = R_4 = R_5 = R_6 = H)
220 (R_1 = R_2 = R_3 = R_4 = R_5 = H, R_6 = OH)



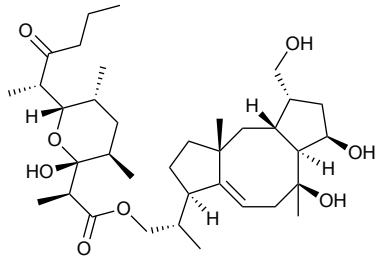
221



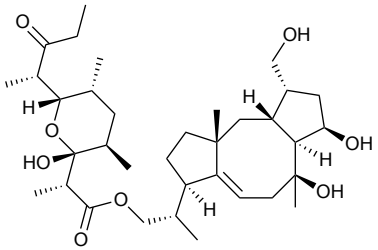
222



223

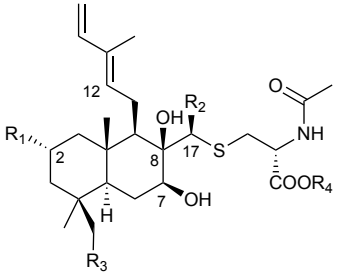


224

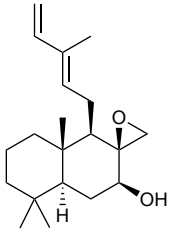


225

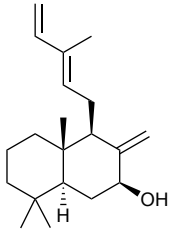
2.4.3 Diterpenoids: Cyslabdans



226 ($R_1 = R_2 = R_3 = R_4 = H$)
227 ($R_1 = R_2 = R_4 = H$, $R_3 = OH$)
228 ($R_1 = R_2 = R_3 = H$, $R_4 = CH_3$)
229 ($R_1 = OH$, $R_2 = R_3 = R_4 = H$)
230 ($R_1 = R_3 = R_4 = H$, $R_2 = OH$)

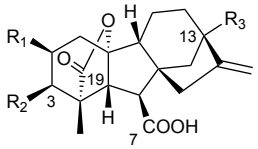


231

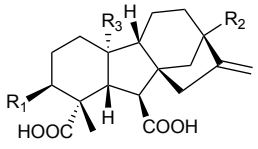


232

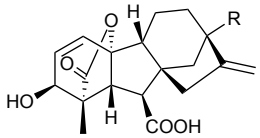
2.4.4 Diterpenoids: Gibberellins



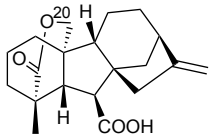
233 (R_1 = H, R_2 = R_3 = OH)
234 (R_1 = R_3 = H, R_2 = OH)
235 (R_1 = R_2 = R_3 = H)
236 (R_1 = R_2 = H, R_3 = OH)
237 (R_1 = R_2 = R_3 = OH)
238 (R_1 = R_2 = OH, R_3 = H)



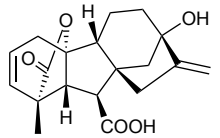
239 (R_1 = R_2 = H, R_3 = CH_3)
240 (R_1 = H, R_2 = OH, R_3 = CHO)
241 (R_1 = R_2 = H, R_3 = CHO)
242 (R_1 = OH, R_2 = H, R_3 = CHO)
243 (R_1 = H, R_2 = OH, R_3 = CH_2OH)
244 (R_1 = H, R_2 = OH, R_3 = CH_3)



245 (R = OH)
246 (R = H)

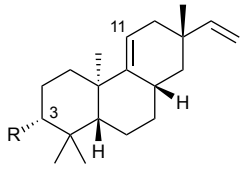


247

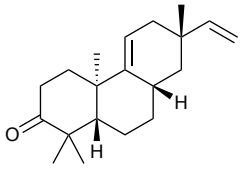


248

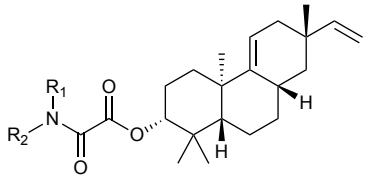
2.4.5 Diterpenoids: Oxaloterpins



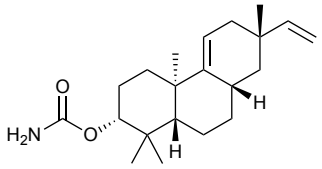
249 (R = OH)
250 (R = H)



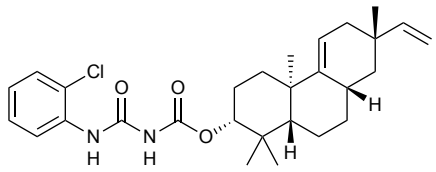
251



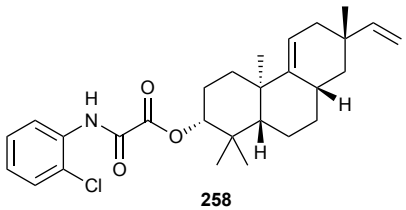
252 (R_1 = OH, R_2 = Ac)
253 (R_1 = OH, R_2 = CH_2CH_2OH)
254 (R_1 = OH, R_2 = H)
255 (R_1 = R_2 = H)



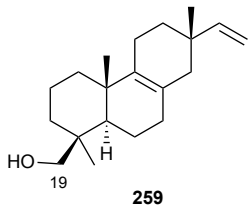
256



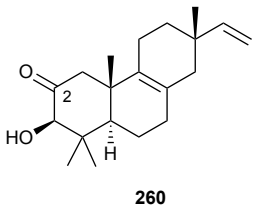
257



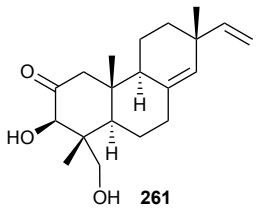
258



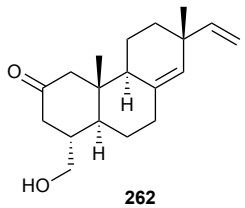
259



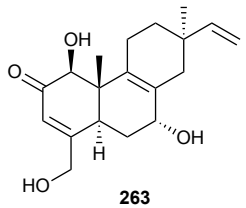
260



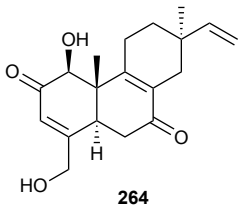
261



262

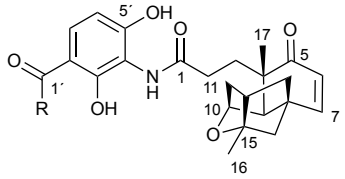


263

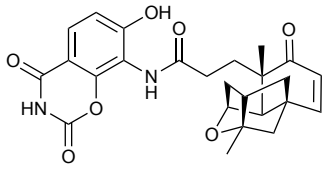


264

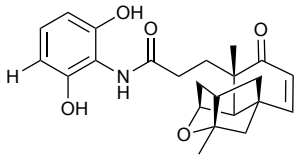
2.4.6.1 Diterpenoids: Platensimycin



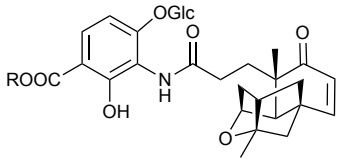
265 (R = OH)
268 (R = NH_2)
278 (R = SH)
280 (R = OCH_3)



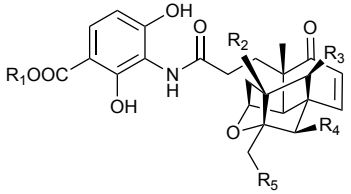
269



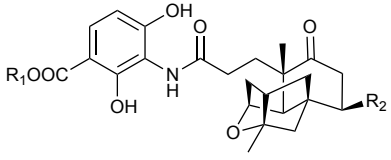
270



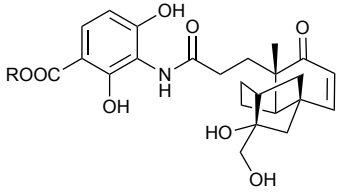
271 (R = H)
272 (R = CH_3)



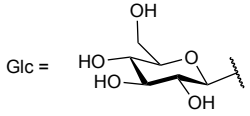
283 (R_1 = R_2 = R_3 = R_5 = H, R_4 = OH)
284 (R_1 = CH_3, R_2 = R_3 = R_5 = H, R_4 = OH)
285 (R_1 = R_2 = R_4 = R_5 = H, R_3 = OH)
286 (R_1 = CH_3, R_2 = R_4 = R_5 = H, R_3 = OH)
287 (R_1 = R_3 = R_4 = R_5 = H, R_2 = OH)
288 (R_1 = CH_3, R_2 = OH, R_3 = R_4 = R_5 = H)
289 (R_1 = R_2 = R_3 = R_4 = H, R_5 = OH)
290 (R_1 = CH_3, R_2 = R_3 = R_4 = H, R_5 = OH)

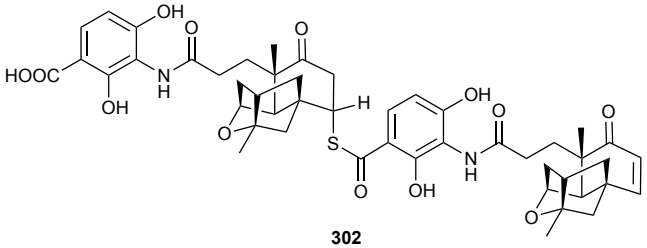


291 (R_1 = H, R_2 = OH)
292 (R_1 = CH_3, R_2 = OH)

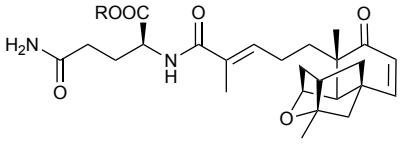


293 (R = H)
294 (R = CH_3)

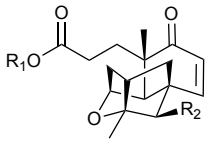




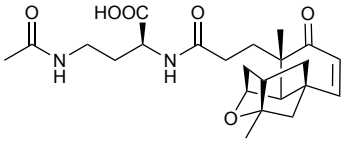
302



267 (R = H)
308 (R = CH_3)

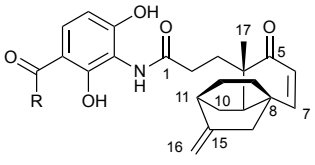


303 (R_1 = H, R_2 = H)
304 (R_1 = CH_3, R_2 = H)
305 (R_1 = H, R_2 = OH)
306 (R_1 = Me, R_2 = OH)

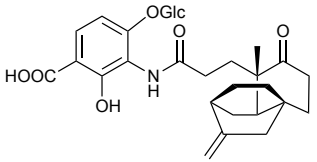


307

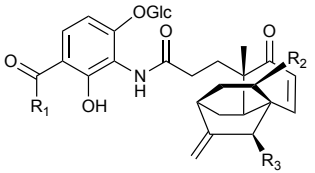
2.4.6.2 Diterpenoids: Platencin



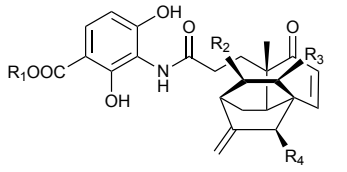
266 (R = OH)
279 (R = SH)



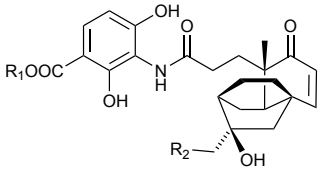
273



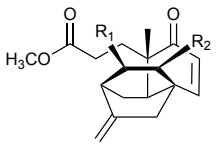
274 (R_1 = OH, R_2 = H, R_3 = H)
275 (R_1 = OH, R_2 = OH, R_3 = H)
276 (R_1 = OH, R_2 = H, R_3 = OH)
277 (R_1 = SCH_3, R_2 = OH, R_3 = H)



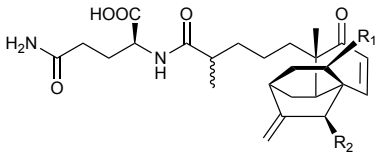
295 (R_1 = R_2 = R_4 = H, R_3 = OH)
296 (R_1 = CH_3, R_2 = R_4 = H, R_3 = OH)
297 (R_1 = R_3 = R_4 = H, R_2 = OH)
298 (R_1 = R_2 = R_3 = H, R_4 = OH)



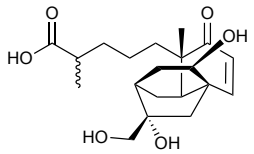
299 (R_1 = R_2 = H)
300 (R_1 = H, R_2 = OH)
301 (R_1 = CH_3, R_2 = OH)



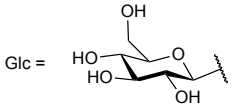
281 (R_1 = H, R_2 = OH)
282 (R_1 = OH, R_2 = H)



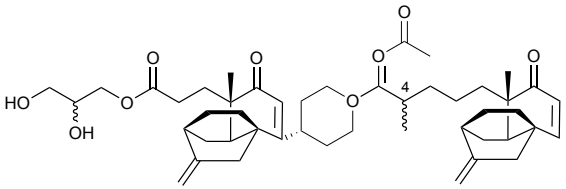
309 (R_1 = R_2 = H)
310 (R_1 = OH, R_2 = H)
311 (R_1 = H, R_2 = OH)



312

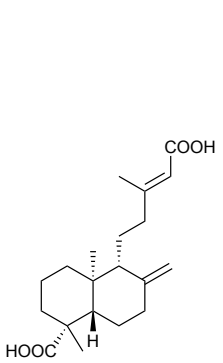


Glc =

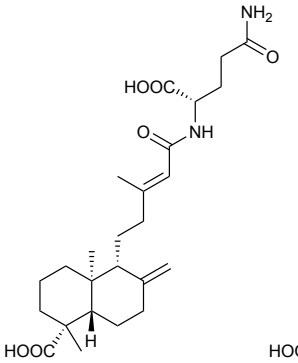


315

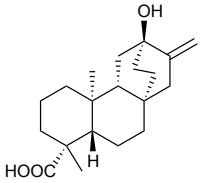
316 (*4S*)
317 (*4R*)



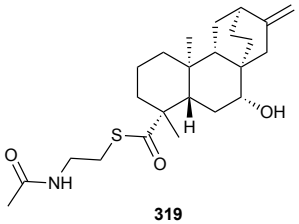
313



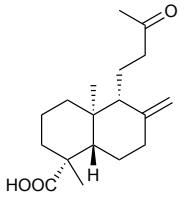
314



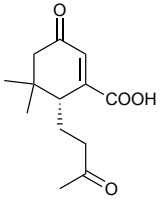
318



319

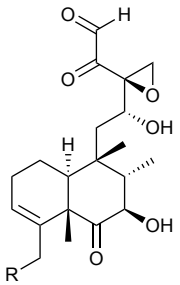


320

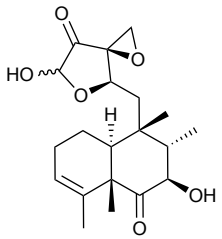


321

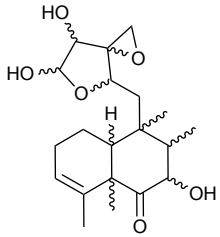
2.4.7 Diterpenoids: Terpentecins



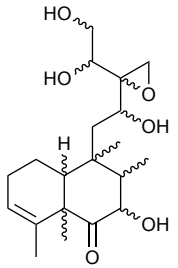
322 (R = H)
323 (R = OH)



322 – hemiacetal form

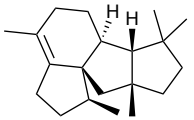


324

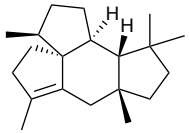


325

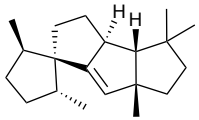
2.4.8 Diterpenoids: Miscellaneous diterpenoids



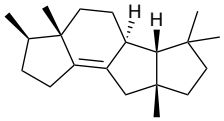
326



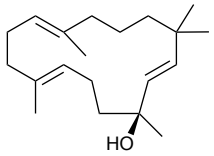
327



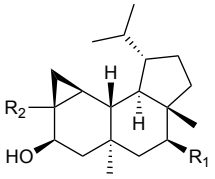
328



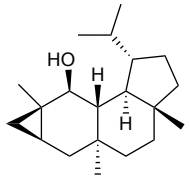
329



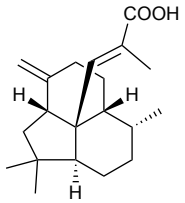
330



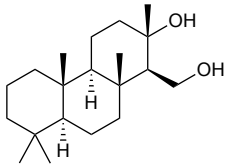
331 (R_1 = H, R_2 = CH_3)
332 (R_1 = OH, R_2 = CH_3)
333 (R_1 = H, R_2 = CH_2OH)
334 (R_1 = OH, R_2 = CH_2OH)
335 (R_1 = OH, R_2 = CHO)



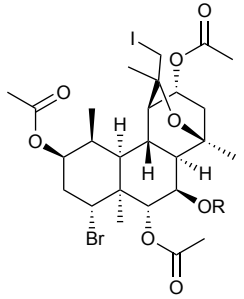
336



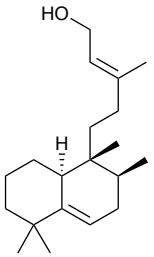
337



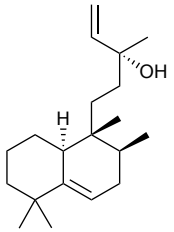
338



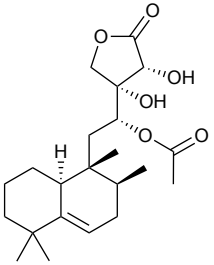
339 (R = H)
340 (R = Ac)



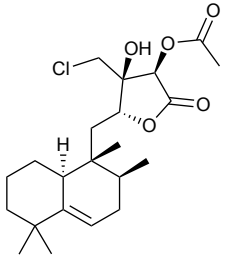
341



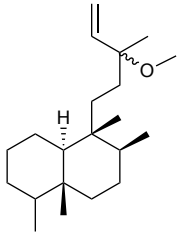
342



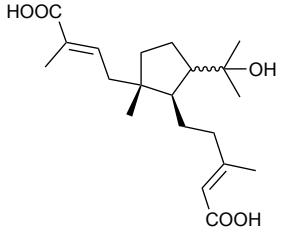
343



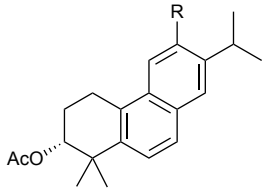
344



345

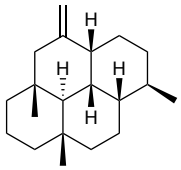


346

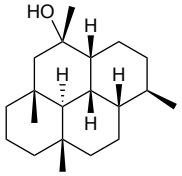


347 (R = H)
348 (R = OH)

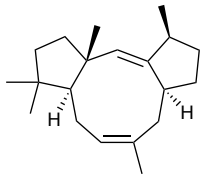
2.4.9 Diterpenoids: Heterologously expressed diterpenoids



