

## **Natural sesquiterpene quinone/quinols: Chemistry, biological activities, and synthesis**

Xin-Hui Tian,<sup>a,b</sup> Li-Li Hong,<sup>a</sup> Wei-Hua Jiao,<sup>a</sup> and Hou-Wen Lin<sup>\*,a</sup>

### Affiliation

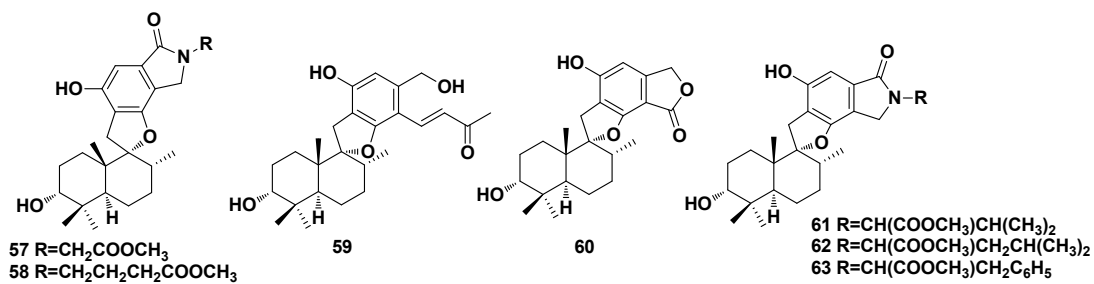
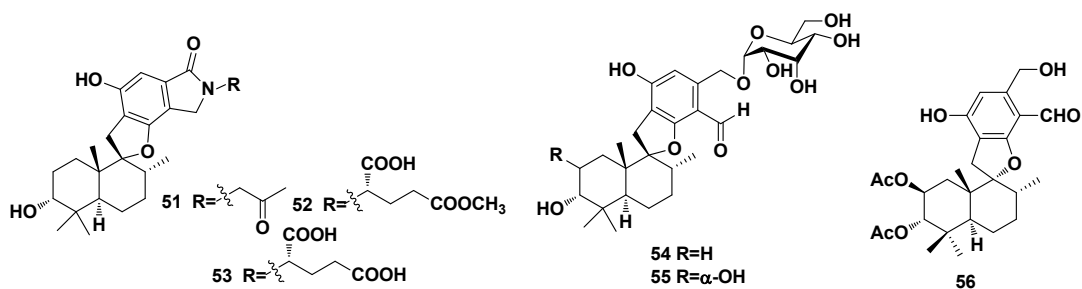
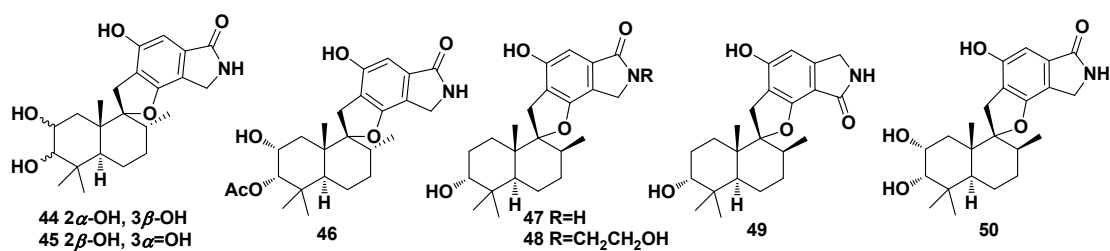
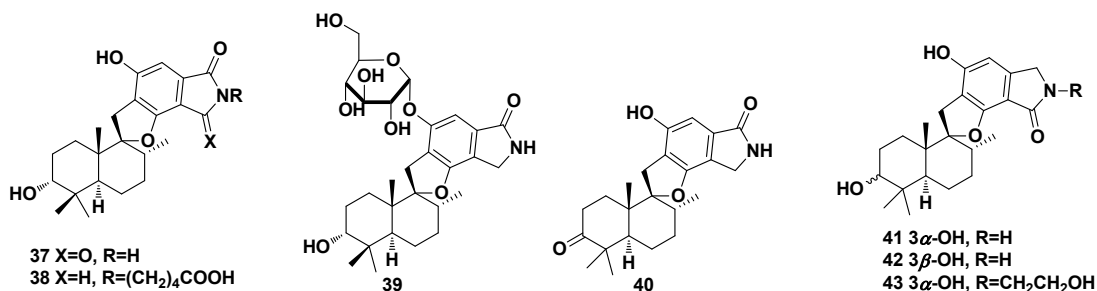
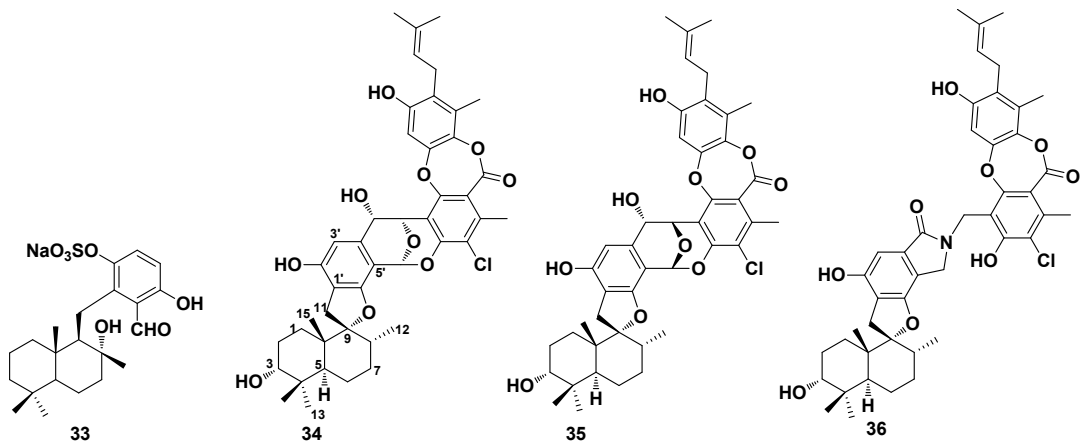
<sup>a</sup>Marine Drugs Research Center, Department of Pharmacy, State Key Laboratory of Oncogenes and Related Genes, Ren Ji Hospital, School of Medicine, Laboratory of Microbial Metabolism and School of Life Science & Biotechnology, Shanghai Jiao Tong University, Shanghai 200127, P. R. China.