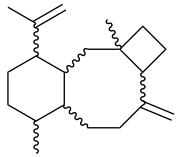
349



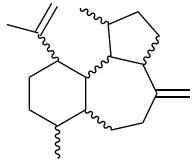
350



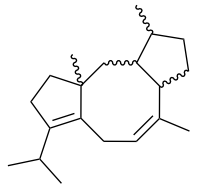
351



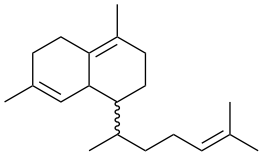
352



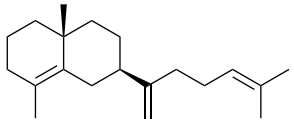
353



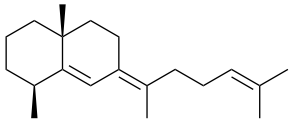
354



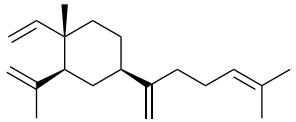
355



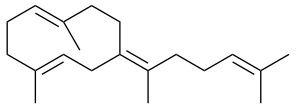
356



357

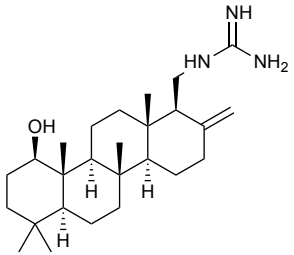


358

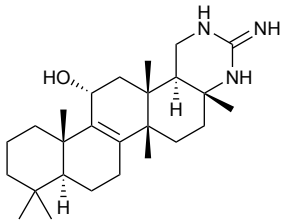


359

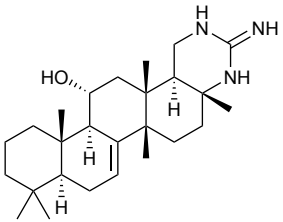
2.5 Sesterterpenoids



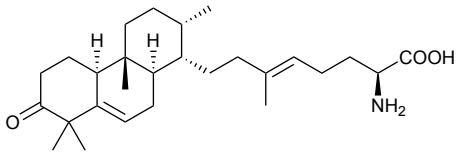
360



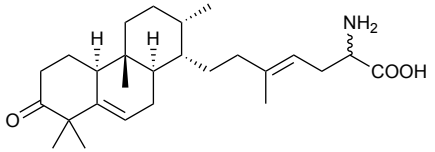
361



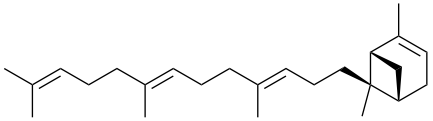
362



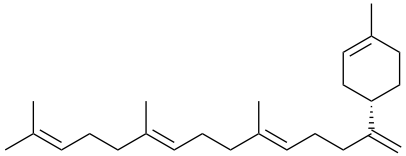
363



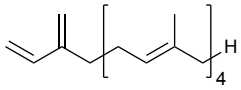
364



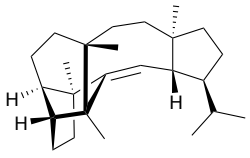
365



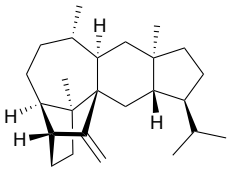
366



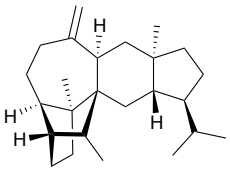
367



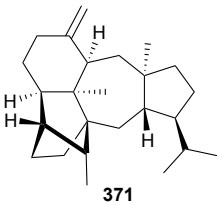
368



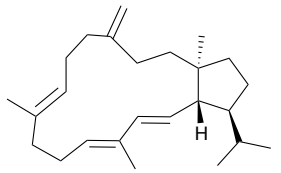
369



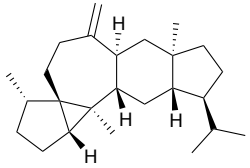
370



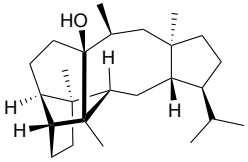
371



372

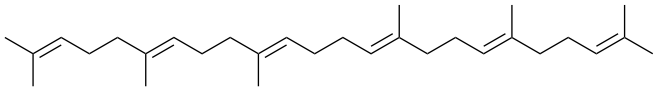


373

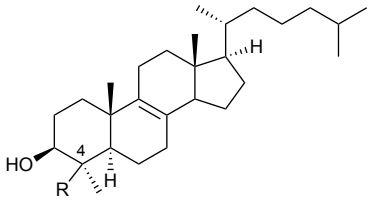


374

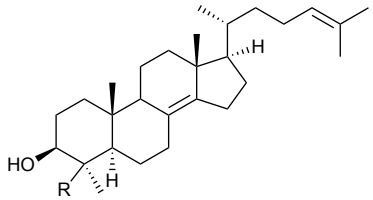
2.6.1 Triterpenoids: Sterols



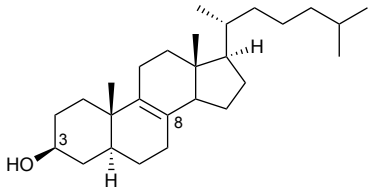
375



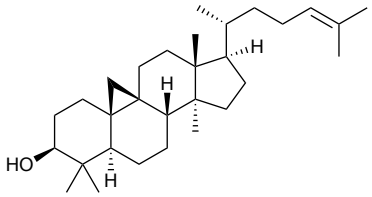
376 (R = H)
378 (R = CH_3)



377 (R = H)
379 (R = CH_3)

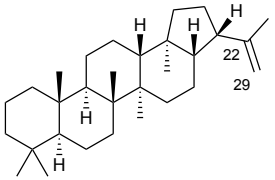


380

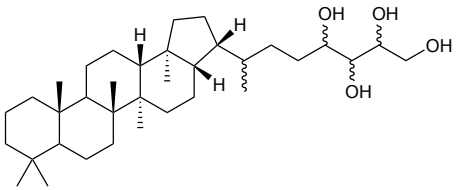


381

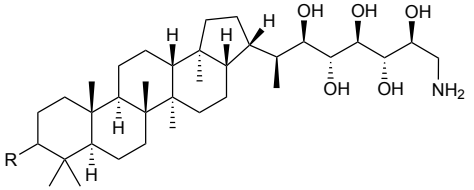
2.6.1 Triterpenoids: Hopanoids



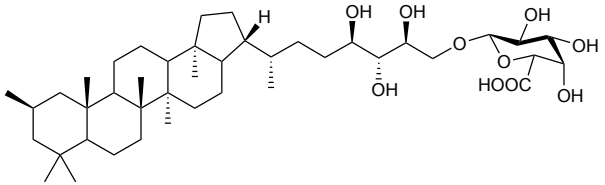
382



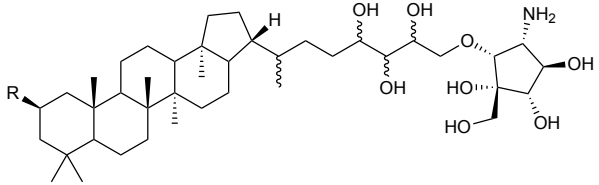
383



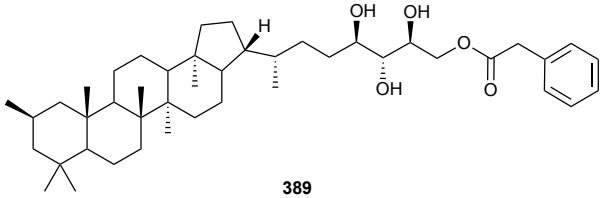
384 (R = H)
385 (R = CH_3)



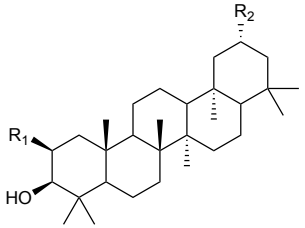
386



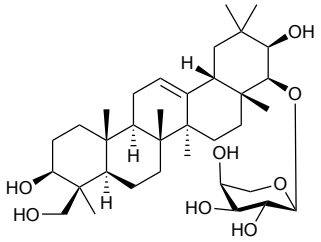
387 (R = H)
388 (R = CH_3)



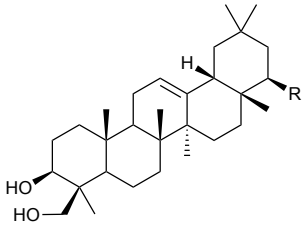
389



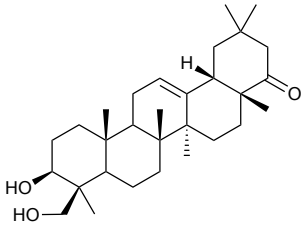
390 (R_1 = R_2 = H)
391 (R_1 = H, R_2 = CH_3)
392 (R_1 = R_2 = CH_3)
393 (R_1 = CH_3, R_2 = H)



394

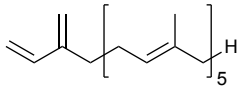


395 (R = H)
396 (R = OH)

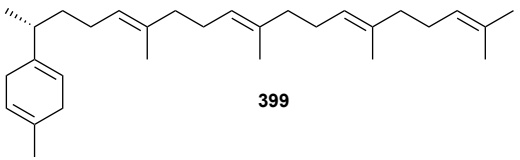


397

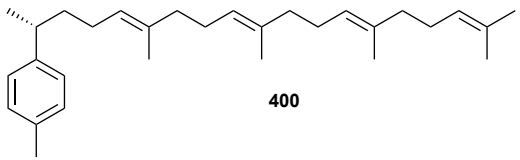
2.6.2 Triterpenoids: Miscellaneous triterpenoids



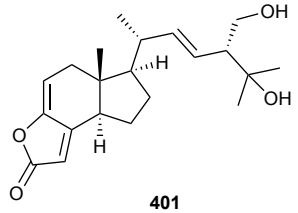
398



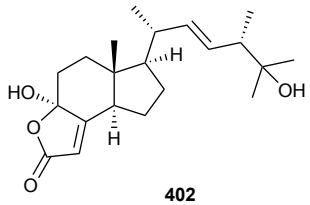
399



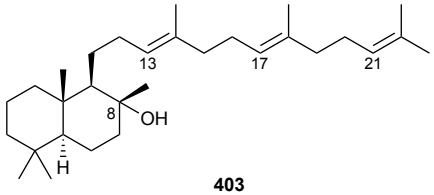
400



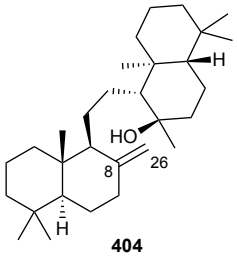
401



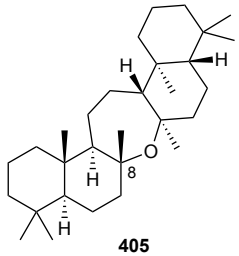
402



403

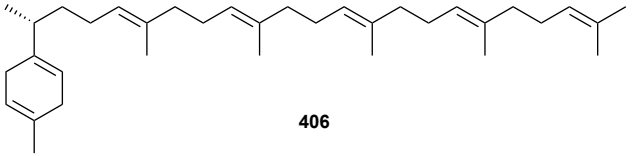


404

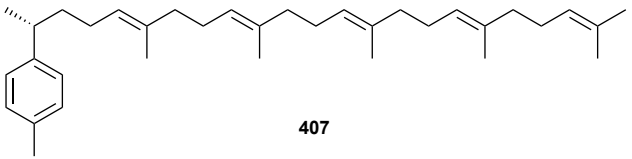


405

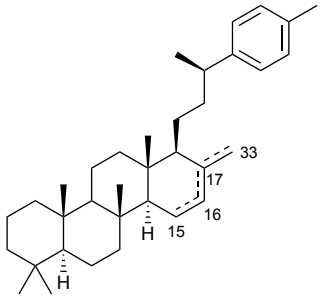
2.7 Sesquarterpenoids



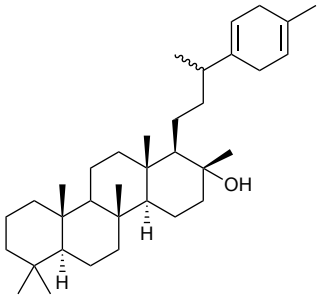
406



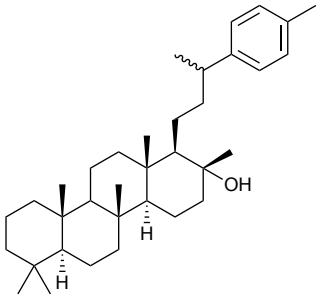
407



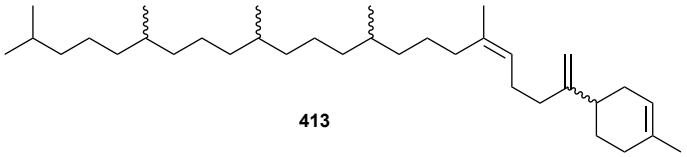
408 ($\Delta^{16,17}$)
409 ($\Delta^{17,33}$)
410 ($\Delta^{15,16}$)



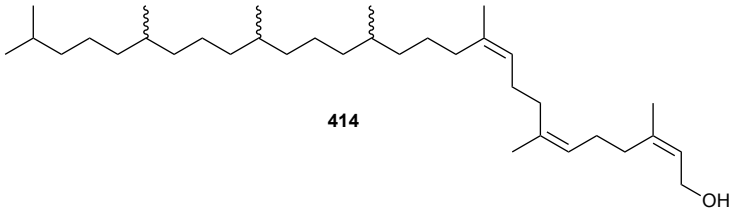
411



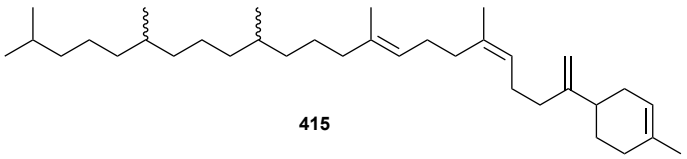
412



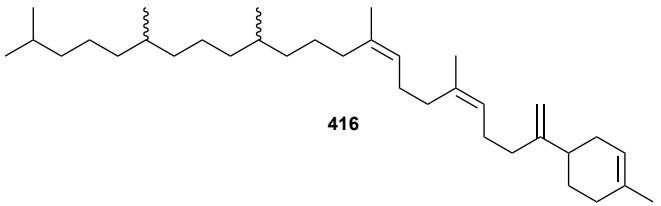
413



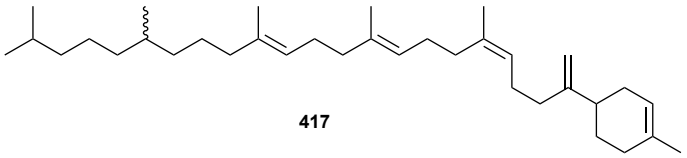
414



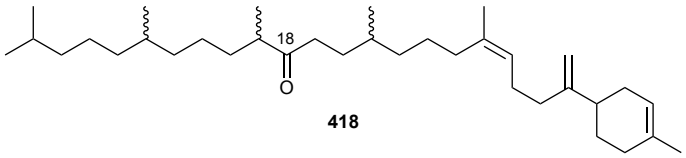
415



416

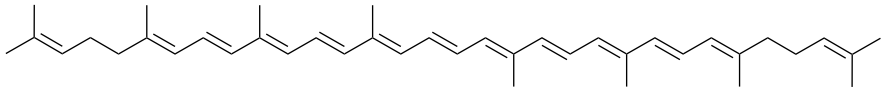


417

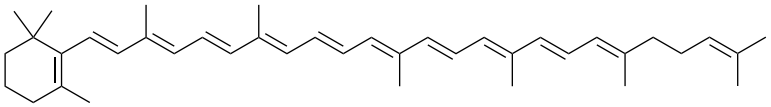


418

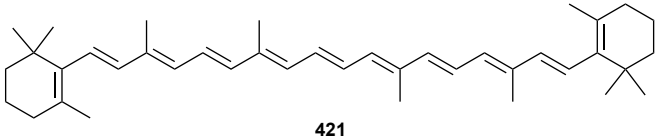
2.8.1 Tetraterpenoids: Carotenoids



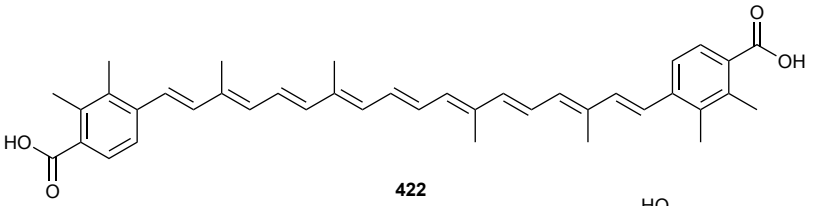
419



420



421



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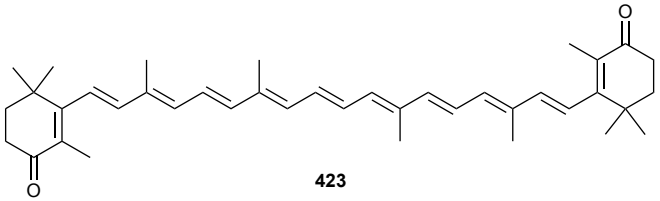
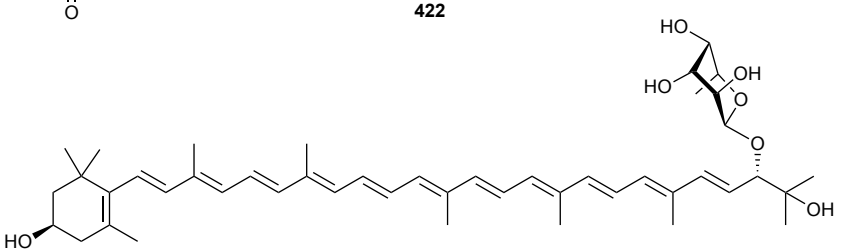
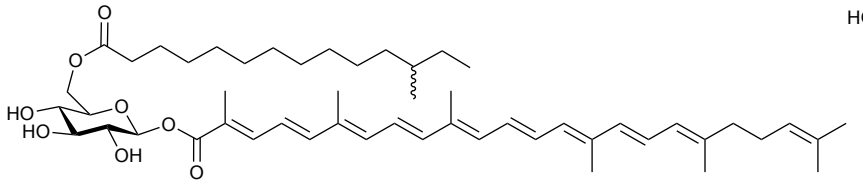


423

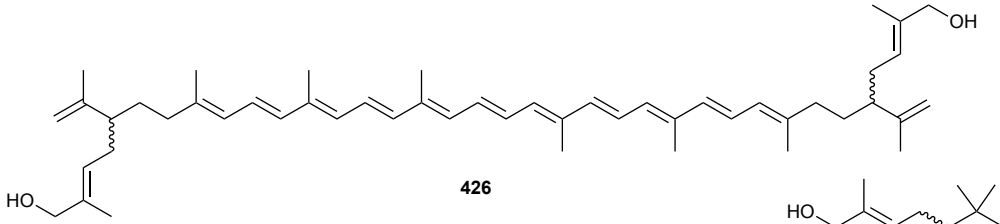


424

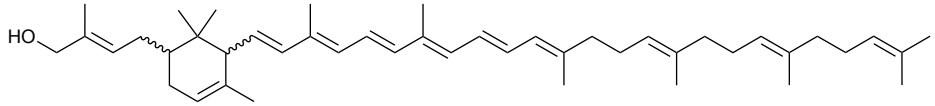


425

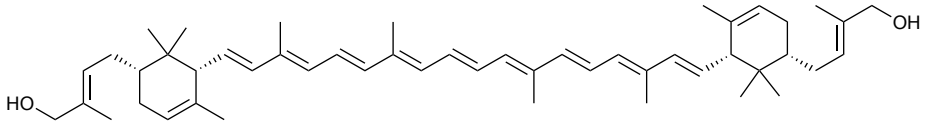
2.8.2 Tetraterpenoids: Other carotenoids



426

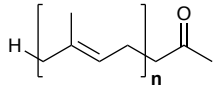


427

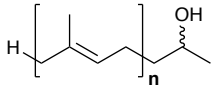


428

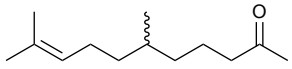
2.8.3 Tetraterpenoids: Norcarotenoids



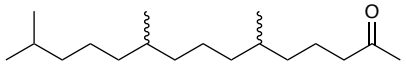
429 (n = 1)
431 (n = 2)
435 (n = 6)



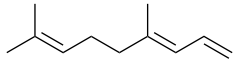
430 (n = 1)
432 (n = 2)



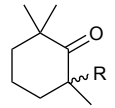
433



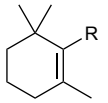
434



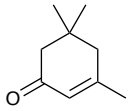
436



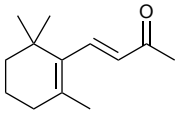
437 (R = H)
438 (R = OH)



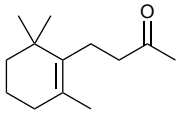
439 (R = CHO)
440(R = CH_2OH)



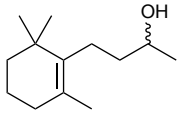
441



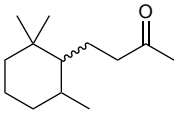
442



443



444



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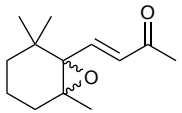
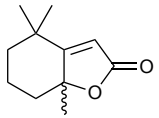
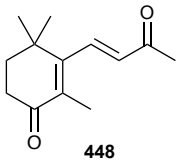