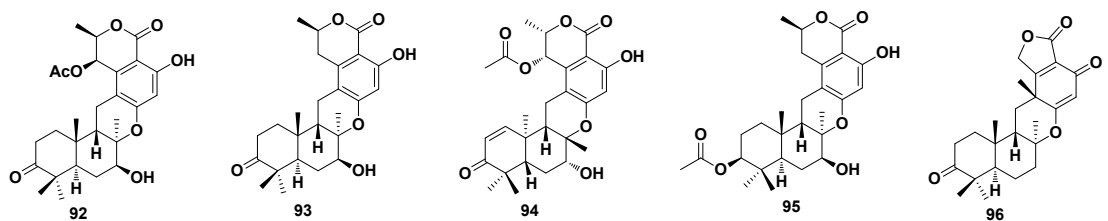
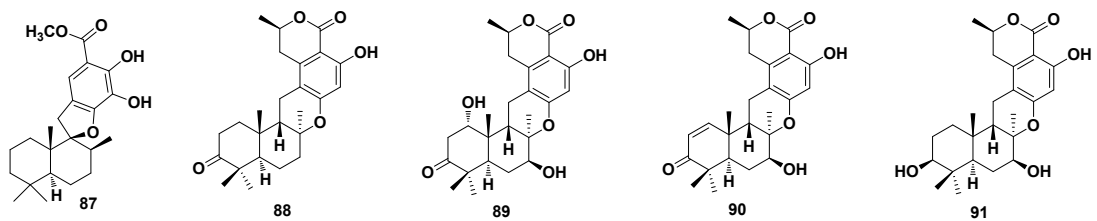
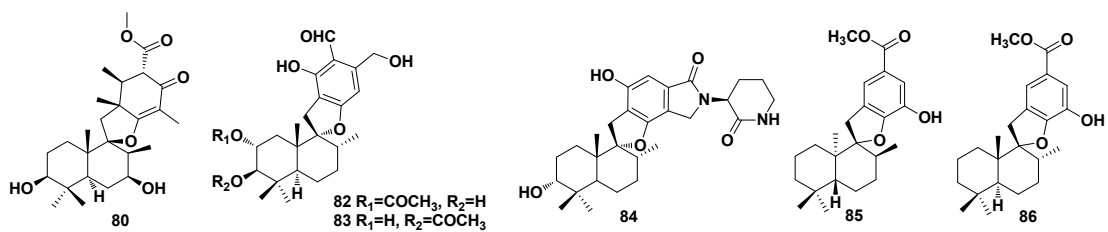
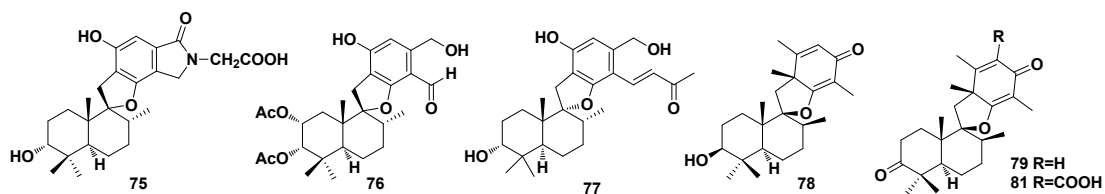
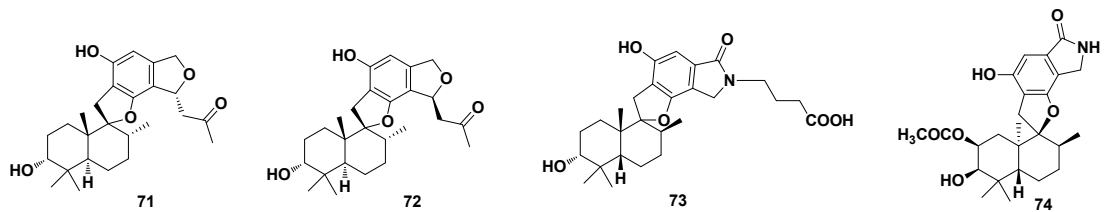
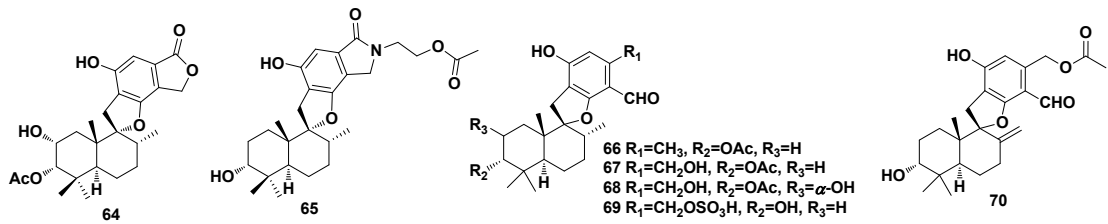
<sup>b</sup>Institute of Interdisciplinary Integrative Medicine Research, Shanghai University of Traditional Chinese Medicine, Shanghai 201203, P. R. China.