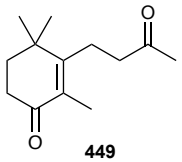
446



447



448



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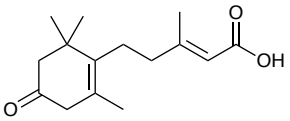

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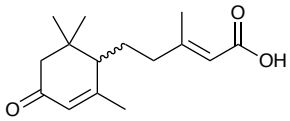

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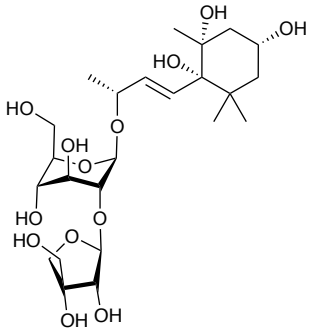

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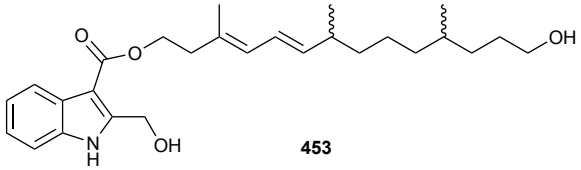

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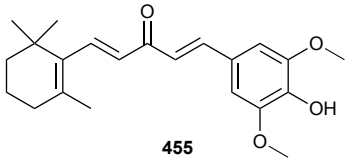

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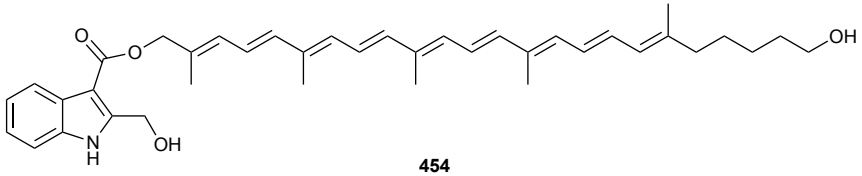
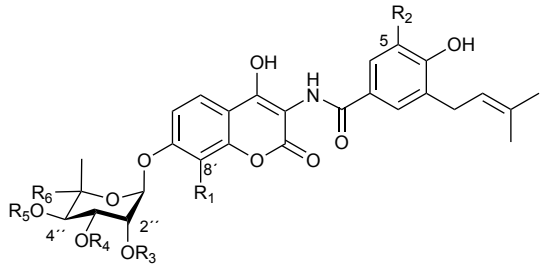
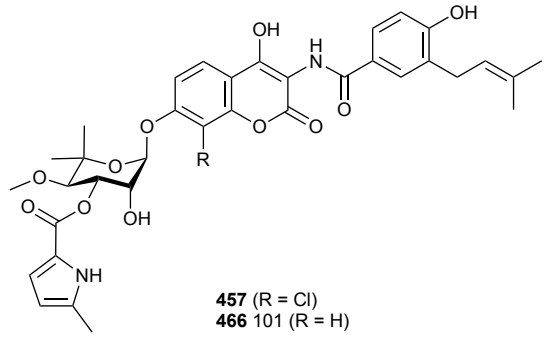


454

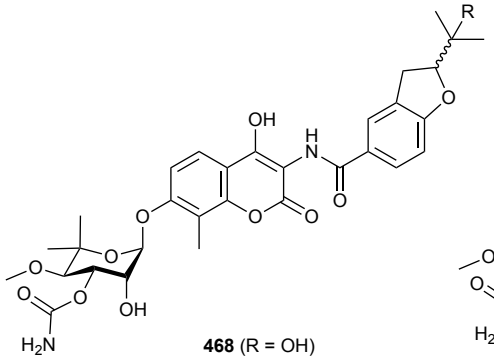
3.1 Aminocoumarins



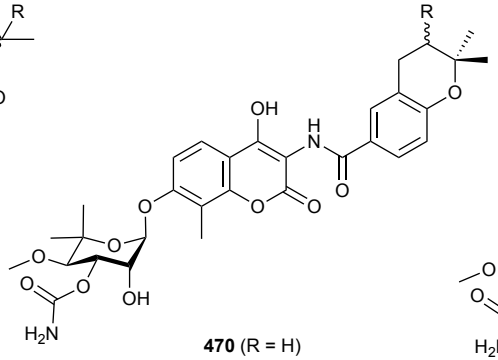
456 ($R_1 = R_5 = R_6 = CH_3$, $R_2 = R_3 = H$, $R_4 = CONH_2$)
458 ($R_1 = R_6 = CH_3$, $R_2 = R_3 = R_5 = H$, $R_4 = CONH_2$)
459 ($R_1 = R_2 = R_3 = H$, $R_5 = R_6 = CH_3$, $R_4 = CONH_2$)
460 ($R_1 = R_5 = CH_3$, $R_2 = R_3 = R_6 = H$, $R_4 = CONH_2$)
461 ($R_1 = R_5 = R_6 = CH_3$, $R_2 = R_3 = R_4 = H$)
462 ($R_1 = R_6 = CH_3$, $R_2 = R_3 = R_4 = R_5 = H$)
463 ($R_1 = R_5 = R_6 = CH_3$, $R_2 = OH$, $R_3 = H$, $R_4 = CONH_2$)
464 ($R_1 = R_6 = CH_3$, $R_2 = OH$, $R_3 = R_5 = H$, $R_4 = CONH_2$)
465 ($R_1 = R_6 = CH_3$, $R_2 = OH$, $R_3 = R_4 = R_5 = H$)
467 ($R_1 = R_5 = R_6 = CH_3$, $R_2 = R_4 = H$, $R_3 = CONH_2$)



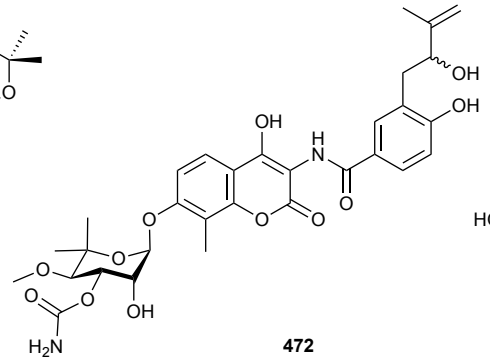
457 (R = Cl)
466 101 (R = H)



468 (R = OH)
469 (R = H)



470 (R = H)
471 (R = OH)



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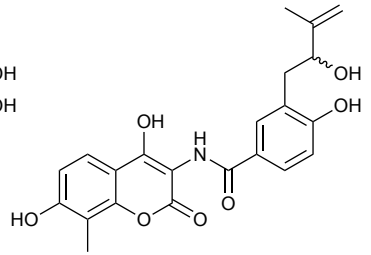
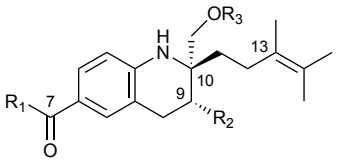
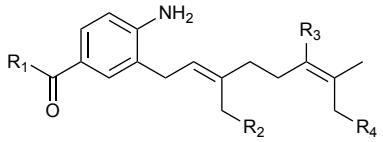


473

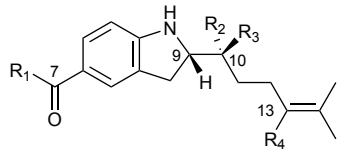
3.2 Benzastatins



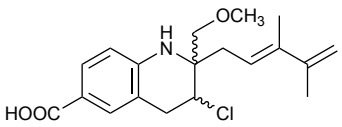
474 (R_1 = OH, R_2 = Cl, R_3 = CH_3)
477 (R_1 = NH_2, R_2=Cl, R_3 = CH_3)
478 (R_1=NH_2, R_2=OH, R_3 = CH_3)
486 (R_1 = R_2 = OH, R_3 = CH_3)
488 (R_1 = OH, R_2 = erg, R_3 = CH_3)
489 (R_1 = NH-HCP, R_2 = OH, R_3 = CH_3)
494 (R_1 = OH, R_2 = Cl, R_3 = H)
495 (R_1 = R_2 = OH, R_3 = H)



475 (R_1 = NH_2, R_2 = OCH_3, R_3 = CH_3, R_4 = H)
476 (R_1 = NH_2, R_2 = R_4 = H, R_3 = CH_3)
482 (R_1 = NH_2, R_2 = R_4 = H, R_3 = CH_2OH)
483 (R_1 = NH_2, R_2 = H, R_3 = CH_3, R_4 = OH)
496 (R_1 = OH, R_2 = R_3 = R_4 = H)
497 (R_1 = OH, R_2 = R_4 = H, R_3 = CH_3)
498 (R_1 = R_2 = OH, R_3 = CH_3, R_4 = H)



479 (R_1 = NH_2, R_2 = OH, R_3 = CH_2OCH_3, R_4 = CH_3)
480 (R_1 = NH_2, R_2 = OH, R_3 = R_4 = CH_3)
481 (R_1 = NH_2, R_2 = OH, R_3 = CH_3, R_4 = H)
484 (R_1 = OH, R_2 = OH, R_3 = CH_3, R_4 = H)
485 (R_1 = R_2 = OH, R_3 = CH_2OCH_3, R_4 = CH_3)
487 (R_1 = OH, R_2 = Cl, R_3 = CH_2OCH_3, R_4 = CH_3)
490 (R_1 = NH–HCP, R_2 = OH, R_3 = CH_2OCH_3, R_4 = CH_3)
499 (R_1 = R_2 = OH, R_3 = R_4 = CH_3)



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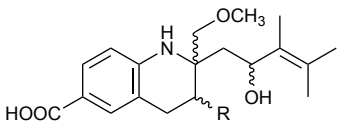
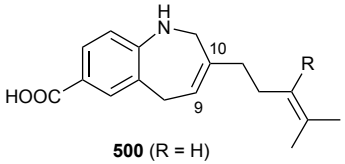
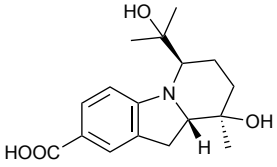


492 (R = Cl)
493 (R = OCH_3)



500 (R = H)
501 K (R = CH_3)



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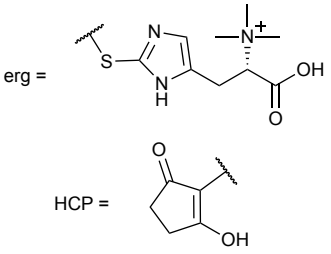
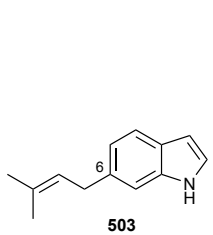


3.3.1 Indoles: Simple Indoles



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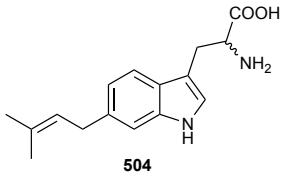

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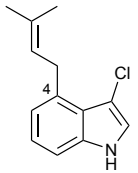

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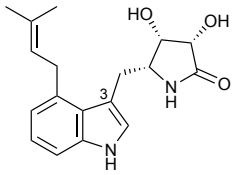

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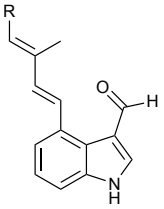
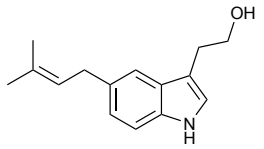


507 (R = H)
508 (R = Cl)



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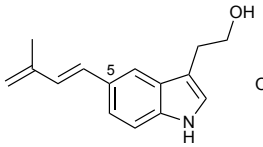

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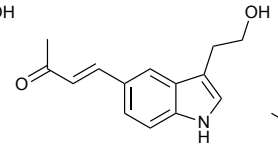

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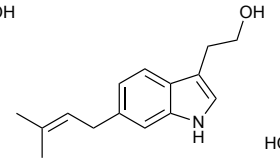

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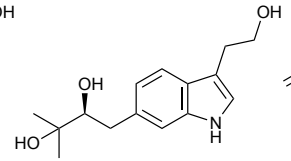

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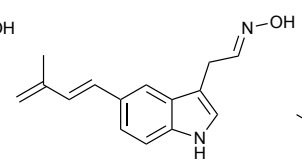

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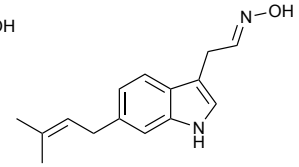

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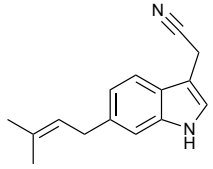

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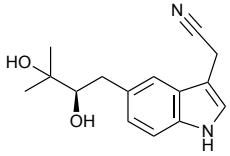

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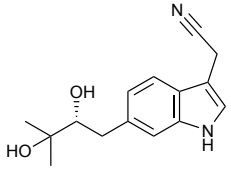

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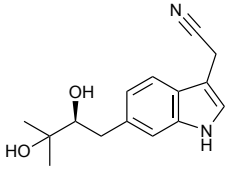

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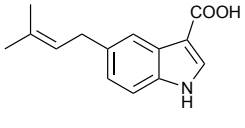

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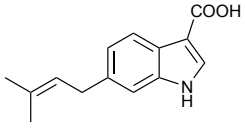

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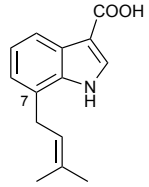

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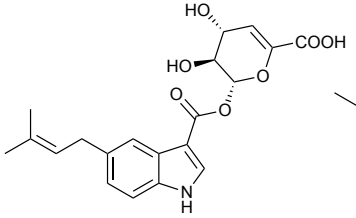

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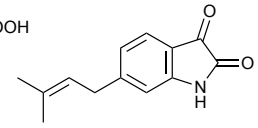

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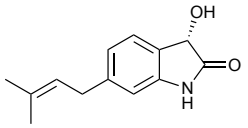

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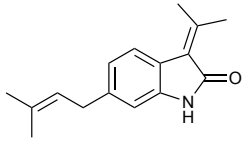

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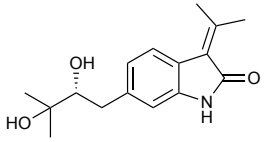

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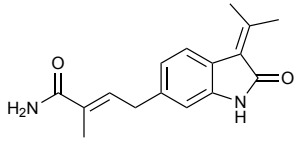

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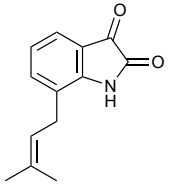

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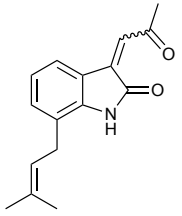
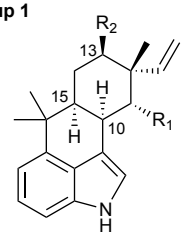


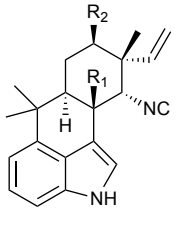
530

3.3.2.1 Indoles: Hapalindole-like indole alkaloids group 1

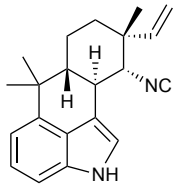
Group 1



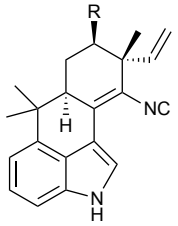
531 (R_1 = NC, R_2 = Cl)
532 (R_1 = NCS, R_2 = Cl)
533 (R_1 = NC, R_2 = H)
534 (R_1 = NCS, R_2 = H)
535 (R_1 = NCS, R_2 = OH)
536 (R_1 = NHCHO, R_2 = Cl)
537 (R_1 = NHCHO, R_2 = H)



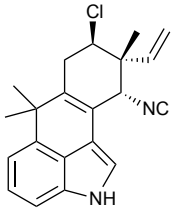
538 (R_1 = H, R_2 = Cl)
539 (R_1 = R_2 = H)
540 (R_1 = OH, R_2 = Cl)



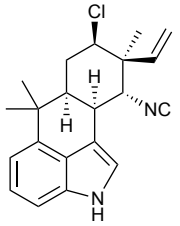
541



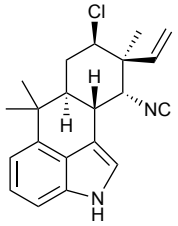
542 (R = Cl)
543 (R = H)



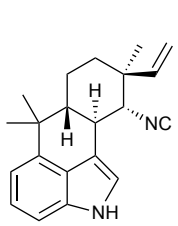
544



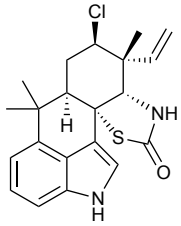
545 (R = Cl)
546 (R = H)



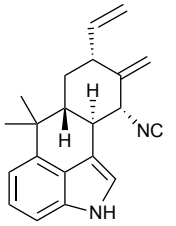
547



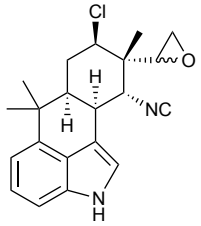
548



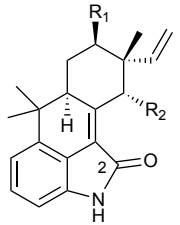
549



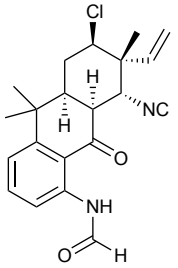
550



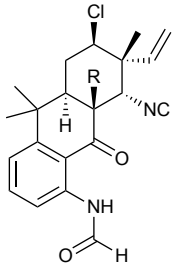
551/**552**
(epimers not determined)



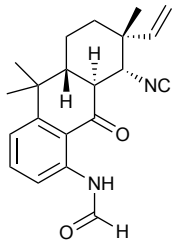
553 (R_1 = Cl, R_2 = NC)
554 (R_1 = Cl, R_2 = NCS)
555 (R_1 = H, R_2 = NCS)



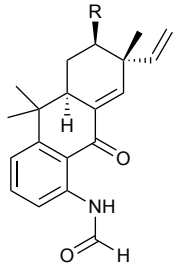
556



557 (R = H)
558 (R = OH)



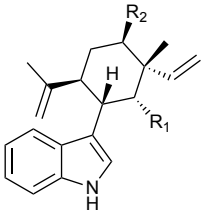
559



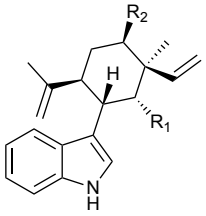
560 (R = Cl)
561 (R = H)
562 (R = OH)

3.3.2.2 Indoles: Hapalindole-like indole alkaloids groups 2–5

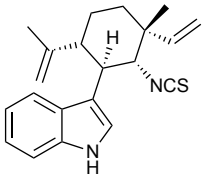
Group 2



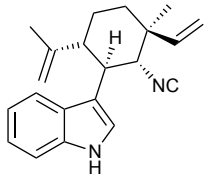
563 (R_1 = NC, R_2 = H)
564 (R_1 = NCS, R_2 = H)
565 (R_1 = NC, R_2 = Cl)
566 (R_1 = NCS, R_2 = Cl)



567 (R_1 = NC, R_2 = H)
568 (R_1 = NCS, R_2 = H)
569 (R_1 = NC, R_2 = Cl)
570 (R_1 = NCS, R_2 = Cl)

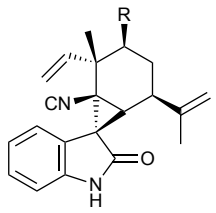


571



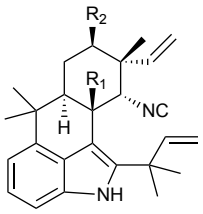
572

Group 3



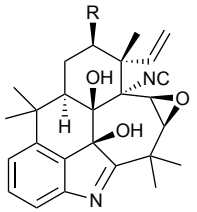
573 (R = Cl)
574 (R = H)

Group 4

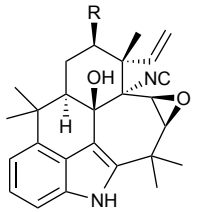


575 (R_1 = H, R_2 = Cl)
576 (R_1 = OH, R_2 = Cl)
577 (R_1 = OH, R_2 = H)
578 (R_1 = H, R_2 = H)

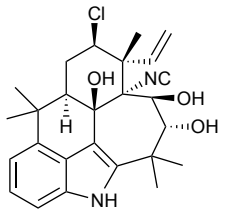
Group 5



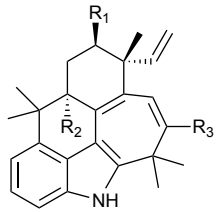
579 (R = Cl)
580 (R = H)