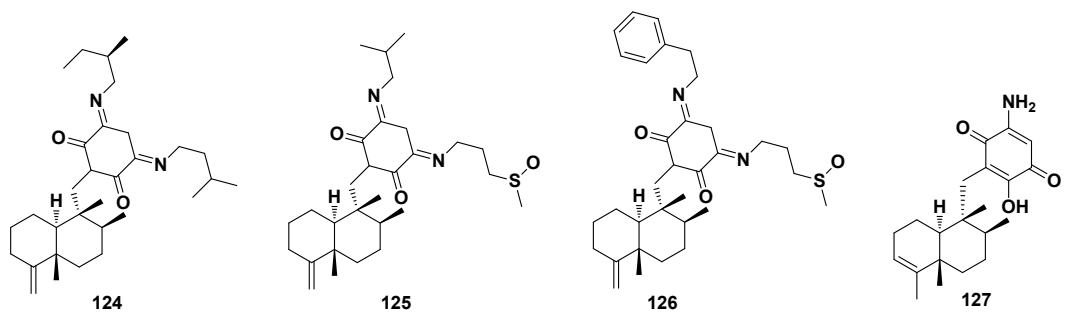
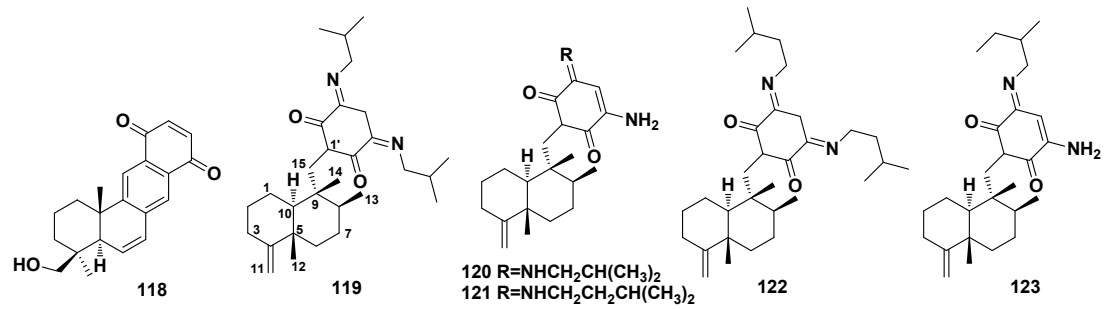
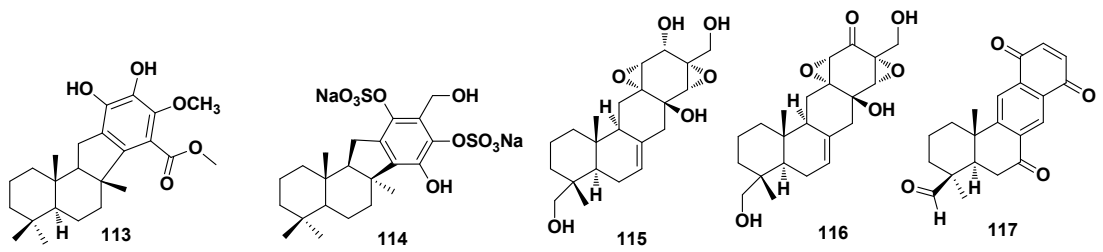
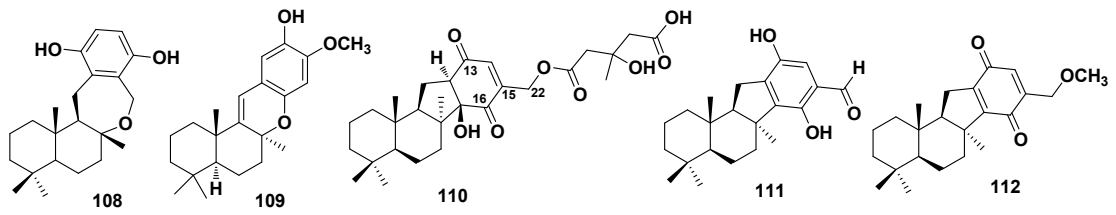
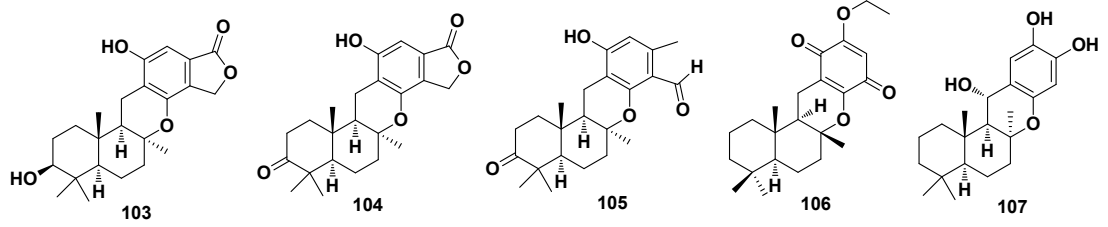
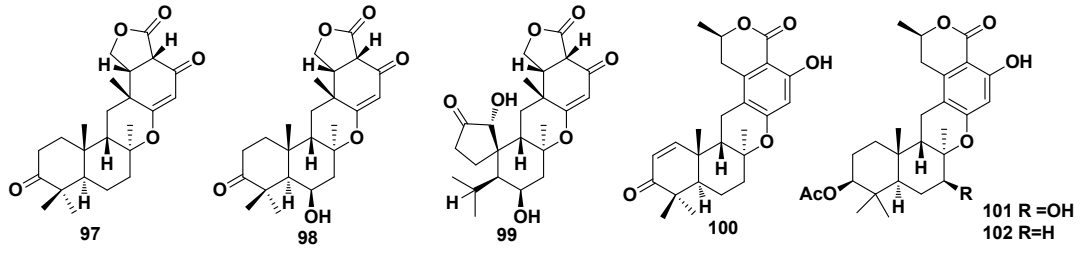
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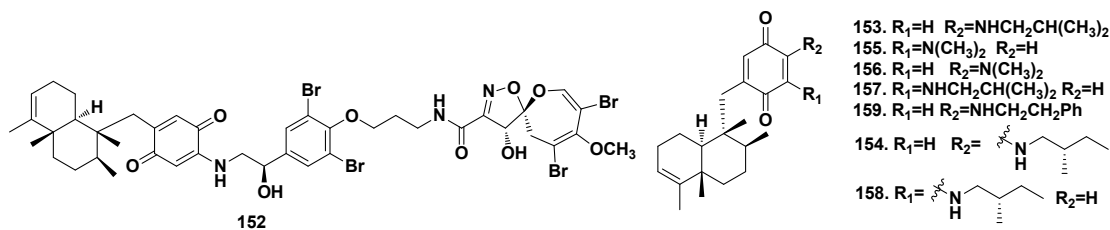
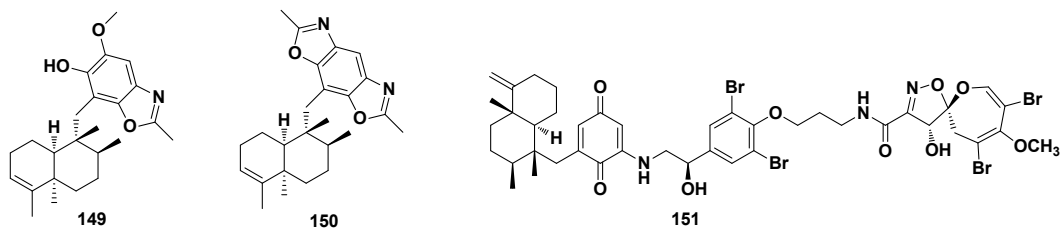
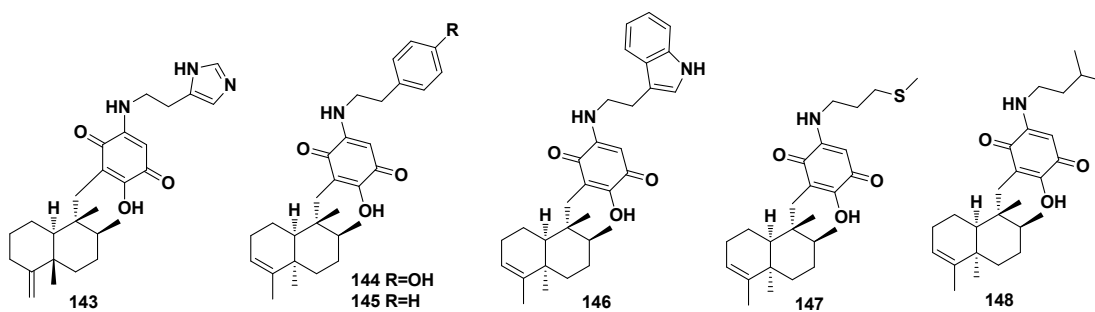
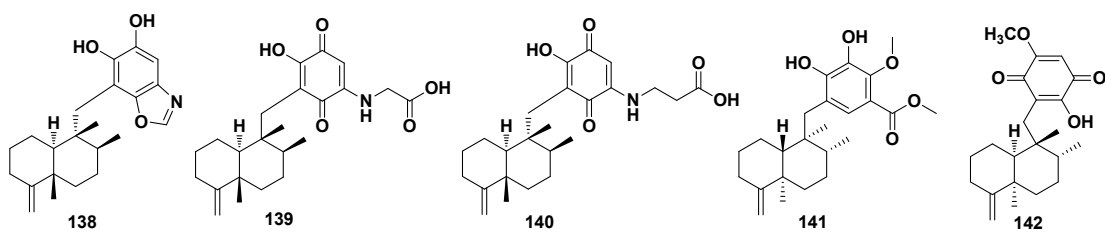
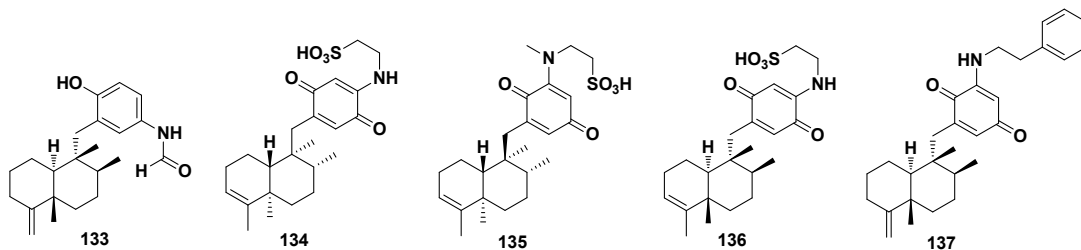
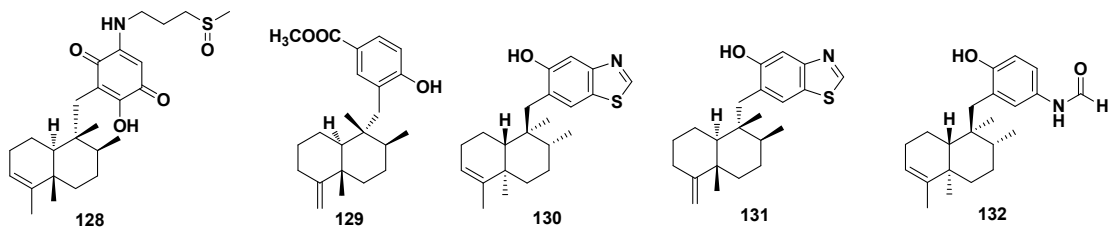
Contents-Compilation of all the sesquiterpene quinone/quinols



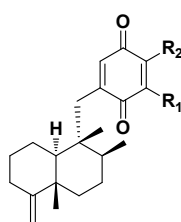




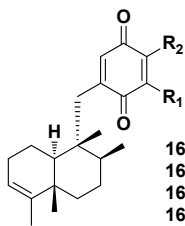




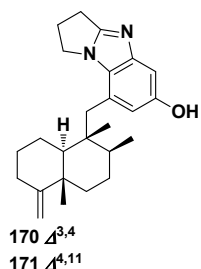
153.  $R_1=H$   $R_2=NHCH_2CH(CH_3)_2$   
 155.  $R_1=N(CH_3)_2$   $R_2=H$   
 156.  $R_1=H$   $R_2=N(CH_3)_2$   
 157.  $R_1=NHCH_2CH(CH_3)_2$   $R_2=H$   
 159.  $R_1=H$   $R_2=NHCH_2CH_2Ph$   
 154.  $R_1=H$   $R_2=$   
 158.  $R_1=$   $R_2=H$



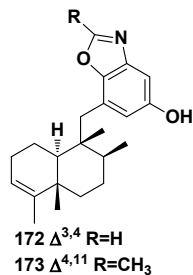
160.  $R_1 = \text{NHCH}_3$ ,  $R_2 = \text{H}$   
 161.  $R_1 = \text{H}$ ,  $R_2 = \text{NHCH}_3$   
 162.  $R_1 = \text{N}(\text{CH}_3)_2$ ,  $R_2 = \text{H}$   
 163.  $R_1 = \text{H}$ ,  $R_2 = \text{NHCH}_2\text{CH}(\text{CH}_3)_2$   
 164.  $R_1 = \text{H}$ ,  $R_2 = \text{N}(\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3)$   
 165.  $R_1 = \text{H}$ ,  $R_2 = \text{NHCH}_2\text{CH}_2\text{Ph}$



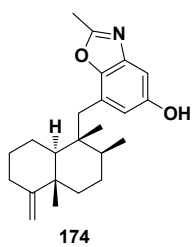
166.  $R_1 = \text{H}$ ,  $R_2 = \text{NHCH}_3$   
 167.  $R_1 = \text{NH}_2$ ,  $R_2 = \text{H}$   
 168.  $R_1 = \text{H}$ ,  $R_2 = \text{NH}_2$   
 169.  $R_1 = \text{NHCH}_2\text{CH}_2\text{Ph}$ ,  $R_2 = \text{H}$



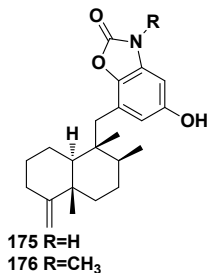
170.  $\Delta^{3,4}$   
 171.  $\Delta^{4,11}$



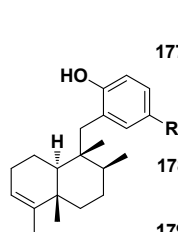
172.  $\Delta^{3,4}$ ,  $R = \text{H}$   
 173.  $\Delta^{4,11}$ ,  $R = \text{CH}_3$



174



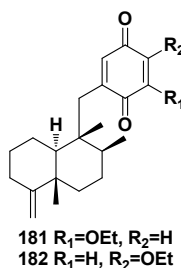
175.  $R = \text{H}$   
 176.  $R = \text{CH}_3$



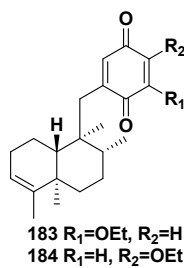
177.  $R =$

178.  $R =$

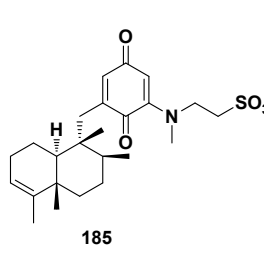
179.  $R = \text{NHCOCH}_3$   
 180.  $R = \text{NHCOCH}_2\text{CH}(\text{CH}_3)_2$



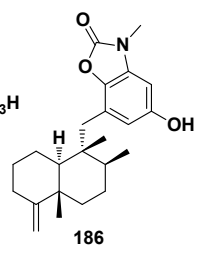
181.  $R_1 = \text{OEt}$ ,  $R_2 = \text{H}$   
 182.  $R_1 = \text{H}$ ,  $R_2 = \text{OEt}$



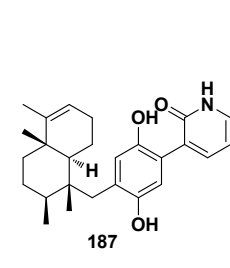
183.  $R_1 = \text{OEt}$ ,  $R_2 = \text{H}$   
 184.  $R_1 = \text{H}$ ,  $R_2 = \text{OEt}$



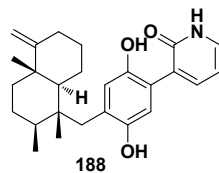
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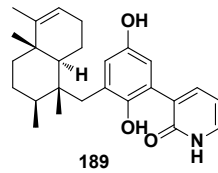
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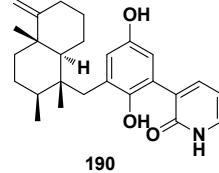
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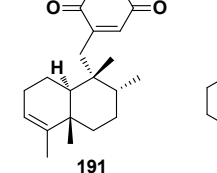
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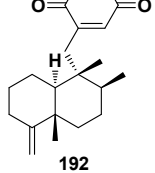
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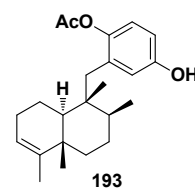
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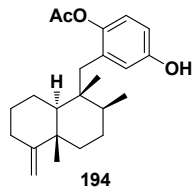
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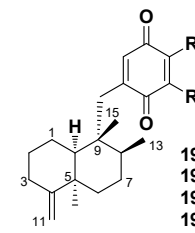
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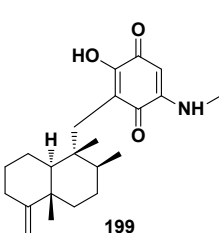
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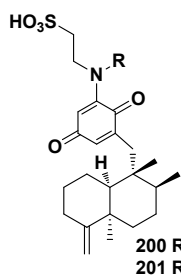
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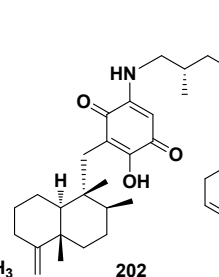
195.  $R_1 = \text{H}$ ,  $R_2 = \text{NH}_2$   
 196.  $R_1 = \text{NH}_2$ ,  $R_2 = \text{H}$   
 197.  $R_1 = \text{H}$ ,  $R_2 = \text{NHCH}_3$   
 198.  $R_1 = \text{NHCH}_3$ ,  $R_2 = \text{H}$



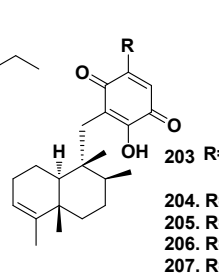
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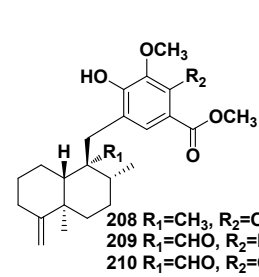
200.  $R = \text{H}$   
 201.  $R = \text{CH}_3$



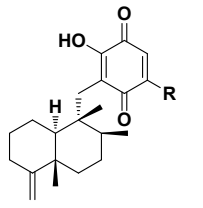
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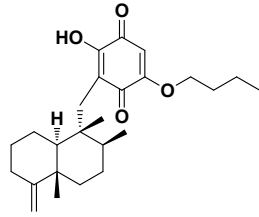
203.  $R =$   
 204.  $R = \text{NHCH}_2\text{CH}_2\text{CH}(\text{CH}_3)_2$   
 205.  $R = \text{NHCH}_2\text{CH}(\text{CH}_3)_2$   
 206.  $R = \text{NHCH}_2\text{CH}_2\text{Ph}$   
 207.  $R = \text{NHCH}_2\text{CH}_2\text{SO}_3\text{H}$



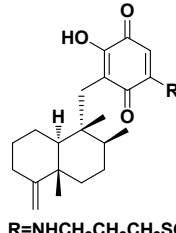
208.  $R_1 = \text{CH}_3$ ,  $R_2 = \text{OH}$   
 209.  $R_1 = \text{CHO}$ ,  $R_2 = \text{H}$   
 210.  $R_1 = \text{CHO}$ ,  $R_2 = \text{OH}$



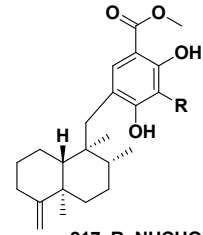
211. R=NHCH<sub>3</sub>  
212. R=NH(CH<sub>2</sub>)<sub>3</sub>SCH<sub>3</sub>



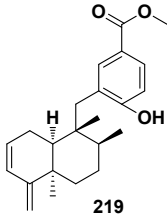
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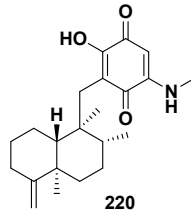
214. R=NHCH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>SOCH<sub>3</sub>  
215. R=NHCH<sub>2</sub>CH<sub>2</sub>SO<sub>3</sub>H  
216. R=NHCH<sub>2</sub>CH<sub>2</sub>OH



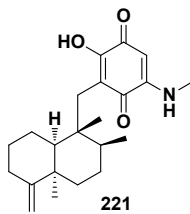
217. R=NHCHO  
218. R=NHCOCH<sub>2</sub>OH