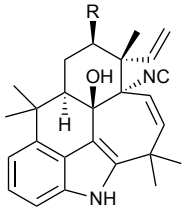
581 (R = Cl)
582 (R = H)



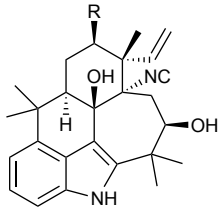
583



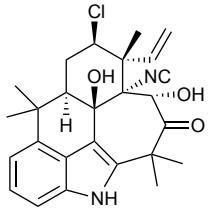
584 (R_1 = Cl, R_2 = H, R_3 = CN)
585 (R_1 = R_3 = H, R_2 = OH)
586 (R_1 = R_2 = H, R_3 = CN)



587 (R = Cl)
588 (R = H)



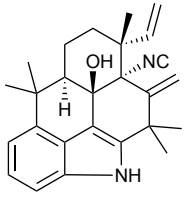
589 (R = Cl)
590 (R = H)



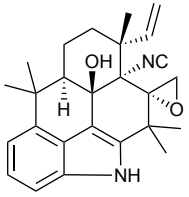
591

3.3.2.3 Indoles: Hapalindole-like indole alkaloids groups 6–9

Group 6

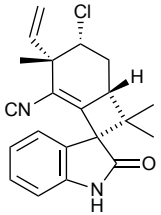


592



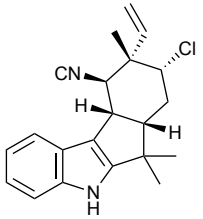
593

Group 8

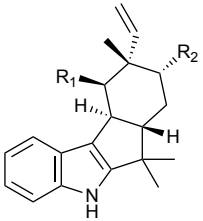


603

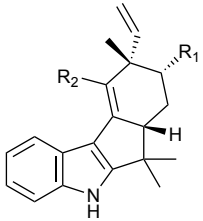
Group 7



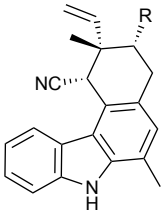
594



595 (R_1 = NC, R_2 = Cl)
596 (R_1 = NC, R_2 = H)
597 (R_1 = NCS, R_2 = H)

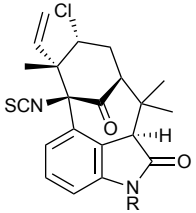


598 (R_1 = Cl, R_2 = NC)
599 (R_1 = Cl, R_2 = CN)
600 (R_1 = H, R_2 = CN)

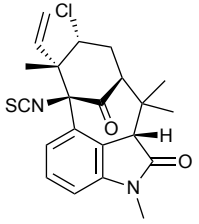


601 (R = Cl)
602 (R = H)

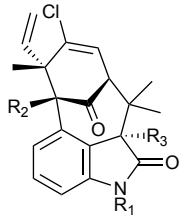
Group 9



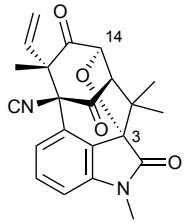
604 (R = H)
605 (R = CH_3)



606

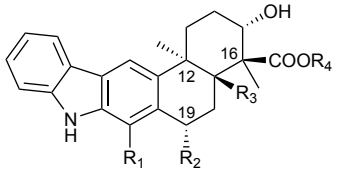


607 (R_1 = CH_3, R_2 = NC, R_3 = H)
608 (R_1 = H, R_2 = NCS, R_3 = H)
609 (R_1 = CH_3, R_2 = NCS, R_3 = H)
610 (R_1 = CH_3, R_2 = NC, R_3 = OH)
611 (R_1 = CH_3, R_2 = NCS, R_3 = OH)

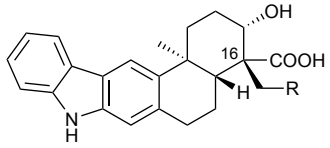


612

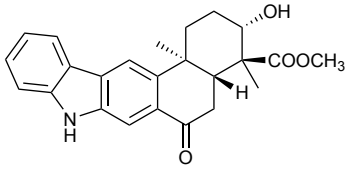
3.3.3.1 Indoles: Xiamycin monomers



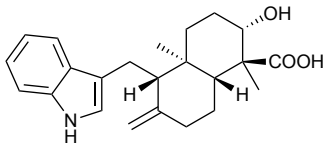
613 ($R_1 = R_2 = R_3 = R_4 = H$)
614 ($R_1 = R_2 = R_3 = H$, $R_4 = CH_3$)
617 ($R_1 = R_2 = R_4 = H$, $R_3 = OH$)
618 ($R_1 = R_3 = R_4 = H$, $R_2 = OH$)
619 ($R_1 = R_3 = H$, $R_2 = OH$, $R_4 = CH_3$)
621 ($R_1 = Cl$, $R_2 = R_3 = R_4 = H$)



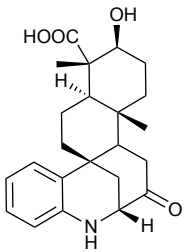
615 (R = H)
616 (R = OH)



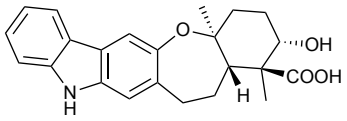
620



622

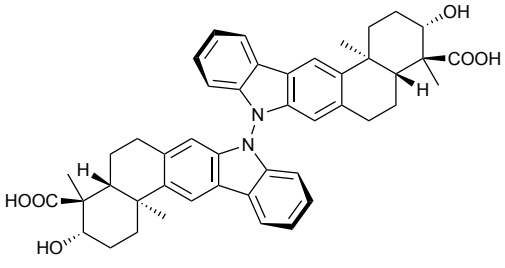


623

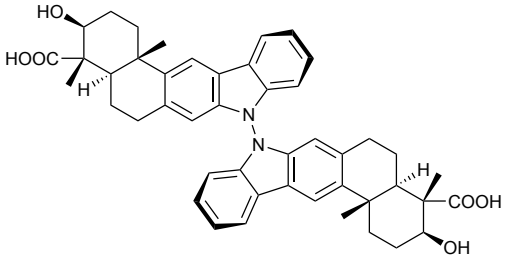


624

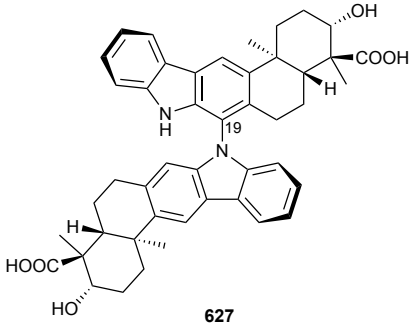
3.3.3.2 Indoles: Xiamycin dimers



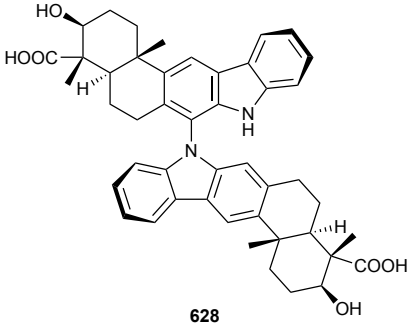
625



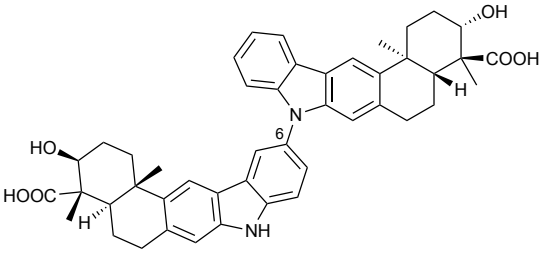
626



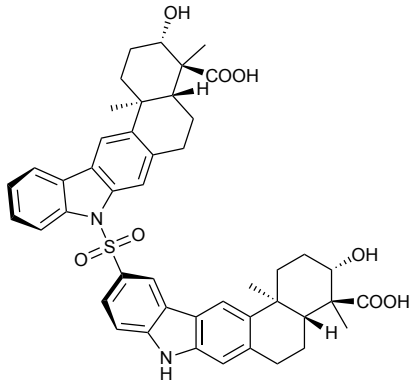
627



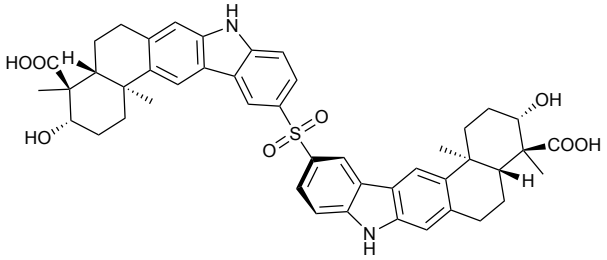
628



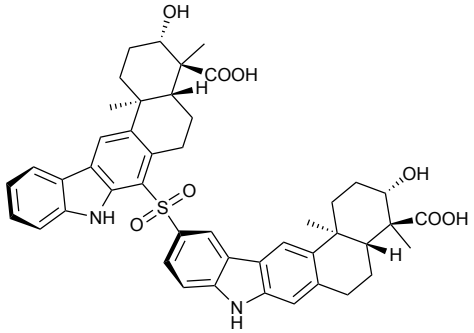
629



630

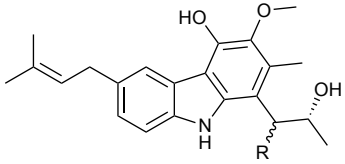


631

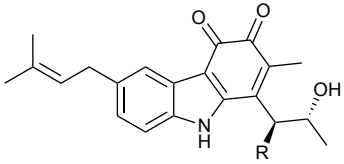


632

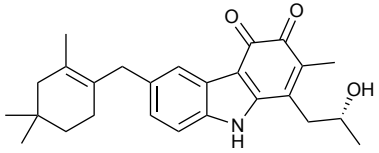
3.3.4 Indoles: Miscellaneous polycyclic indoles



633 (R = OH)
634 (R = H)
635 (R = OCH_3)



636 (R = H)
637 (R = OH)



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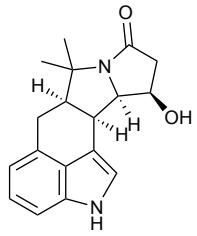
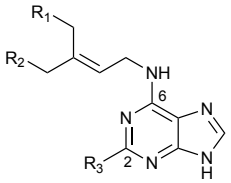
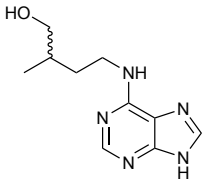


639

3.4 Nucleobases and nucleosides



640 (R_1 = R_2 = R_3 = H)
641 (R_1 = OH, R_2 = R_3 =H)
642 (R_1 = R_3 = H, R_2 =OH)
645 (R_1 = OH, R_2 = H, R_3 = SCH_3)



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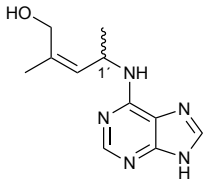

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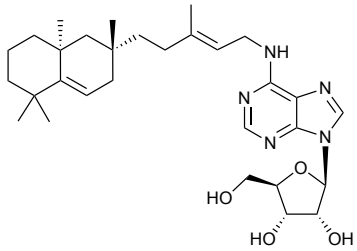

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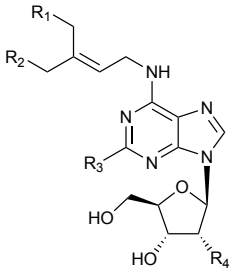
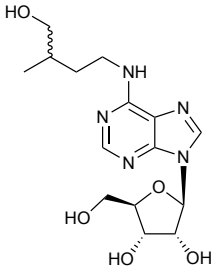


646 (R_1 = R_2 = R_3 = H, R_4 = OH)
647 (R_1 = OH, R_2 = R_3 = H)
648 (R_1 = R_3 = H, R_2 = R_4 = OH)
649 (R_1 = R_3 = R_4 = H, R_2 = OH)
650 (R_1 = R_2 = H, R_3 = SCH_3)
651 (R_1 = OH, R_2 = H, R_3 = SCH_3)



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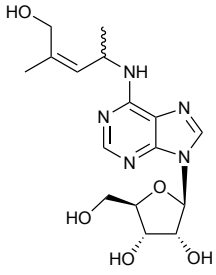

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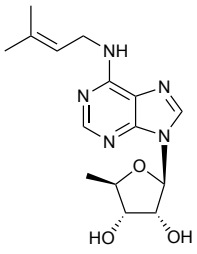

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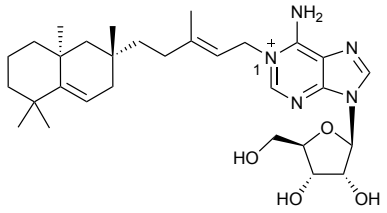

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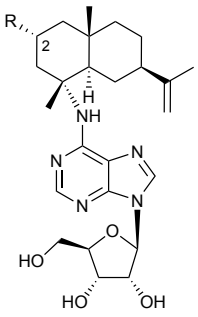
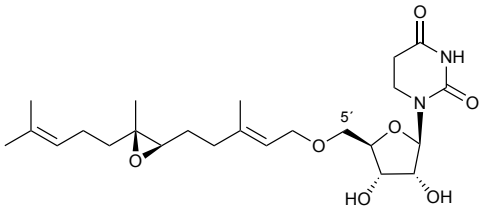


655 (R =H)
656 (R = OH)



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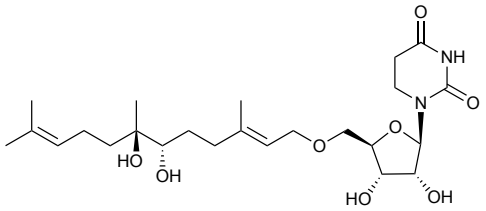

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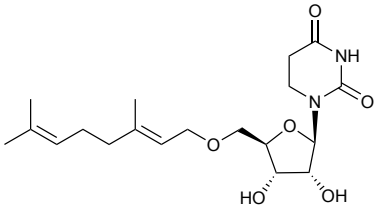

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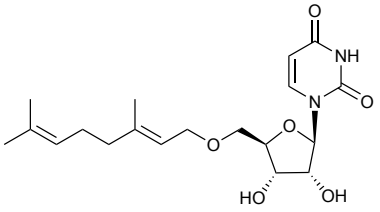
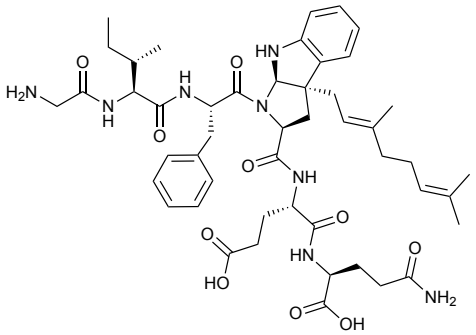


662

3.5.1.1 Peptides: Ribosomal peptides: ComX



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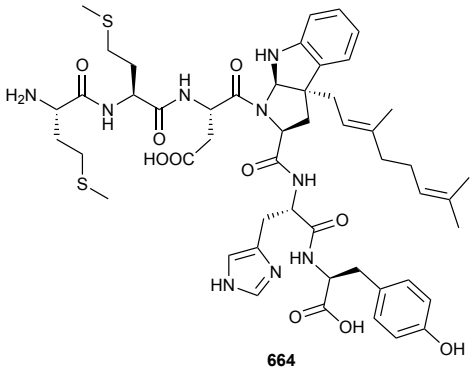

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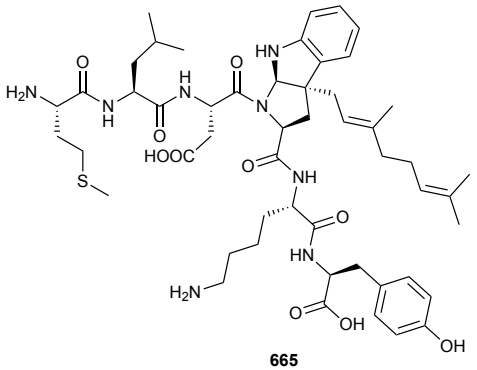

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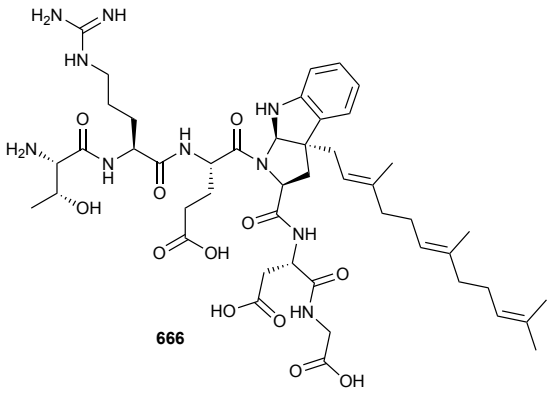

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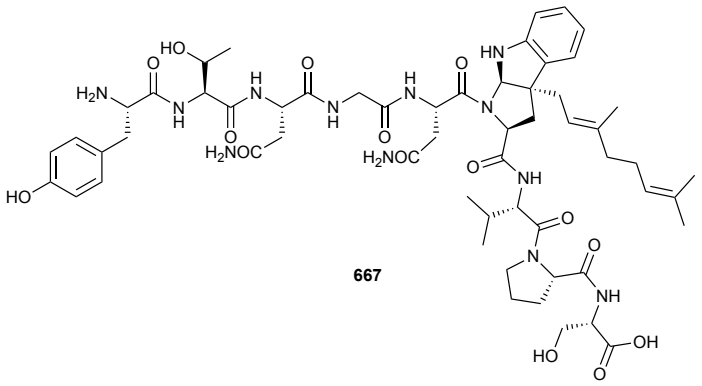

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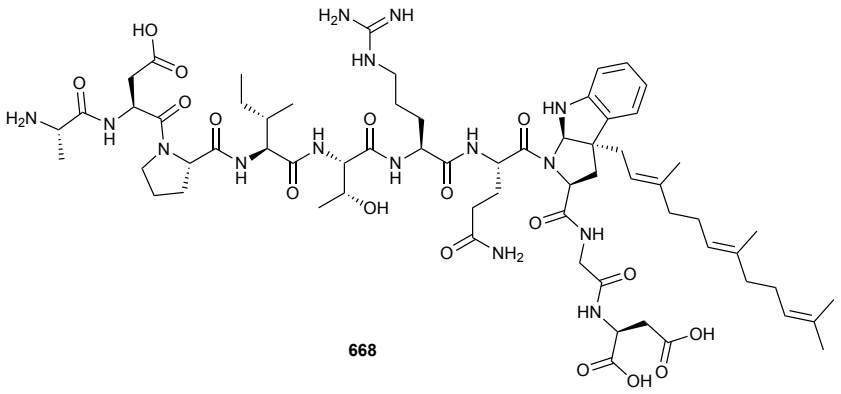

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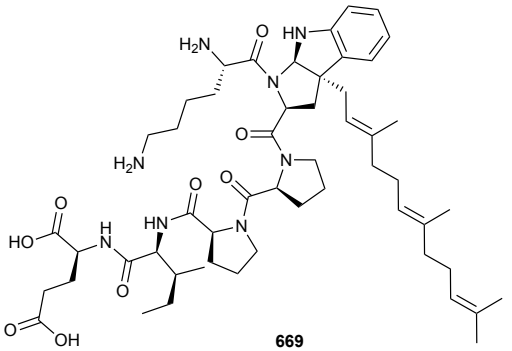
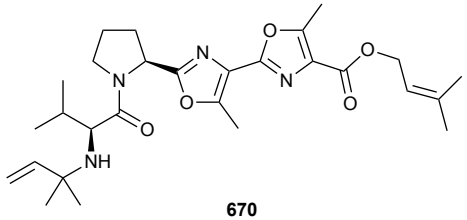


669

3.5.1.1 Peptides: Ribosomal peptides: Linear cyanobactins



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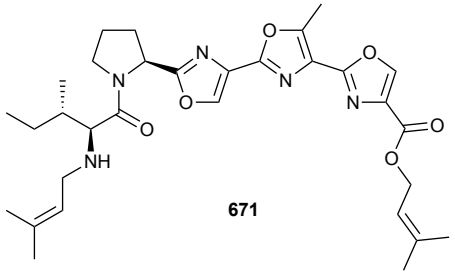

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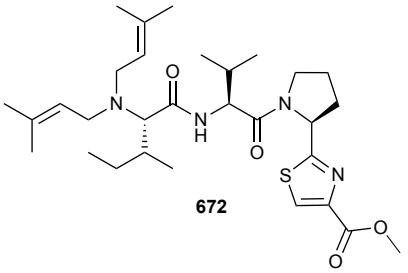

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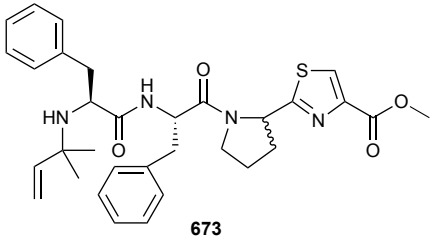

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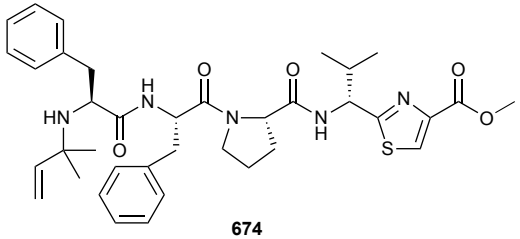

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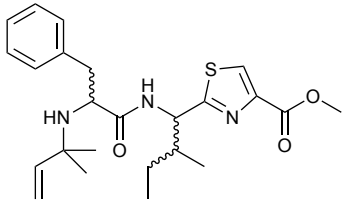
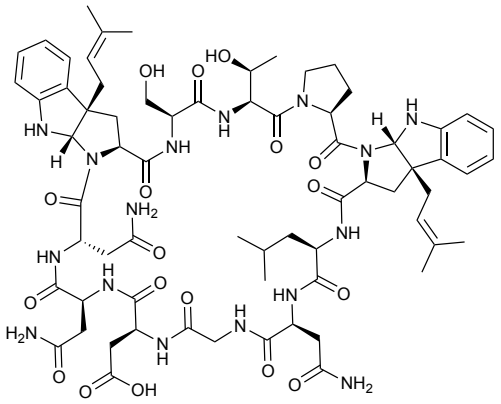


675

3.5.1.1 Peptides: Ribosomal peptides: Cyclic cyanobactins



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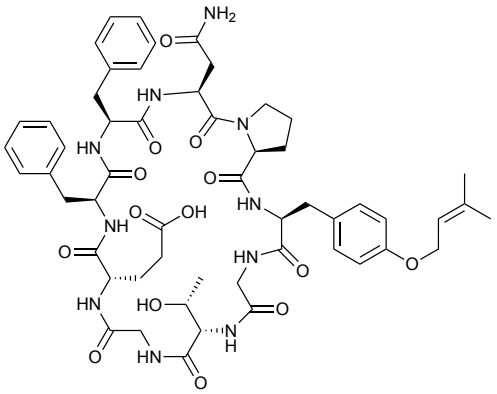

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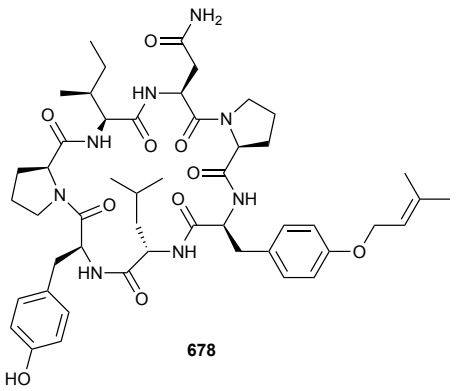

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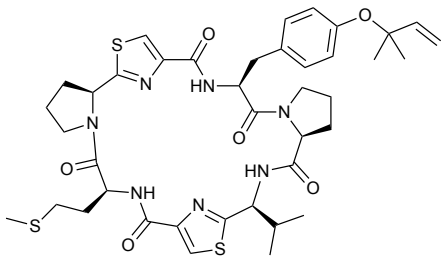

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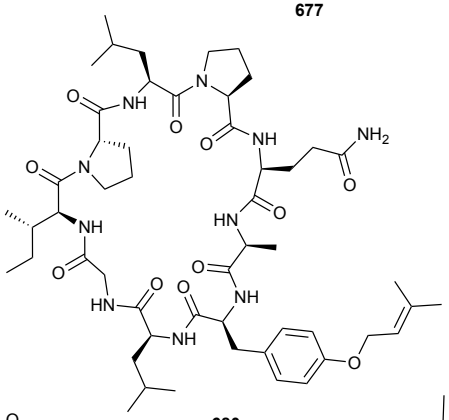

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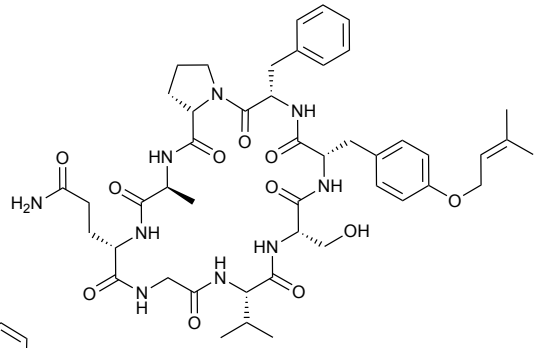

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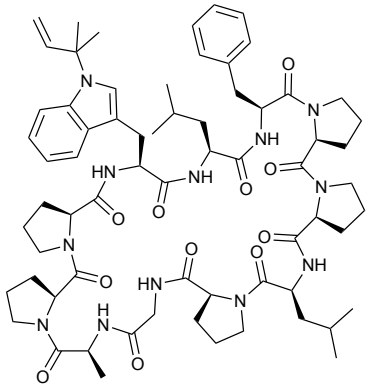

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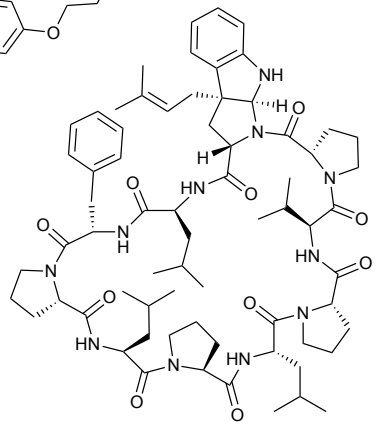

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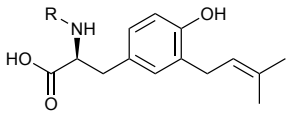
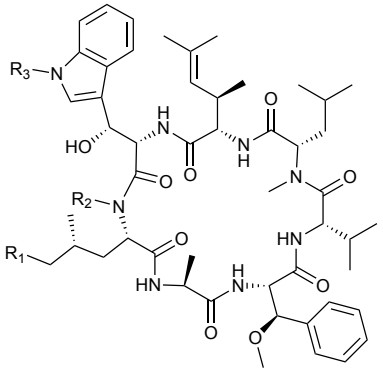
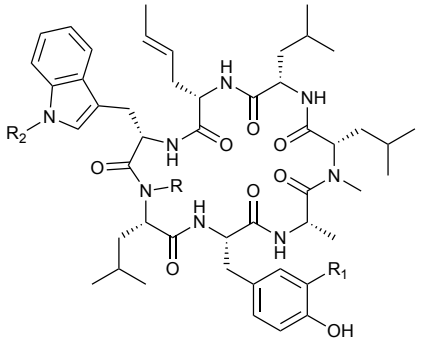


684 (R = H)
685 (R = $COCH_3$)

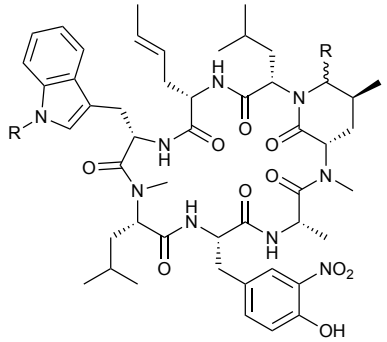
3.5.2 Nonribosomal peptides



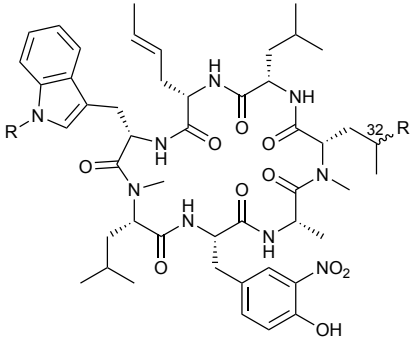
686 (R_1 = OH, R_2 = CH_3, R_3 = epoxy-r-prenyl
687 (R_1 = H, R_2 = CH_3, R_3 = epoxy-r-prenyl)
688 (R_1 = OH, R_2 = CH_3, R_3 = r-prenyl)
689 (R_1 = OH, R_2 = H, R_3 = r-prenyl)



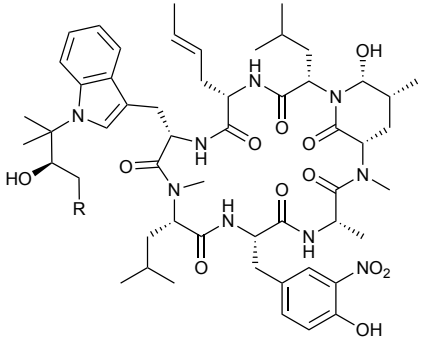
690 (R_1 = NO_2, R_2 = CH_3, R_3 = r-prenyl)
691 (R_1 = NO_2, R_2 = CH_3, R_3 = epoxy-r-prenyl)
699 (R_1 = H, R_2 = CH_3, R_3 = r-prenyl)
701 (R_1 = NO_2, R_2 = H, R_3 = epoxy-r-prenyl)



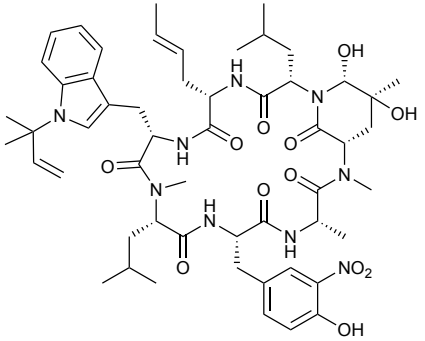
692 (R_1 = α-OH, R_2 = epoxy-r-prenyl)
693 (R_1 = β-OH, R_2 = epoxy-r-prenyl)
695 (R_1 = α-OH, R_2 = r-prenyl)



694 (32*S*, R_1 = COOH, R_2 = epoxy-r-prenyl)
696 (32*S*, R_1 = CH_2OH, R_2 = epoxy-r-prenyl)
697 (32*R*, R_1 = CH_2OH, R_2 = epoxy-r-prenyl)
698 (32*S*, R_1 = CH_2OH, R_2 = r-prenyl)
700 (R_1 = $CH(OCH_3)_2$, R_2 = epoxy-r-prenyl)

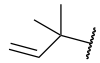


702 (R = OH)
704 (R = Cl)

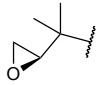


703

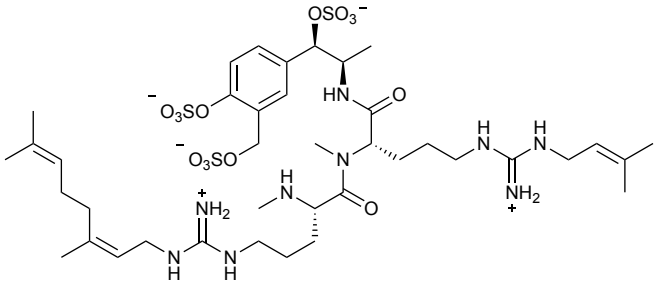
r-prenyl =



epoxy-r-prenyl =



3.5.2 Nonribosomal peptides



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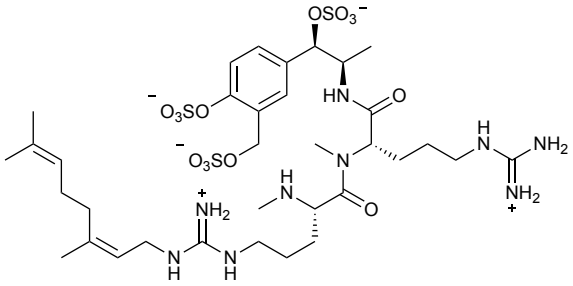

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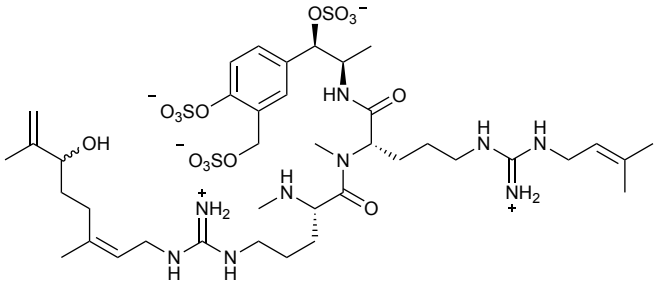

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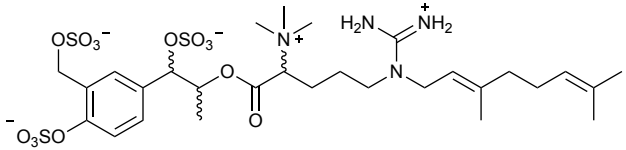

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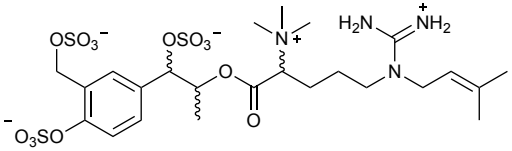

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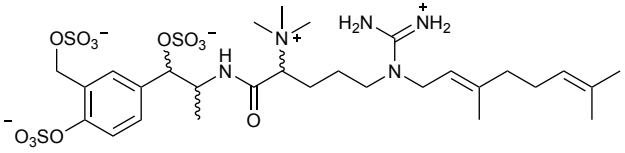
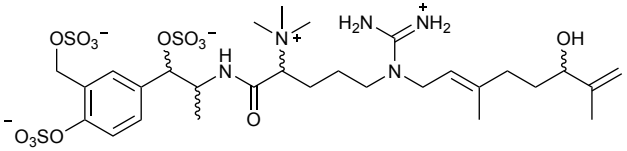
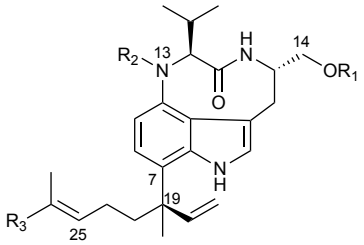


710

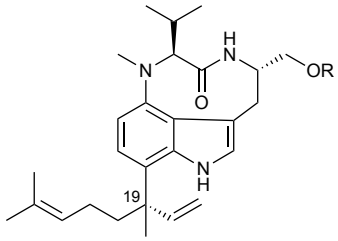


711

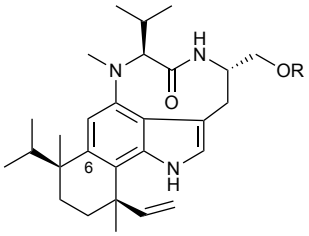
3.5.3 Nonribosomal peptides: Teleocidins



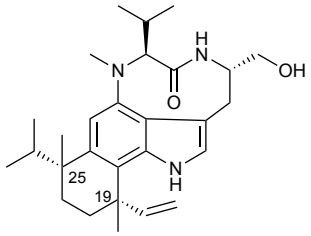
712 (R_1 = H, R_2 = R_3 = CH_3)
731 (R_1 = H, R_2 = CH_3, R_3 = COOH)
737 (R_1 = R_2 = H, R_3 = CH_3)
739 (R_1 = R_2 = R_3 = CH_3)



713 (R = H)
740 (R = Ac)



714 (R = H)
719 (R = CH_3)



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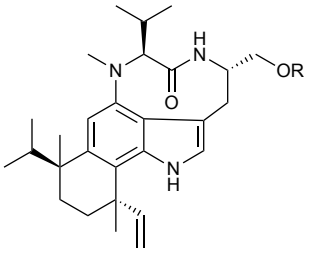
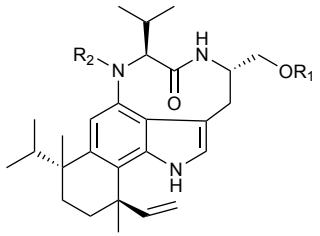
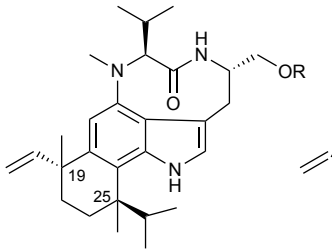


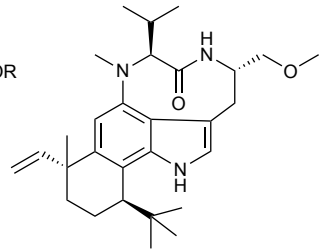
716 (R = H)
741 (R = Ac)



717 (R_1 = H, R_2 = CH_3)
718 (R_1 = R_2 = CH_3)
736 (R_1 = R_2 = H)



720 (R = CH_3)
721 (R = H)



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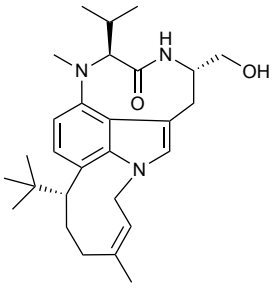

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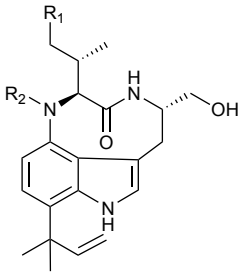
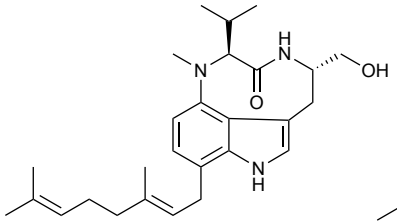


724 (R_1 = H, R_2 = CH_3)
726 (R_1 = R_2 = CH_3)
738 (R_1 = CH_3, R_2 =H)



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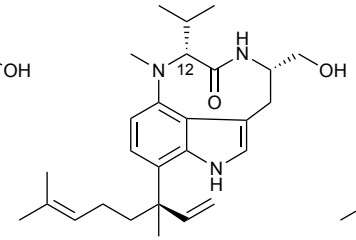

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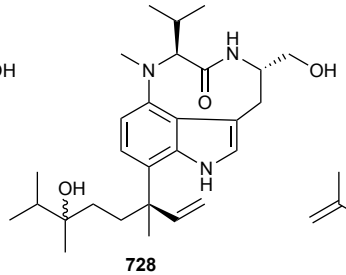

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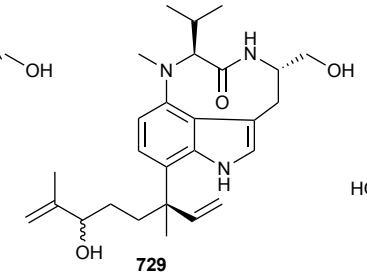
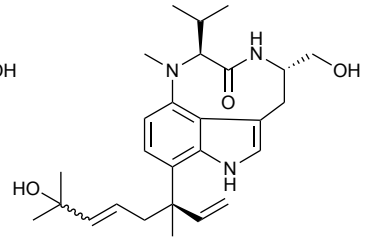
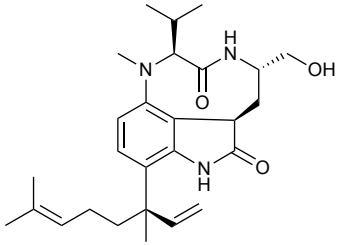


729



730

3.5.3 Nonribosomal peptides: Teleocidins



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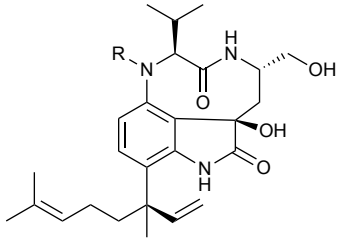
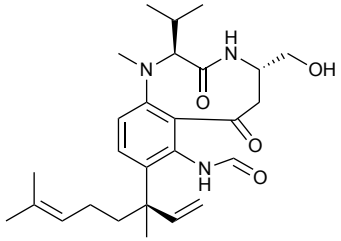


733 (R = CH_3)
734 (R = H)



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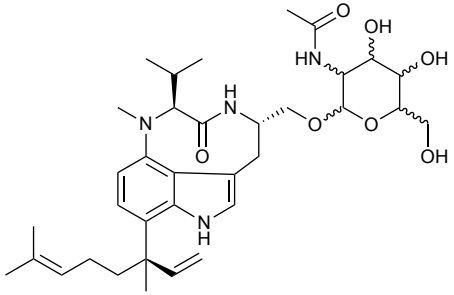