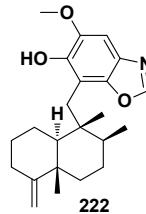
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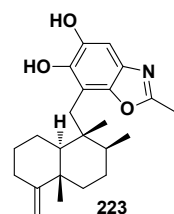
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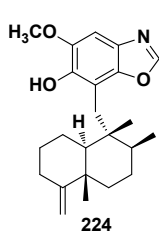
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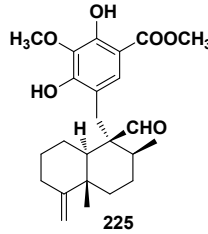
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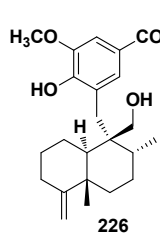
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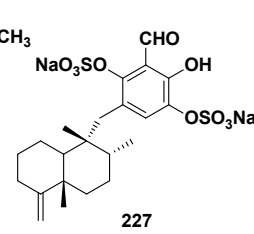
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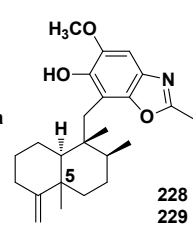
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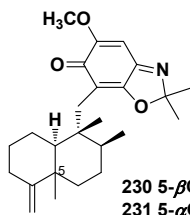
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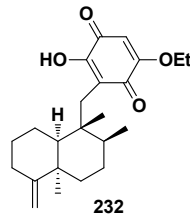
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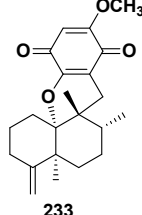
228 5-βCH<sub>3</sub>  
229 5-αCH<sub>3</sub>



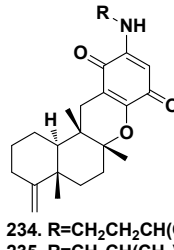
230 5-βCH<sub>3</sub>  
231 5-αCH<sub>3</sub>



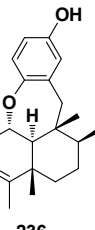
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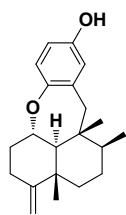
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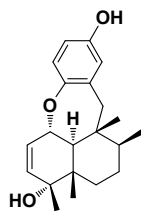
234. R=CH<sub>2</sub>CH<sub>2</sub>CH(CH<sub>3</sub>)<sub>2</sub>  
235. R=CH<sub>2</sub>CH(CH<sub>3</sub>)<sub>2</sub>



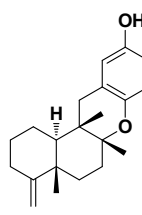
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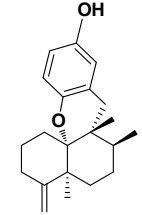
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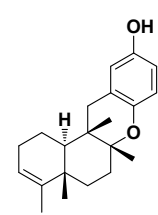
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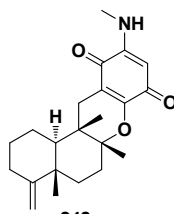
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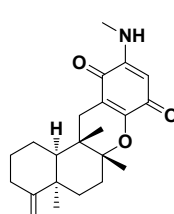
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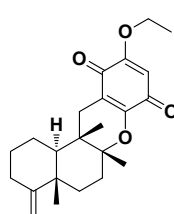
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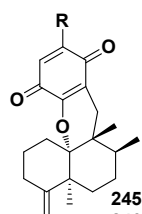
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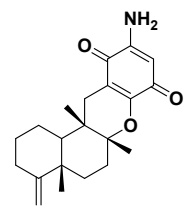
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244

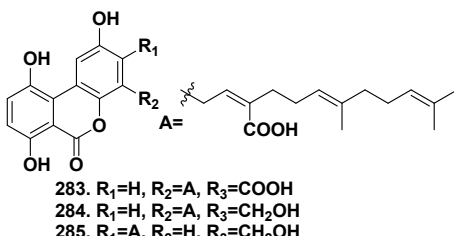
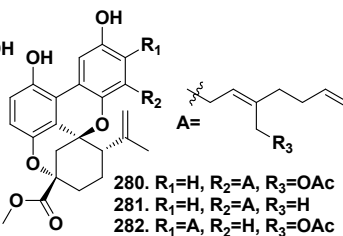
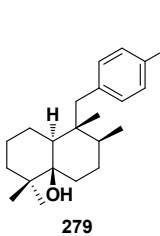
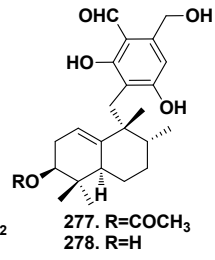
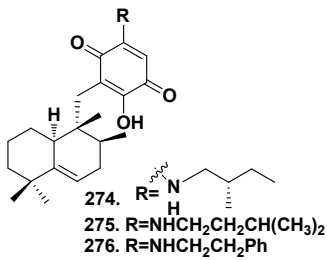
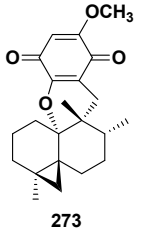
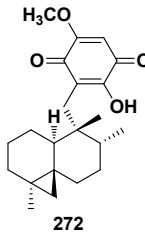
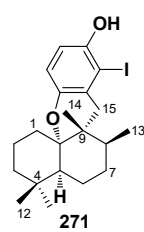
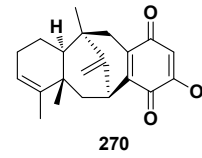
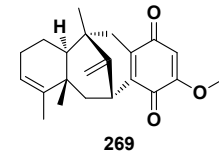
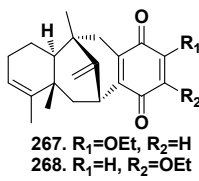
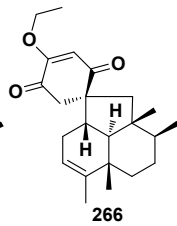
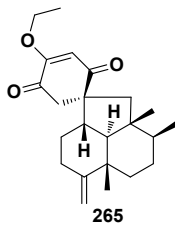
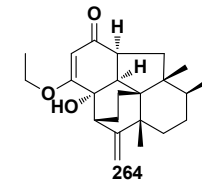
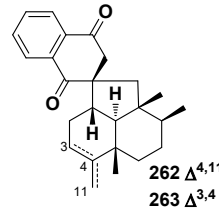
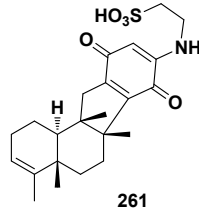
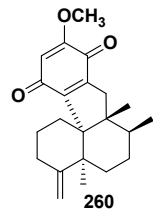
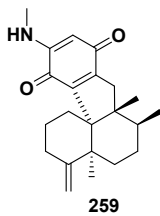
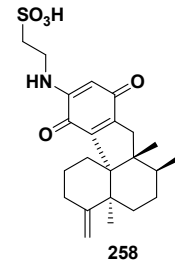
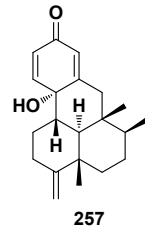
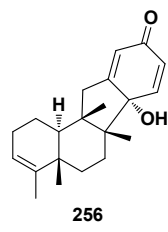
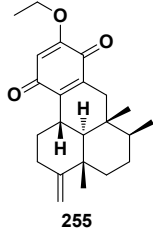
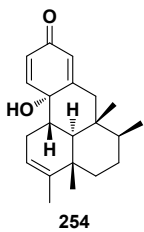
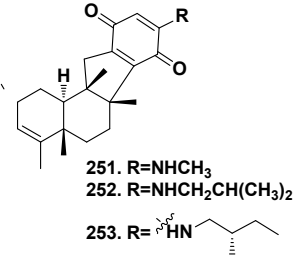
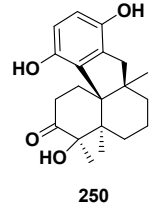
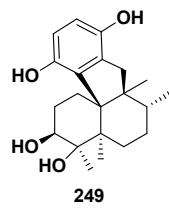
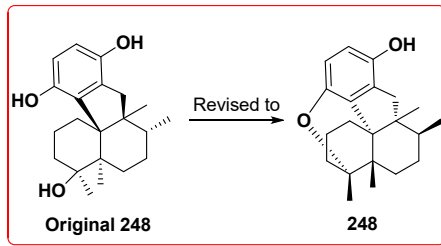