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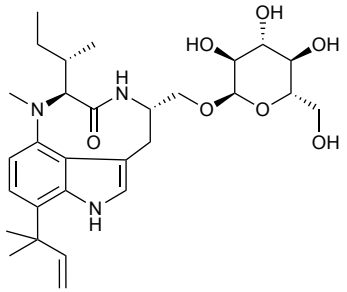
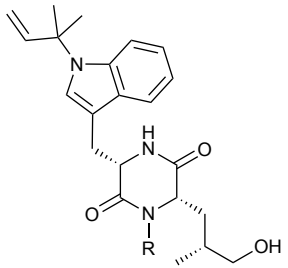
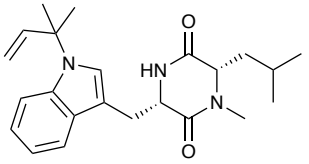


743

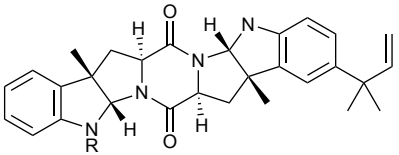
3.5.4 Diketopiperazines



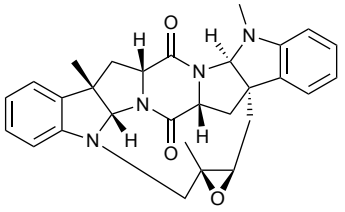
744 (R = CH_3)
745 (R = H)



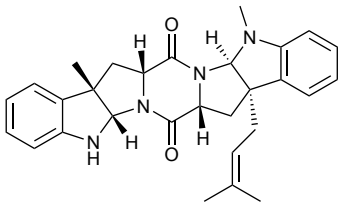
746



747 (R = H)
748 (R = CH_3)



749



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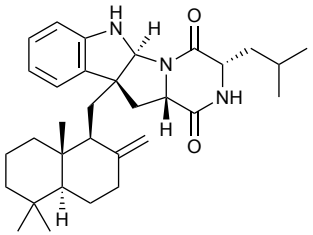

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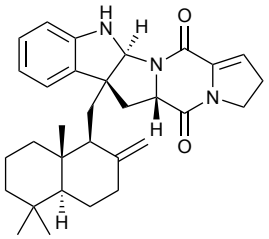

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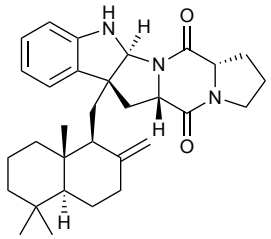

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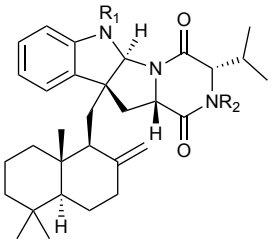
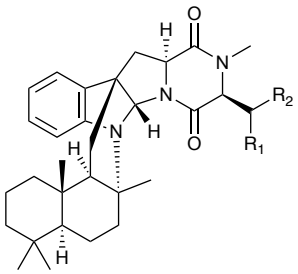
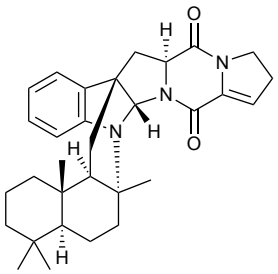


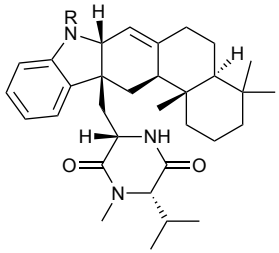
754 (R_1 = H, R_2 = CH_3)
755 (R_1= R_2 = H)
756 (R_1 = CHO, R_2 = CH_3)



757 (R_1 = H, R_2 = $CH(CH_3)_2$)
758 (R_1 = R_2 = CH_3)

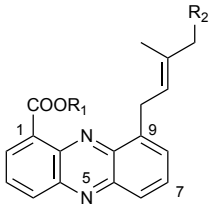


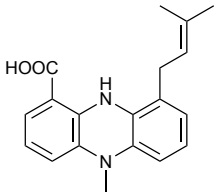
759

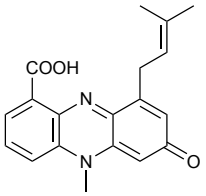


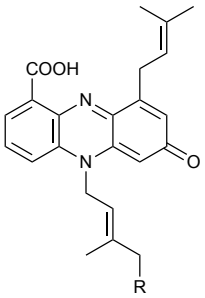
760 (R = H)
761 (R = CHO)

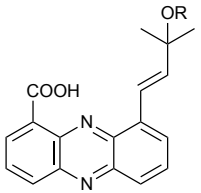
3.6 Phenazines

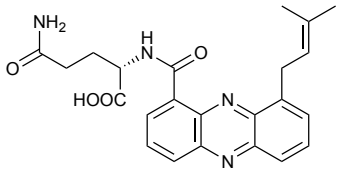












762 (R_1 = R_2 = H)
766 (R_1 = H, R_2 = OH)
780 (R_1 = 6-deoxy-α-L-talopyranose, R_2 = H)
781 (R_1 = L-rhamnose, R_2 = OH)
782 (R_1 = 2′-*O*-methyl-L-rhamnose, R_2 = OH)

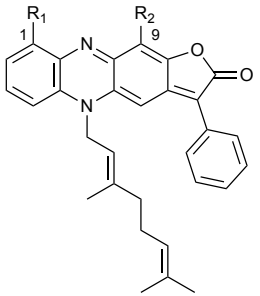
763

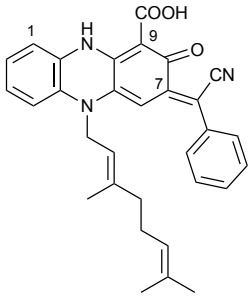
764

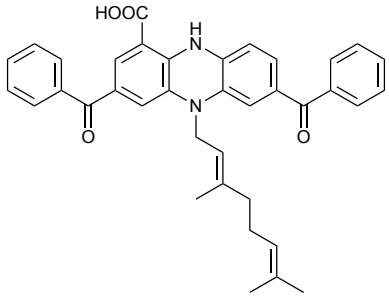
765 (R = H)
767 (R = OH)

768 (R = H)
783 (R = L-rhamnose)

769



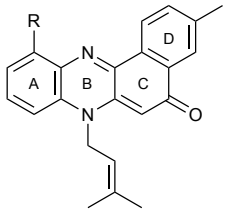


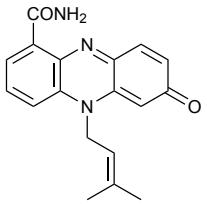


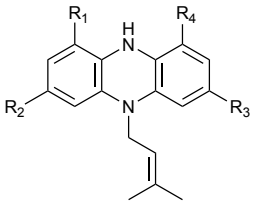
770 (R_1= COOH, R_2 = H)
771 (R_1 = H, R_2 = COOH)

772

773





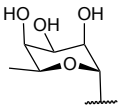


774 (R = H)
775 (R = COOH)

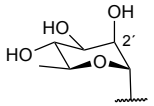
776

777 (R_1 = COOH, R_2 = C_6H_5CO–, R_3 = R_4 = H)
778 (R_1 = COOH, R_2 = R_3 = C_6H_5CO–, R_4 = H)
779 (R_1 = $CONH_2$, R_2 = R_3 = C_6H_5CO–, R_4 = H)
784 (R_1 = COO–L-rhamnose, R_2 = R_4 = H, R_3 = C_6H_5CO–)
785 (R_1 = COO–L-rhamnose, R_2 = H, R_3 = C_6H_5CO–, R_4 = DMA)
786 (R_1 = COO–L-rhamnose, R_2 = R_3 = H, R_4 = DMA)

6-deoxy-α-L-talopyranose =

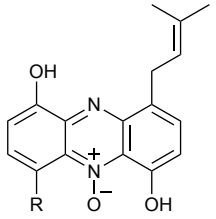


L-rhamnose =

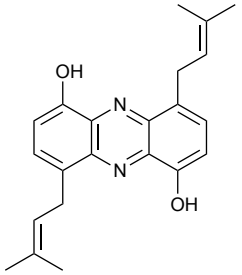


DMA =

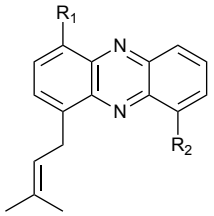
3.6 Phenazines



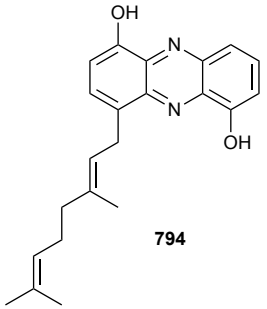
787 (R = H)
789 (R = DMA)



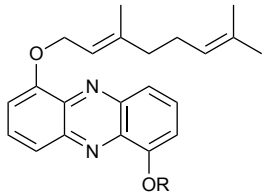
788



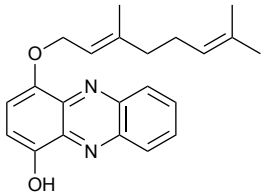
790 (R_1 = R_2 = OCH_3)
791 (R_1 = OCH_3, R_2 = OH)
792 (R_1 = R_2 = OH)
793 (R_1 = OH, R_2 = H)



794



795 (R = H)
796 B (R = CH_3)



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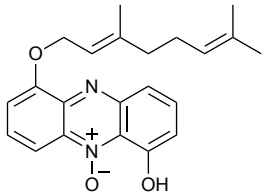

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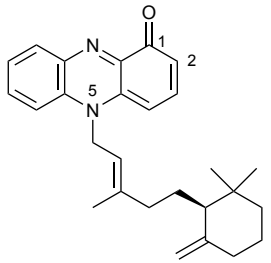

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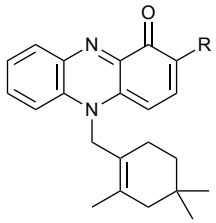
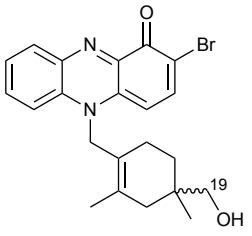


799 (R = H)
801 (R = Cl)
802 (R = Br)



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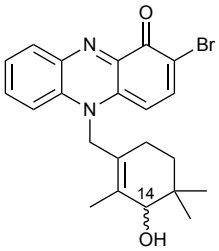

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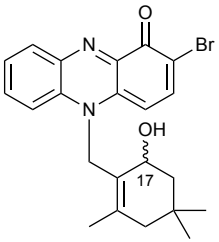

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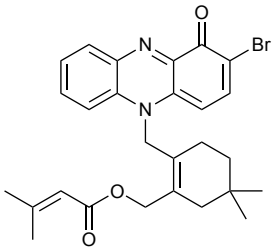

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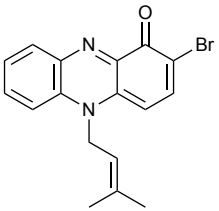
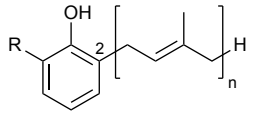
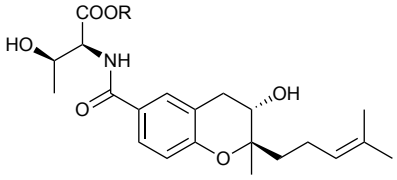


807

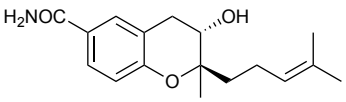
3.7 Phenols



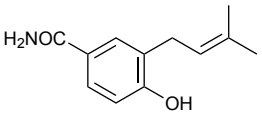
808 (R = H, n = 4)
809 (R = H, n = 9)
810 (R = H, n = 10)
811 (R = OCH_3, n = 10)



812 (R = H)
813 (R = CH_3)



814



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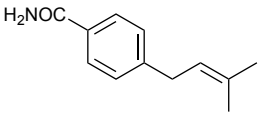

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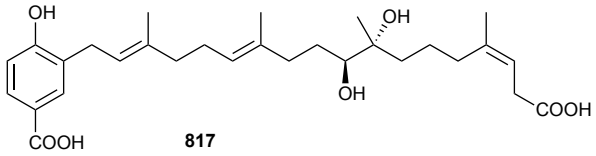

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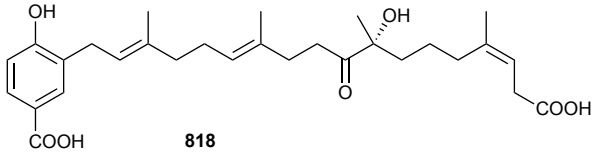

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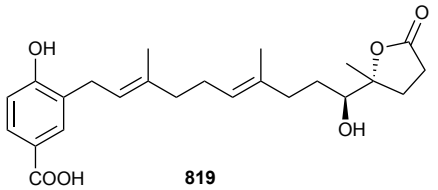

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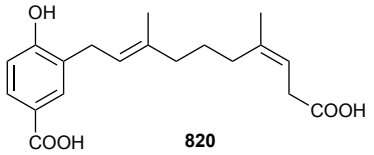

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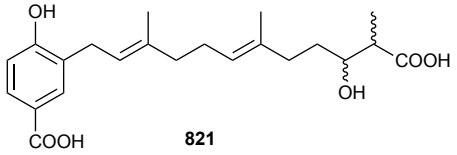

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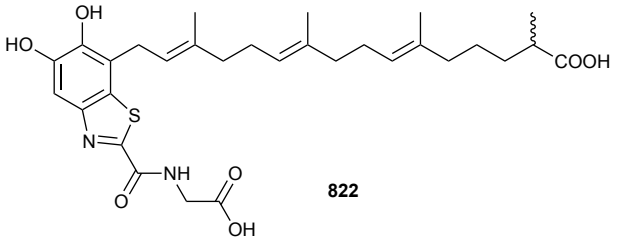

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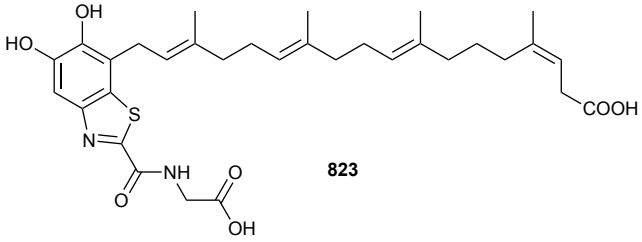

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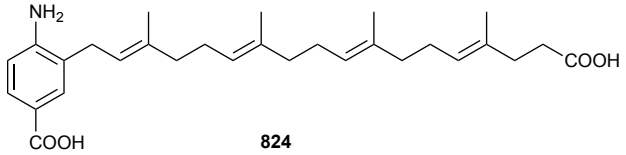

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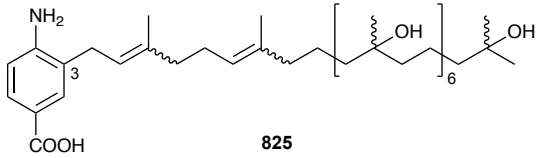
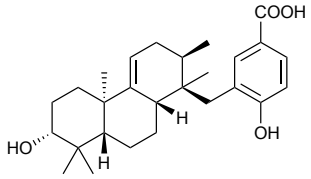


825

3.7 Phenols



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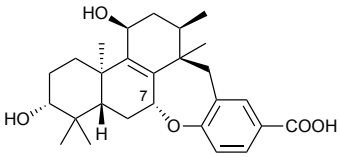

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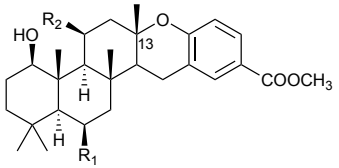
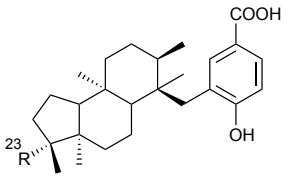
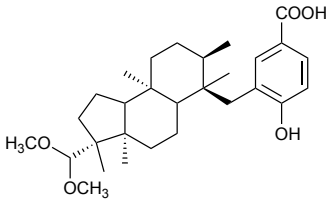


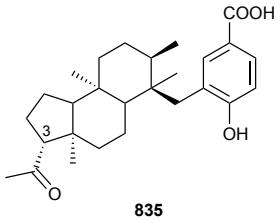
828 (R_1 = OH, R_2 = H)
829 (R_1 = R_2 = H)
830 (R_1 = R_2 = OH)



831 (R = CH_2OH)
832 (R = CHO)
833 (R = COOH)



834



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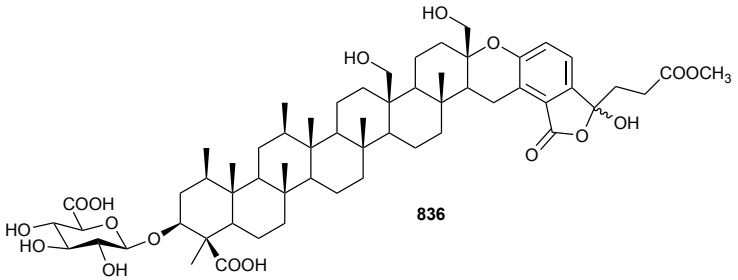

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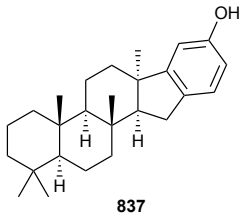

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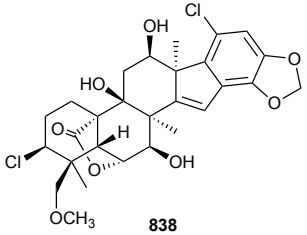
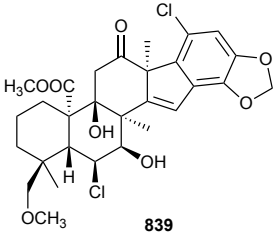


838



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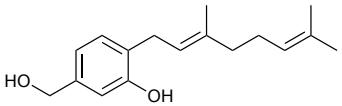

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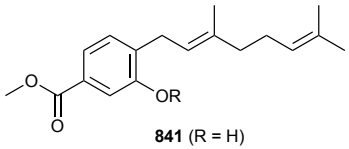
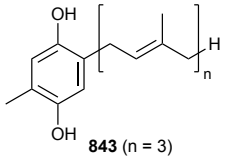
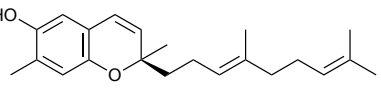


841 (R = H)
842 ($R = CH_3$)



843 (n = 3)
846 (n = 2)



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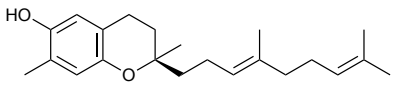
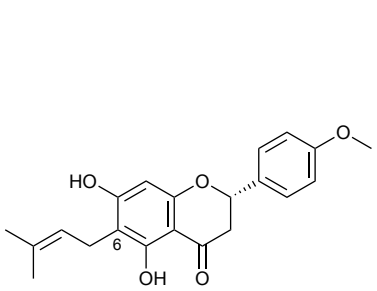
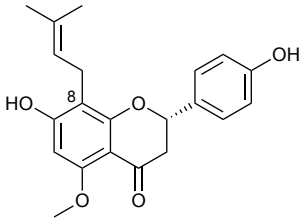


845

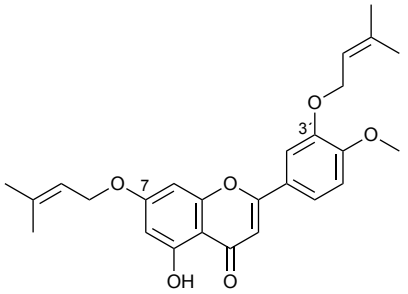
3.8.1 Polyketides: Flavonoids



847



848



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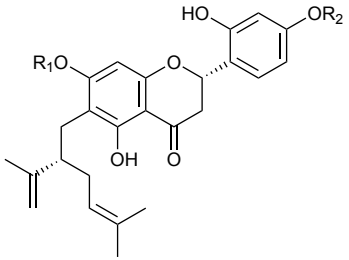
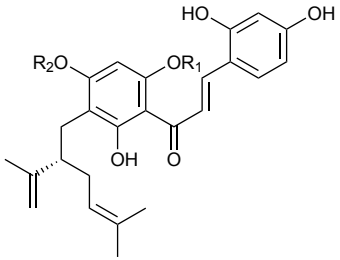
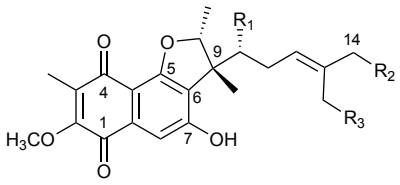


850 (R_1 = R_2 = H)
851 (R_1 = CH_3, R_2 = H)
852 (R_1 = R_2 = CH_3)

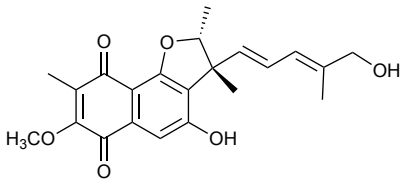


853 (R_1 = CH_3, R_2 = H)
854 (R_1 = H, R_2 = CH_3)

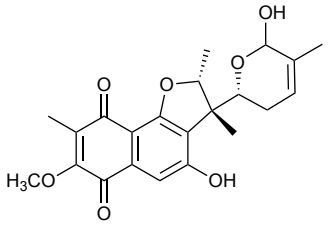
3.8.2 Polyketides: Furaquinocins



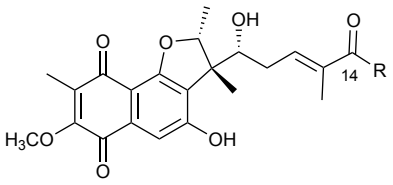
855 (R_1 = R_3 = OH, R_2 = H)
856 (R_1 = R_2 = OH, R_3 = H)
857 (R_1 = R_2 = R_3 = H)
858 (R_1 = OH, R_2 = R_3 = H)
859 (R_1 = R_3 = H, R_2 = OH)
860 (R_1 = R_2 = R_3 = OH)



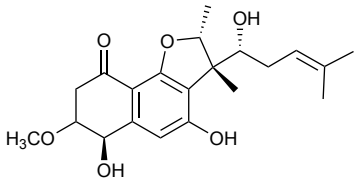
861



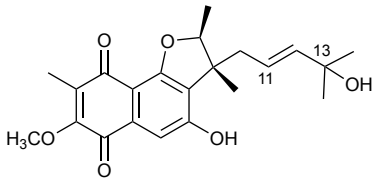
862



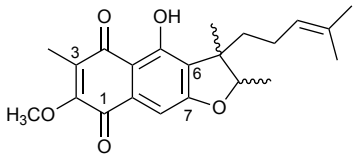
863 (R = OH)
864 (R = NH_2)



865



866



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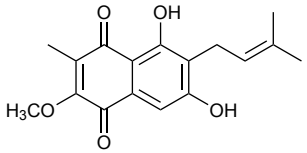

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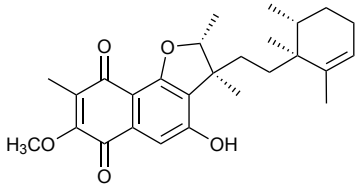

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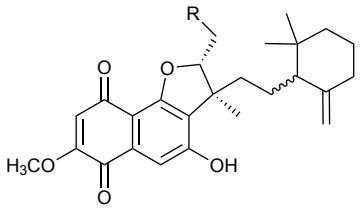
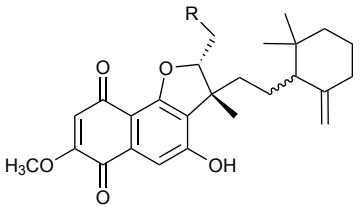
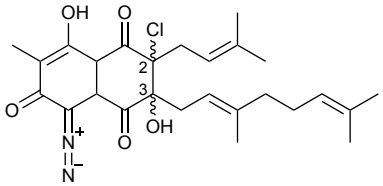


870 (R = H)
872 (R = OH)

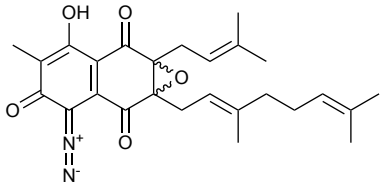


871 (R = H)
873 (R = OH)

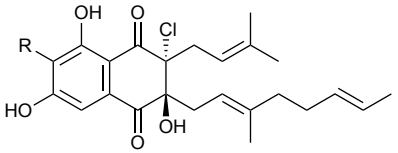
3.8.3.1 Polyketides: Napyradiomycins type A



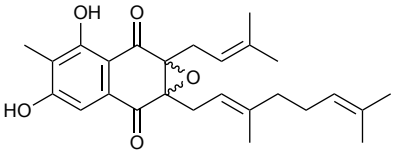
880



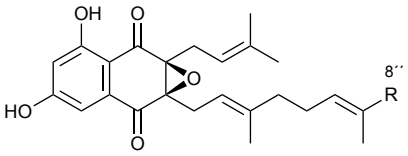
881



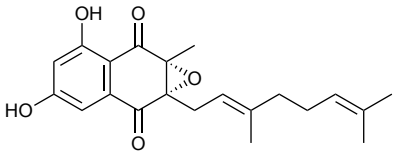
882 (R = CH_3)
888 (R = H)



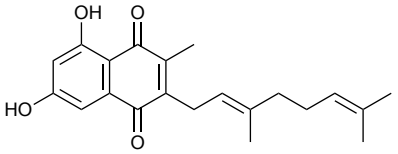
883



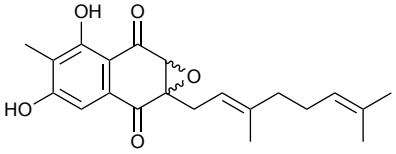
886 (R = CH_3)
887 (R = COOH)



889



890



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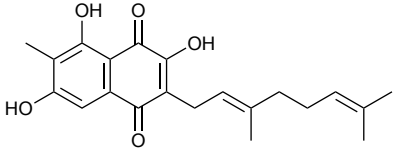
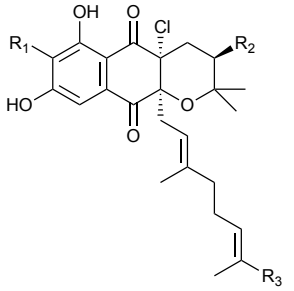
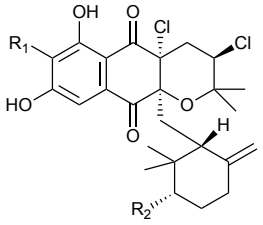


892

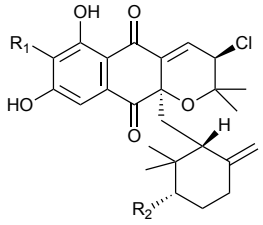
3.8.3.2 Polyketides: Napyradiomycins type B



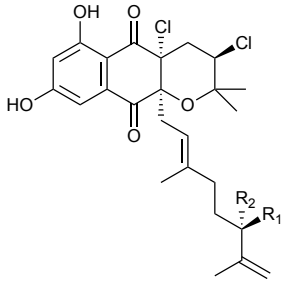
874 (R_1 = H, R_2 = Cl, R_3 = CH_3)
885 (R_1 = R_3 = CH_3, R_2 = Cl)
896 (R_1 = R_3 = CH_3, R_2 = Br)
897 (R_1 = H, R_2 = Br, R_3 = CH_3)
898 (R_1 = H, R_2 = Cl, R_3 = CH_2OH)
899 (R_1 = H, R_2 = Cl, R_3 = CHO)



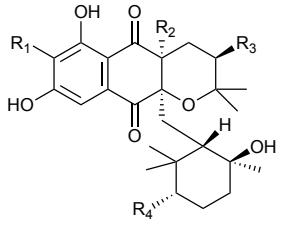
875 (R_1 = H, R_2 = Cl)
877 (R_1 = H, R_2 = Br)
906 (R_1 = CH_3, R_2 = Cl)



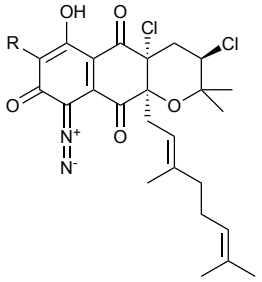
876 (R_1 = H, R_2 = Cl)
910 (R_1 = CH_3, R_2 = Cl)
911 (R_1 = H, R_2 = Br)



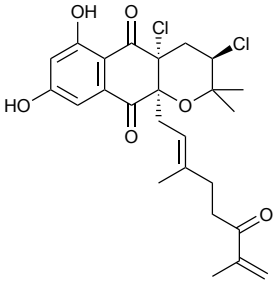
893 (R_1 = OH, R_2 = H)
894 (R_1 = H, R_2 = OH)



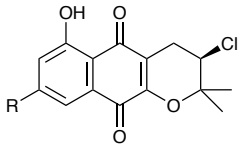
895 (R_1 = H, R_2 = R_3 = R_4 = Cl)
907 (R_1 = CH_3, R_2 = R_3 = R_4 = Cl)
912 (R_1 = CH_3, R_2 = H, R_3 = R_4 = Cl)
913 (R_1 = CH_3, R_2 = Cl, R_3 = R_4 = Br)
914 (R_1 = R_2 = H, R_3 = R_4 = Cl)
915 (R_1 = H, R_2 = OH, R_3 = R_4 = Cl)



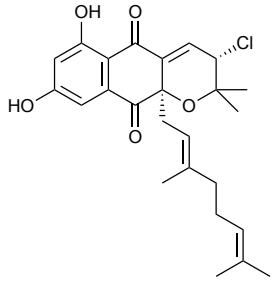
900 (R = H)
884 (R = CH_3)



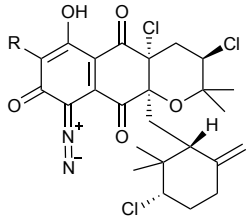
901



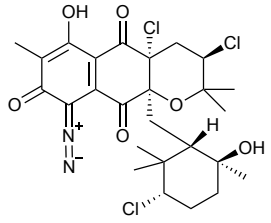
902 (R = OH)
903 (R = OCH_3)



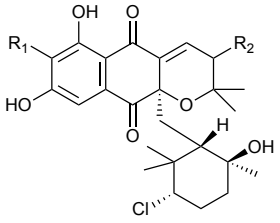
904 (R = β-Cl)
905 (R = α-OH)



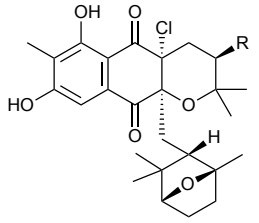
908 (R = CH_3)
920 (R = H)



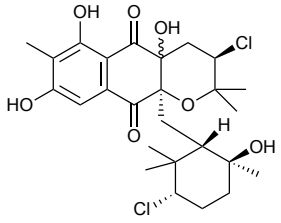
909



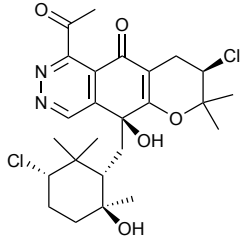
916 (R_1 = CH_3, R_2 = β-Cl)
917 (R_1 = H, R_2 = α-OH)
918 (R1 = H, R2 = β-Cl)
919 (R_1 = H, R_2 = α-Cl)



921 (R = Cl)
922 (R = Br)

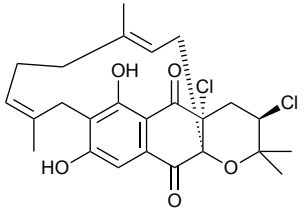


923

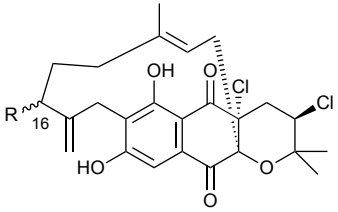


931

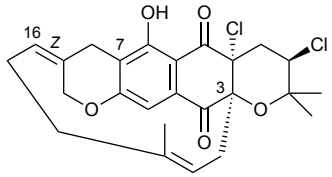
3.8.3.3 Polyketides: Napyradiomycins type C



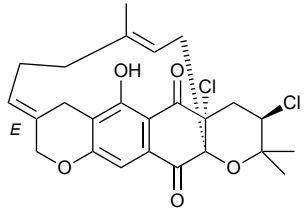
878



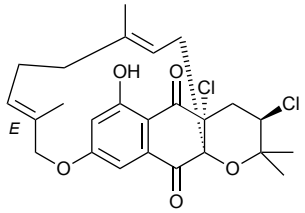
879 (R = Cl)
927 (R = OH)



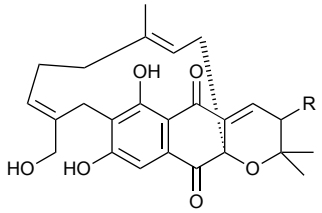
924



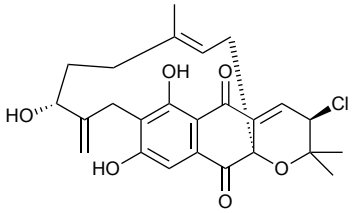
925



926

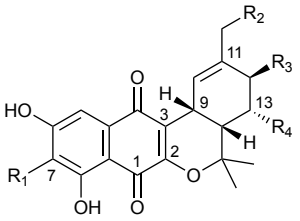


928 (R = β-Cl)
929 (R = α-OH)

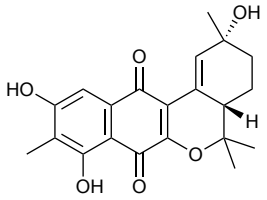


930

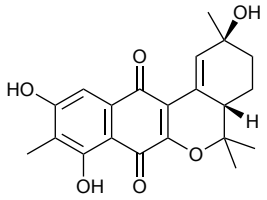
3.8.4 Polyketides: Naphterpins



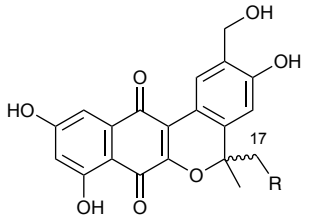
932 (R_1 = CH_3, R_2 = R_3 = R_4 = H)
935 (R_1 = CH_3, R_2 = R_4 = H, R_3 = OH)
936 (R_1 = CH_3, R_2 = R_4 = H, R_3 = OAc)
937 (R_1 = R_2 = R_3 = R_4 = H)
938 (R_1 = R_3 = R_4 = H, R_2 = OH)
939 (R_1 = R_4 = H, R_2 = R_3 = OH)
940 (R_1 = H, R_2 = R_3 = R_4 = OH)



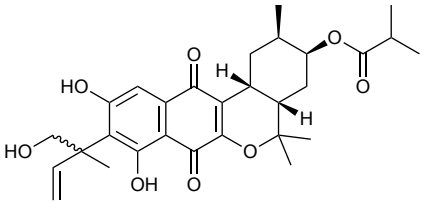
933



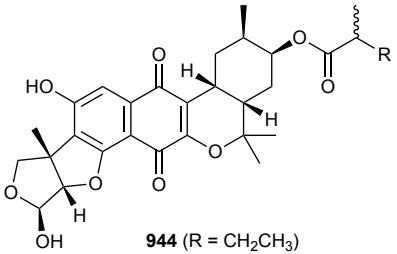
934



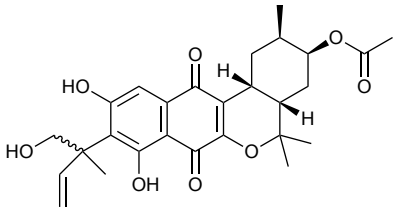
941 (R = H)
942 (R = OH)



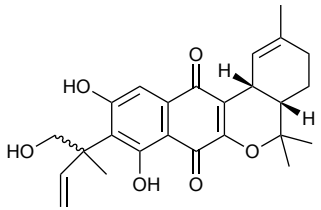
943



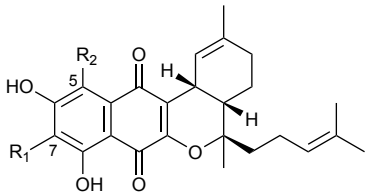
944 (R = CH_2CH_3)
945 (R = CH_3)



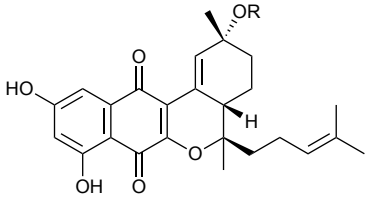
946



947

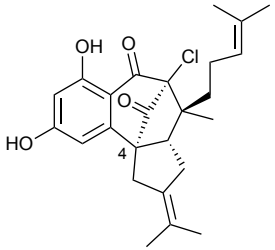


948 (R_1 = H, R_2 = Br)
949 (R_1 = Br, R_2 = H)
950 (R_1 = R_2 = H)

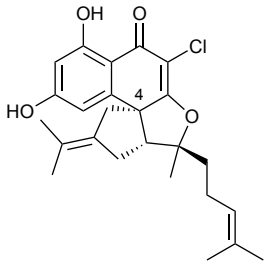


951 (R = H)
952 (R = CH_3)

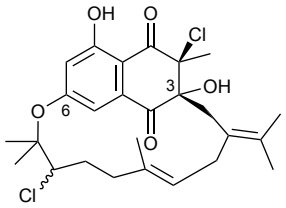
3.8.5 Polyketides: Merochlorins



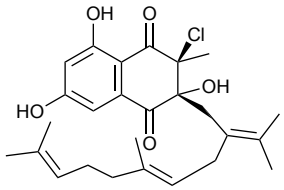
953



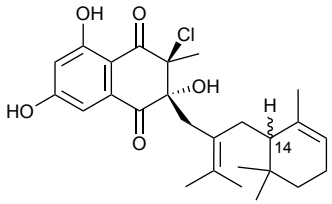
954



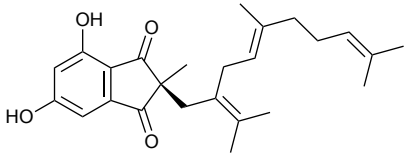
955



956

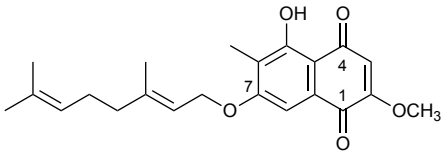


957 (14*S*)
958 (14*R*)

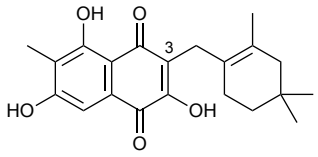


959

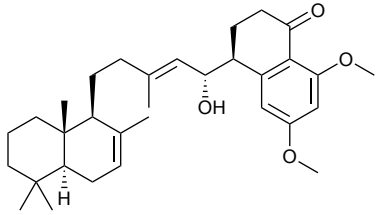
3.8.6 Polyketides: Miscellaneous polyketides



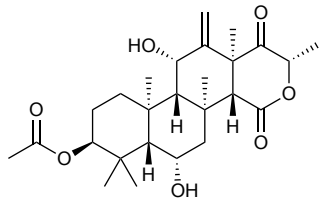
960



961

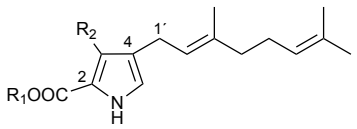


962

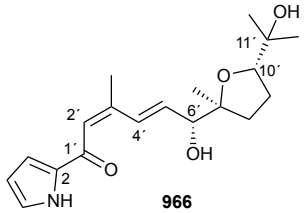


963

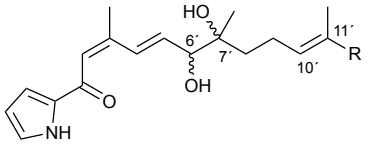
3.9 Pyrroles



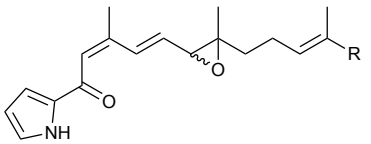
964 (R_1 = H, R_2 = H)
965 (R_1 = CH_3, R_2 = $NHCOCH_3$)



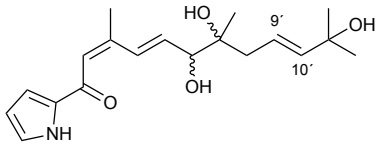
966



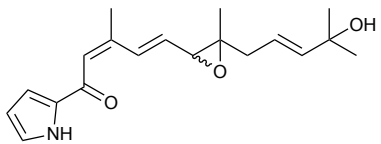
967 (R = H)
969 (R = CH_2OH)
970 (R = CHO)



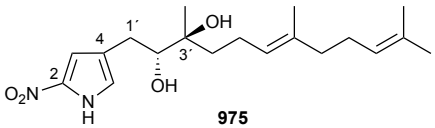
968 (R = CH_3)
971 (R = CH_2OH)
972 (R = CHO)