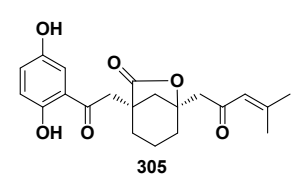
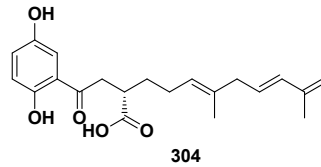
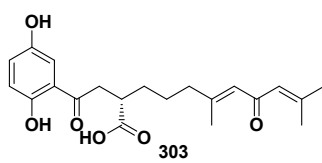
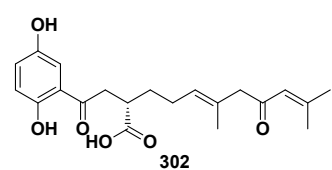
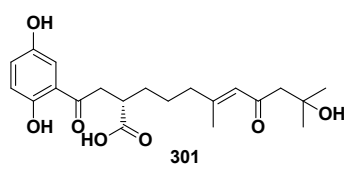
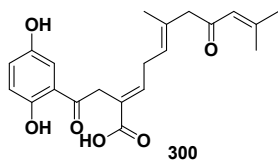
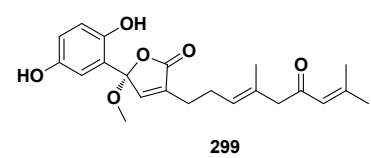
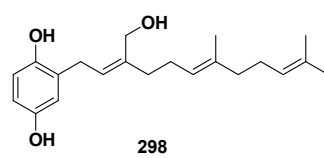
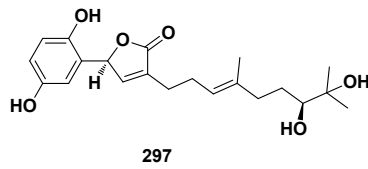
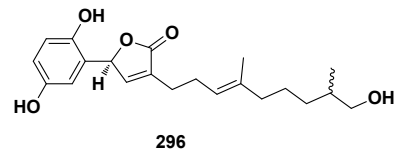
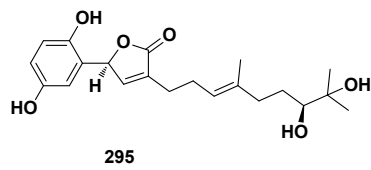
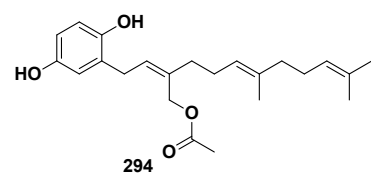
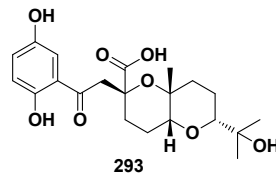
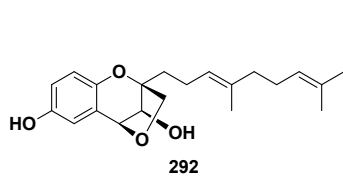
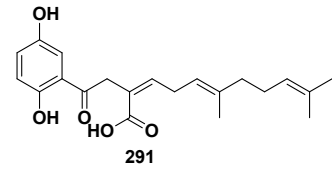
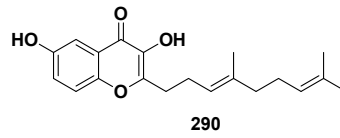
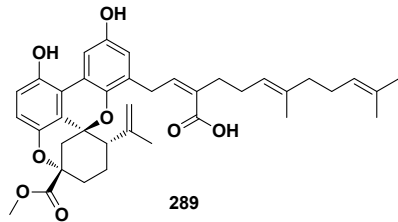
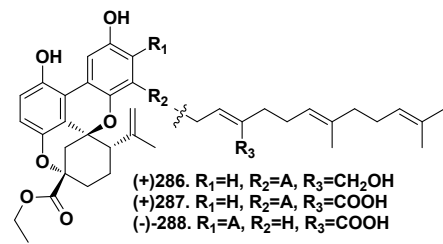
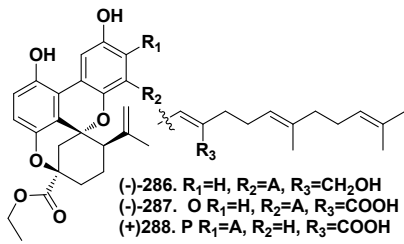
245. R=OCH<sub>2</sub>CH<sub>3</sub>  
246. R=NHCH<sub>3</sub>

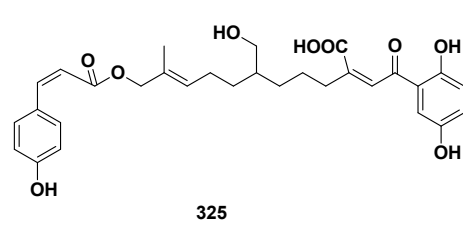
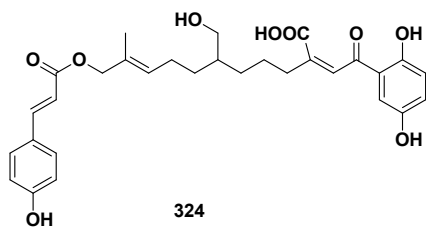
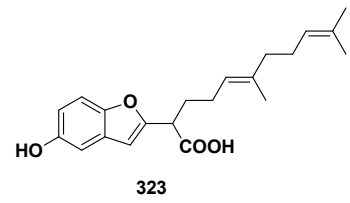
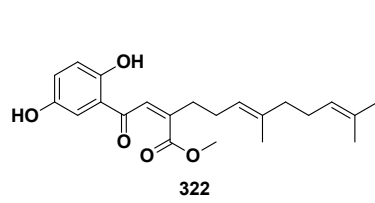
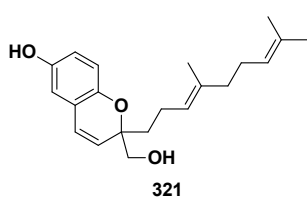
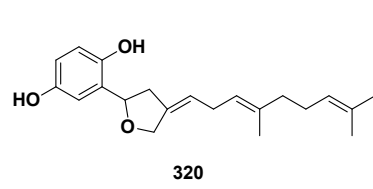
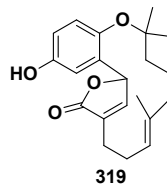
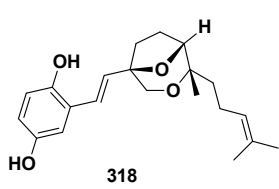
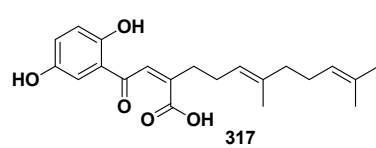
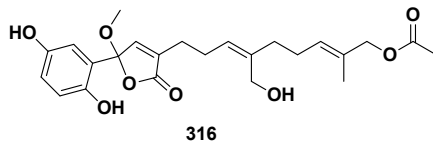
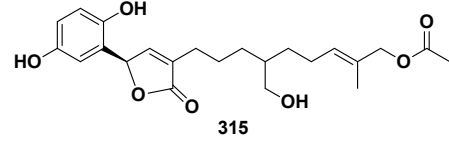
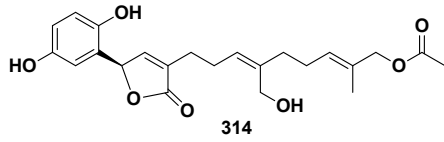
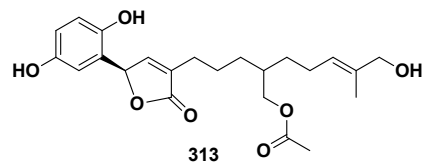
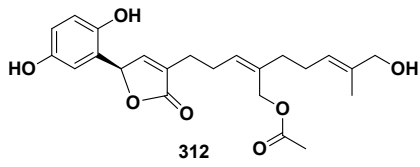
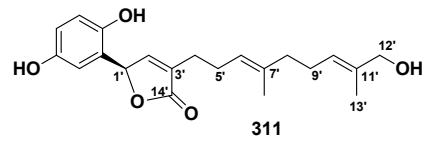
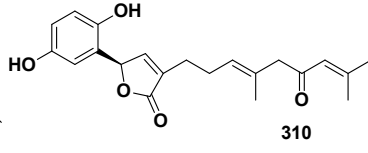
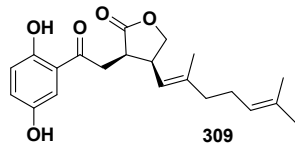
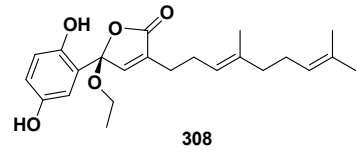
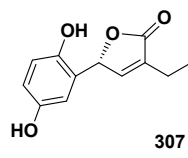
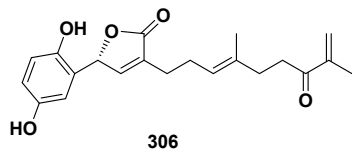