973



974



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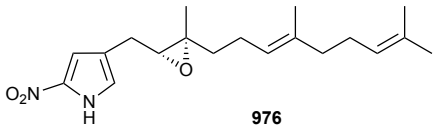
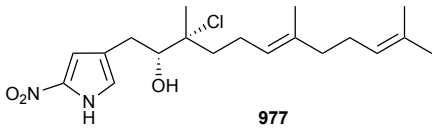


976



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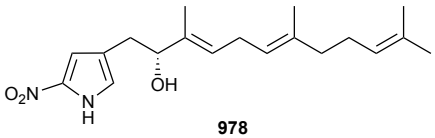
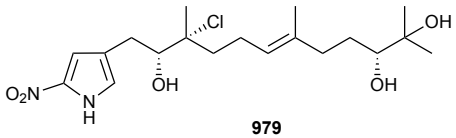
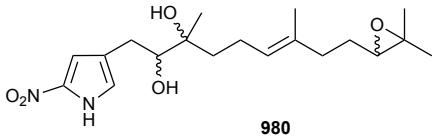


978



979



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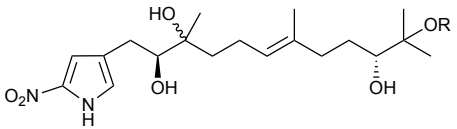
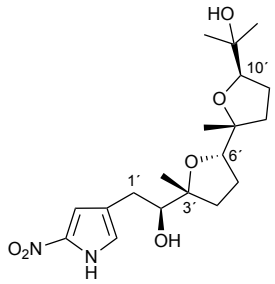
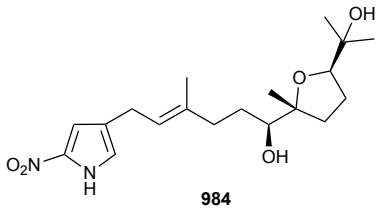


981 (R = CH_3)
982 (R = H)

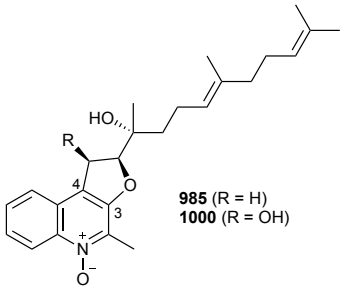


983

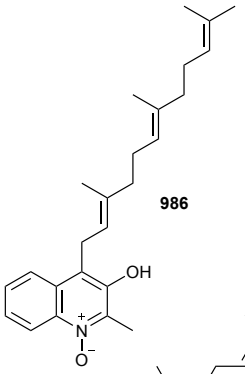


984

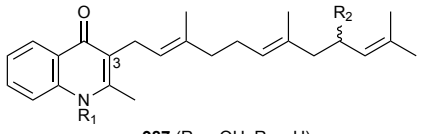
3.10 Quinolines



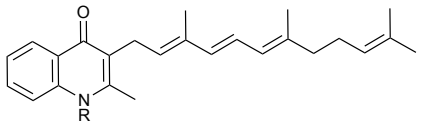
985 (R = H)
1000 (R = OH)



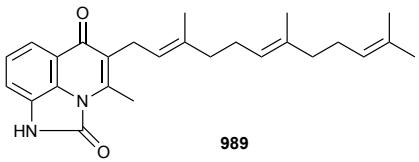
986



987 (R_1 = OH, R_2 = H)
988 (R_1 = R_2 = H)
996 (R_1 = R_2 = OH)



997 (R = H)
998 (R = OH)



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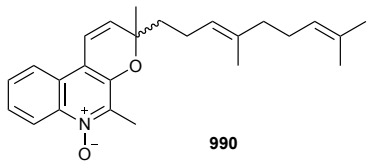

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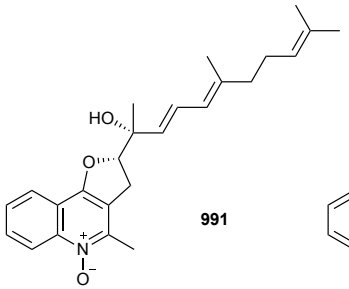

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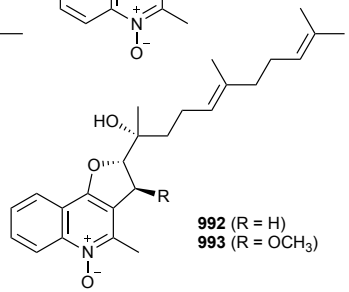
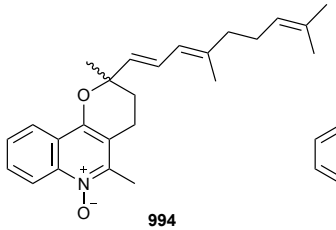
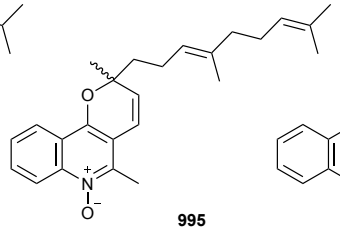


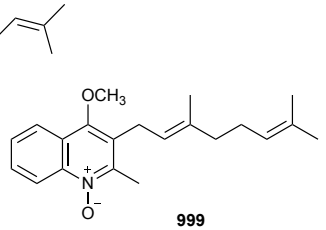
992 (R = H)
993 (R = OCH_3)



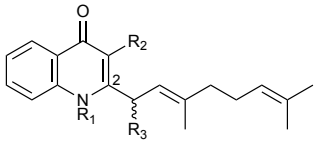
994



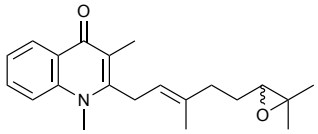
995



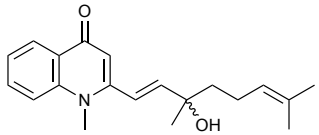
999



1001 (R_1 = R_3 = H, R_2 = CH_3)
1002 (R_1 = R_2 = CH_3, R_3 = H)
1003 (R_1 = CH_2SCH_3, R_2 = CH_3, R_3 = H)
1004 (R_1 = R_2 = R_3 = H)
1005 (R_1 = CH_3, R_2 = R_3 = H)
1006 (R_1 = CH_3, R_2 = H, R_3 = OH)



1007



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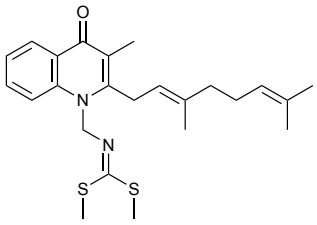
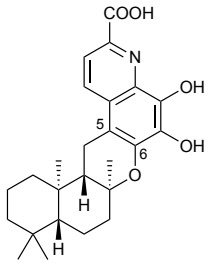


1009



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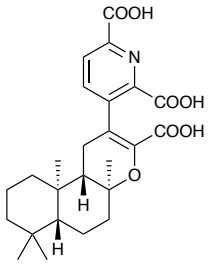
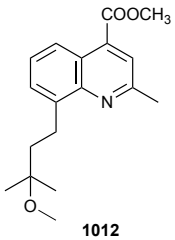
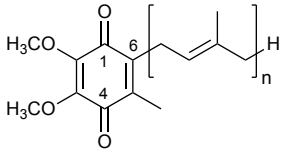


1011

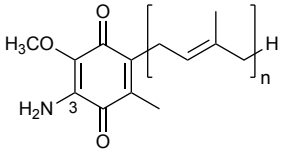


1012

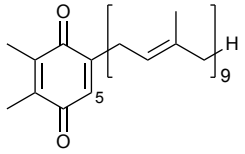
3.11.1 Quinones: Benzoquinones



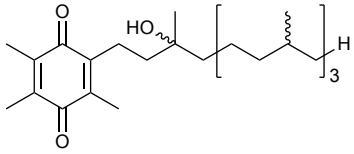
1013 (n = 1–12)



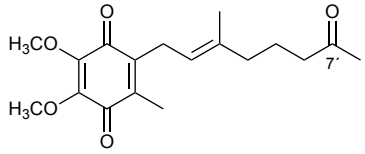
1014 (n = 9, 10)



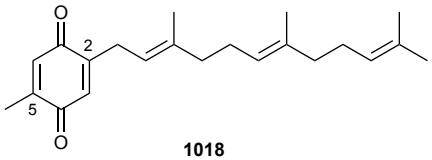
1015



1016



1017



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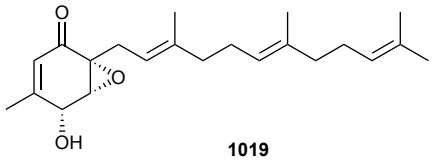
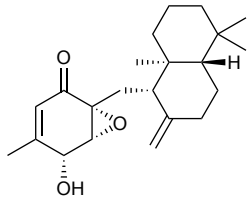
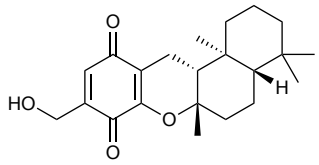


1019

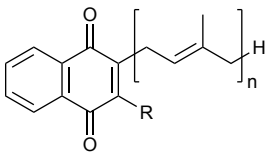


1020

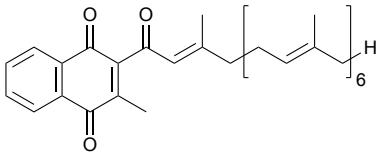


1021

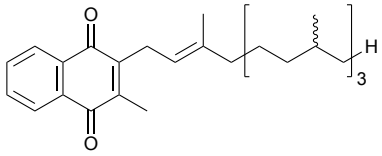
3.11.2 Quinones: Naphthoquinones



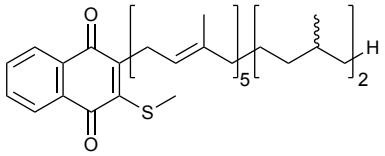
1022 (R = CH_3, n = 1–14)
1023 (R = H, n = 1–9)



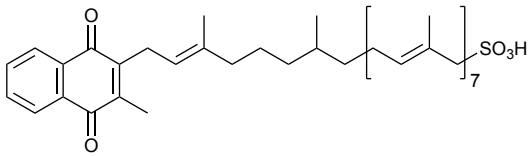
1024



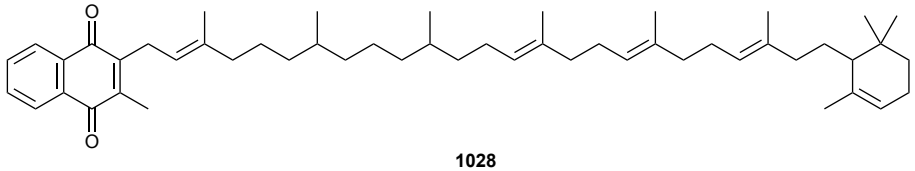
1025



1026

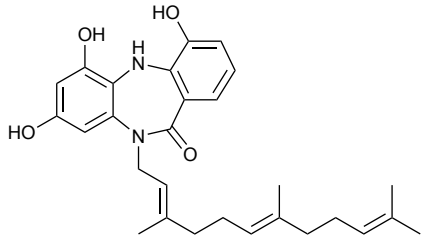


1027



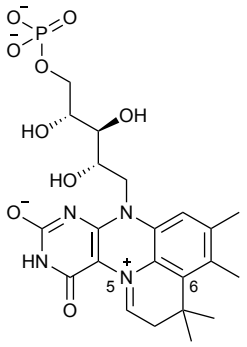
1028

3.12.1 Miscellaneous: Dibenzodiazepinones



1029

3.12.2 Miscellaneous: Flavins



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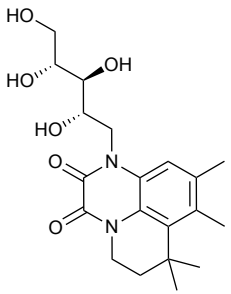
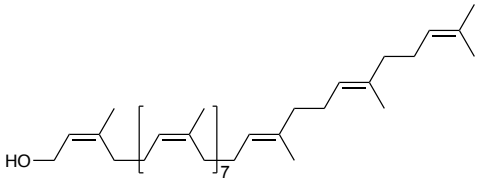
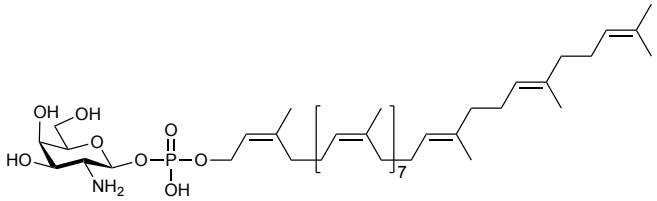


1031

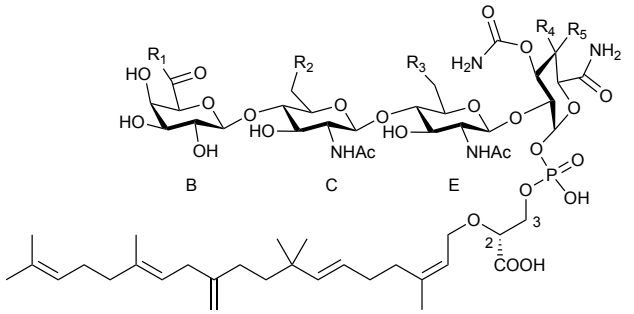
3.12.3 Miscellaneous: Phosphoglycolipids



1032

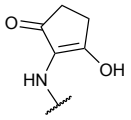


1033



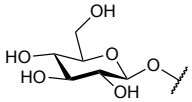
B C E F

acpd =

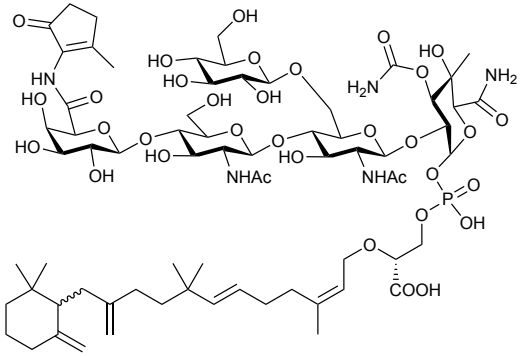


A

D-glucose =

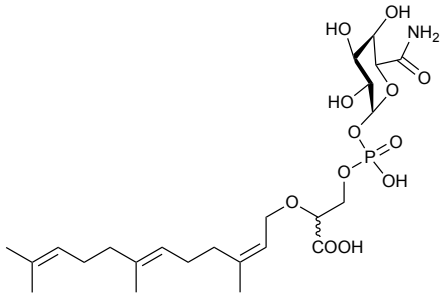


D



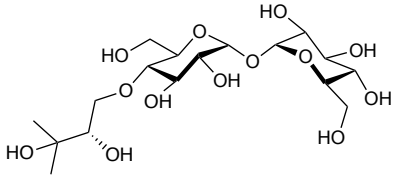
1044

1034 (R_1 = acpd, R_2 = H, R_3 = D-glucose, R_4 = OH, R_5 = CH_3)
1035 (R_1 = acpd, R_2 = R_4 = H, R_3 = D-glucose, R_5 = OH)
1036 (R_1 = acpd, R_2 = R_3 = R_4 = H, R_5 = OH)
1037 (R_1 = acpd, R_2 = R_3 = H, R_4 = OH, R_5 = CH_3)
1038 (R_1 = acpd, R_2 = H, R_3 = R_4 = OH, R_5 = CH_3)
1039 (R_1 = R_4 = OH, R_2 = H, R_3 = D-glucose, R_5 = CH_3)
1040 (R_1 = NH_2, R_2 = H, R_3 = D-glucose, R_4 = OH, R_5 = CH_3)
1041 (R_1 = R_3 = R_4 = OH, R_2 = H, R_5 = CH_3)
1042 (R_1 = NH_2, R_2 = H, R_3 = R_4 = OH, R_5 = CH_3)
1043 (R_1 = acpd, R_2 = R_3 = R_4 = OH, R_5 = CH_3)

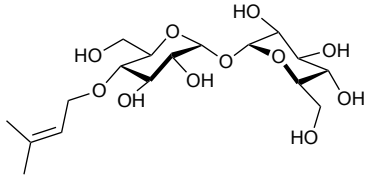


1045

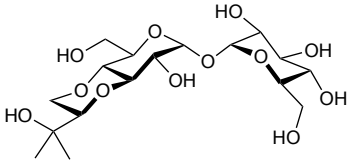
3.12.4 Miscellaneous: Saccharides



1046

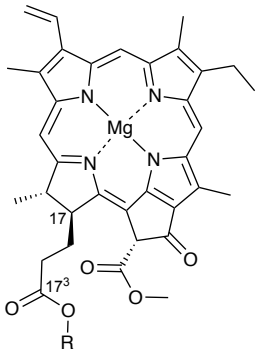


1047

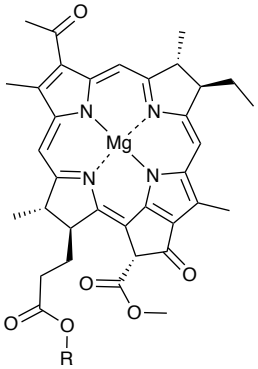


1048

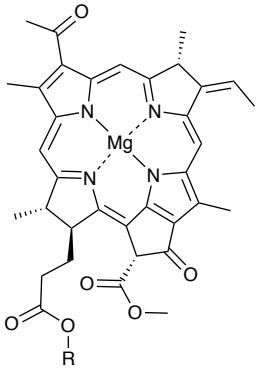
3.12.5 Miscellaneous: Chlorophylls



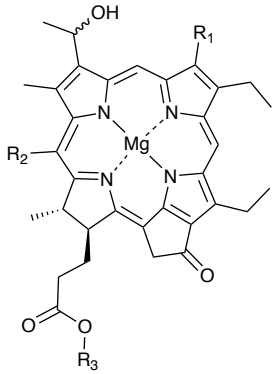
1049 (R = p)
1060 (R = pd)



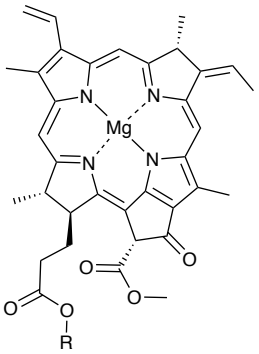
1050 (R = p)
1056 (R = gg)
1057 (R = dhgg)
1058 (R = thgg)



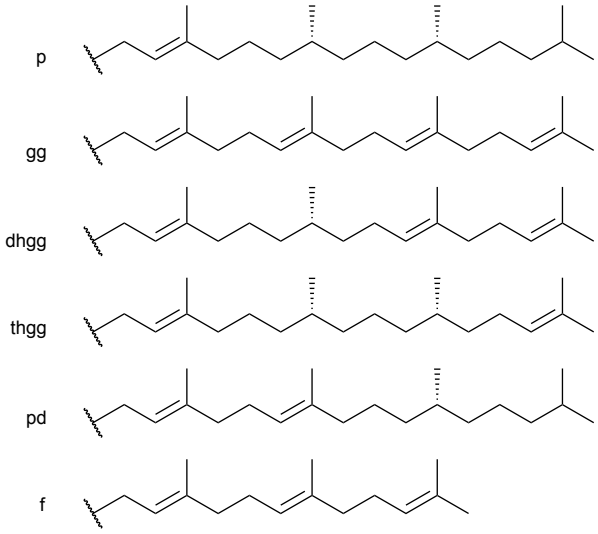
1051 (R = p)



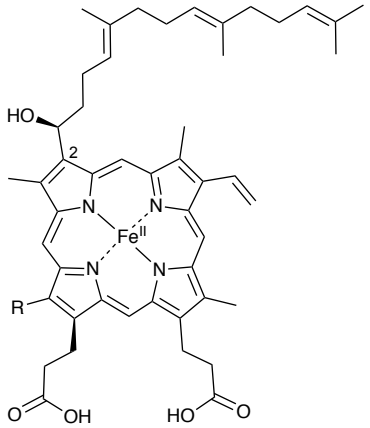
1052 (R_1 = R_2 = CH_3, R_3 = f)
1053 (R_1 = CH_3, R_2 = H, R_3 = f)
1054 (R_1 = CHO, R_2 = H, R_3 = f)



1055 (R = f)
1059 (R = gg)



3.12.6 Miscellaneous: Hemes



1061 (R = CHO)
1062 (R = CH_3)