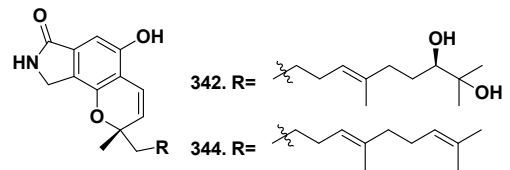
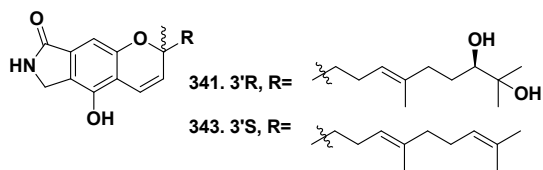
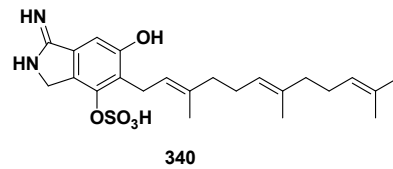
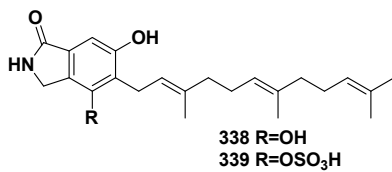
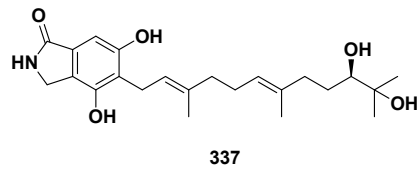
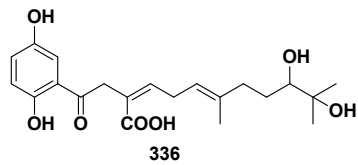
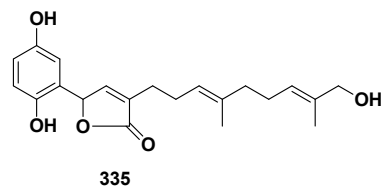
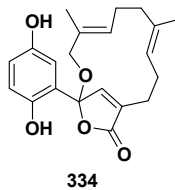
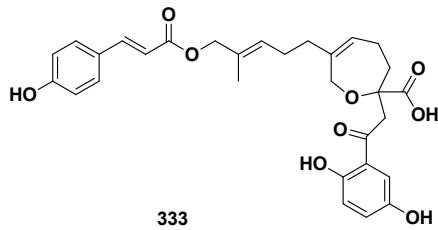
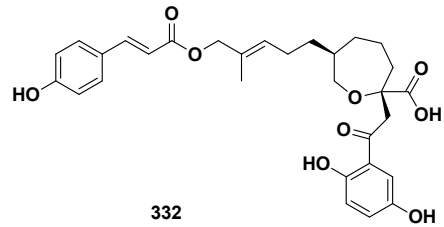
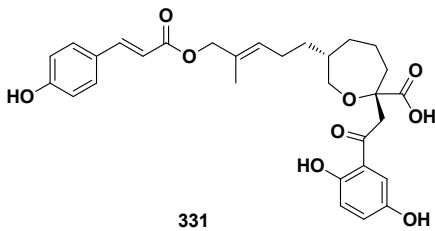
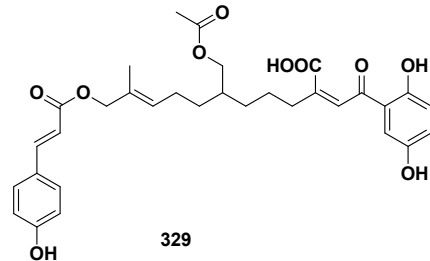
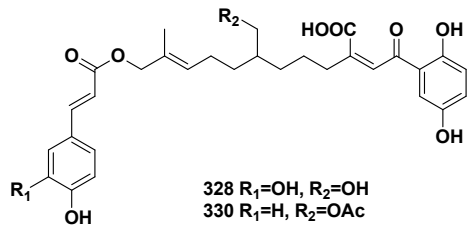
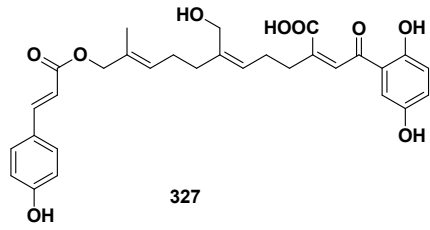
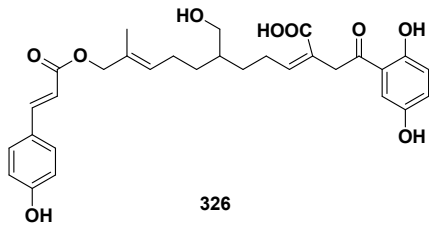
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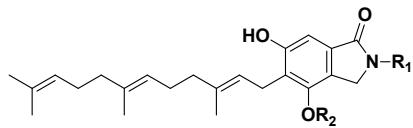




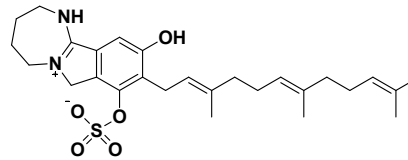




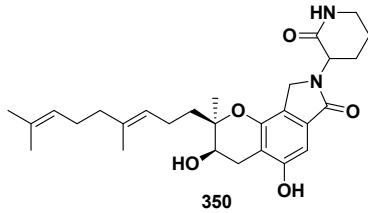




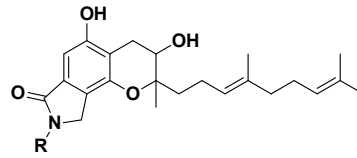
345.  $R_1=CH_2CH_2OH$ ,  $R_2=H$   
 346.  $R_1=CH_2CH_2OH$ ,  $R_2=SO_3H$   
 347.  $R_1=CH_2CH_2CH_2COOH$ ,  $R_2=SO_3H$   
 348.  $R_1=(N-6)-\alpha-D-Glc$ ,  $R_2=SO_3H$



349



350



351 R=



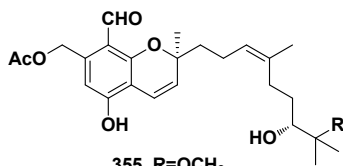
353 R=



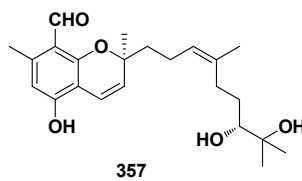
352 R=



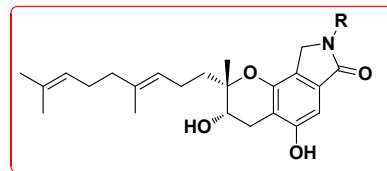
354 R=



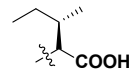
355.  $R=OCH_3$   
 356.  $R=OH$



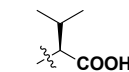
357



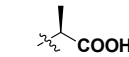
358 R=



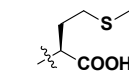
359 R=



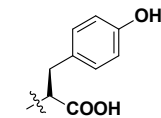
360 R=



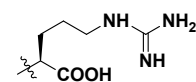
361 R=



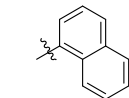
362 R=



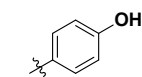
363 R=



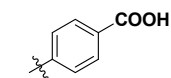
364 R=



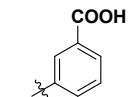
365 R=



366 R=



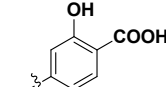
367 R=



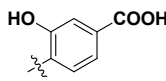
368 R=



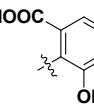
369 R=



370 R=



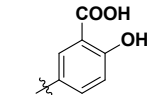
371 R=



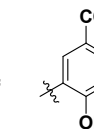
372 R=



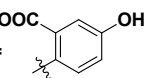
373 R=



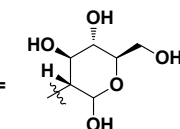
374 R=



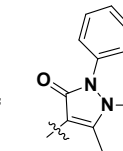
375 R=



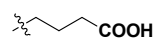
376 R=



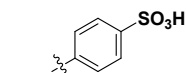
377 R=



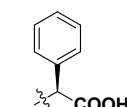
378 R=



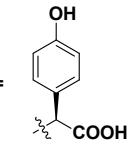
379 R=



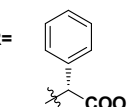
380 R=



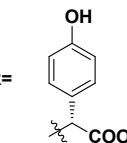
381 R=



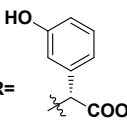
382 R=

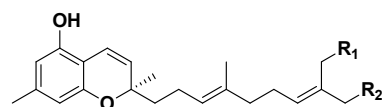
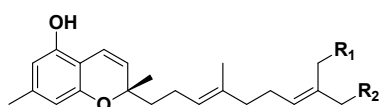
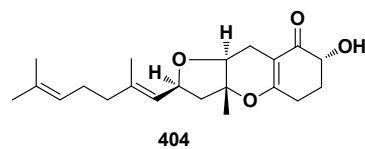
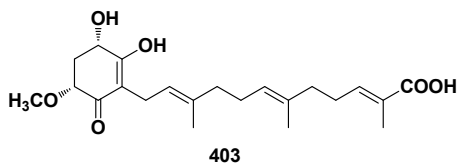
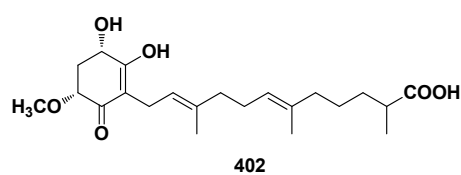
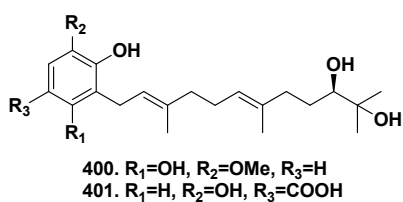
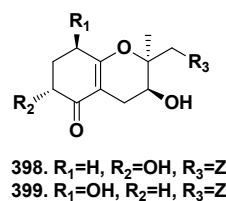
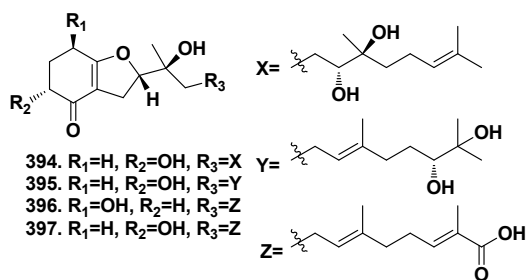
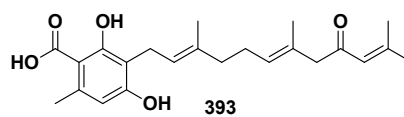
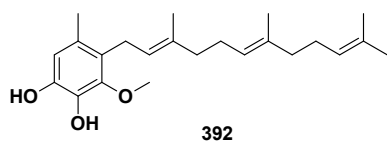
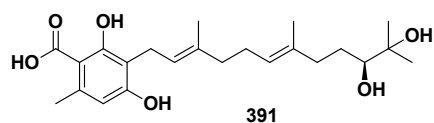
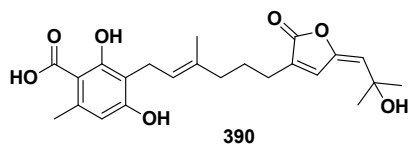
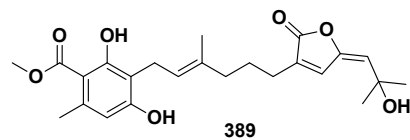
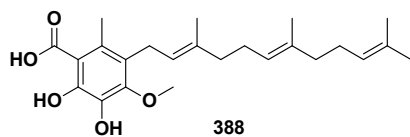
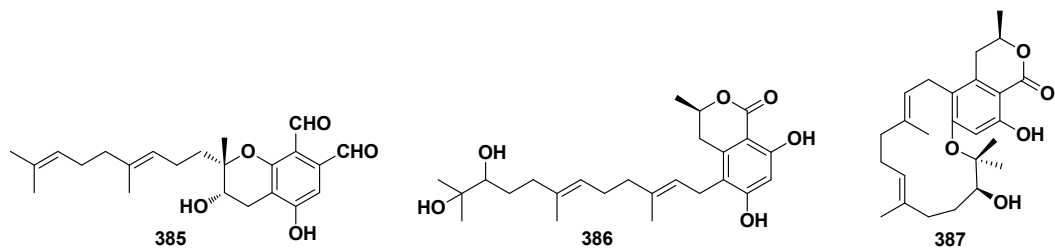


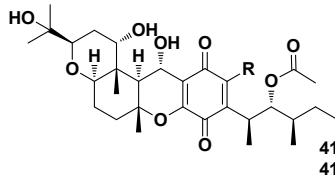
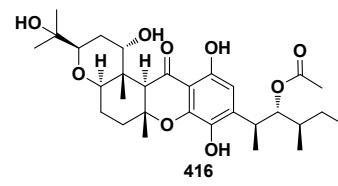
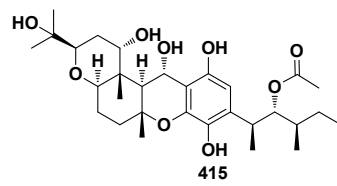
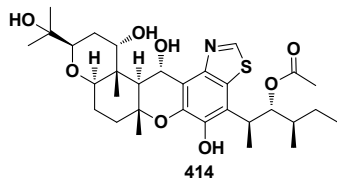
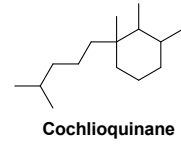
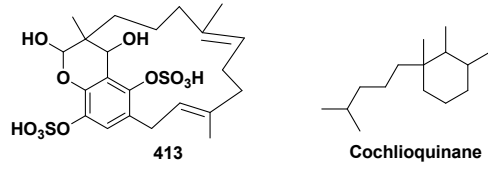
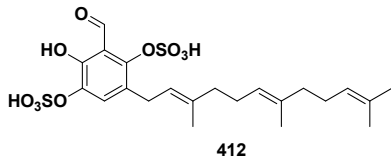
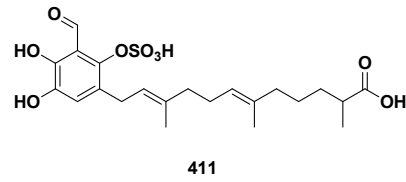
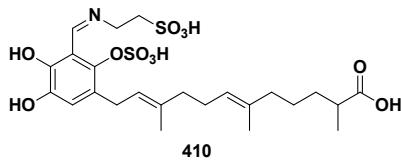
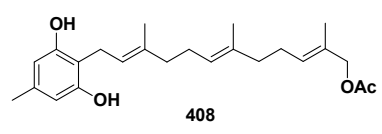
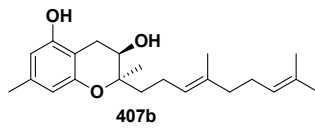
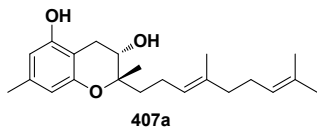
383 R=



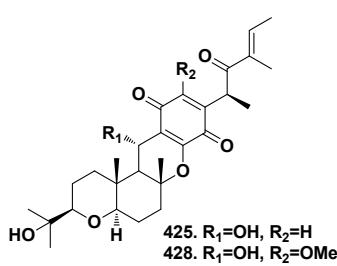
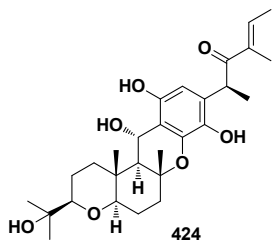
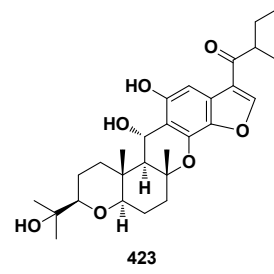
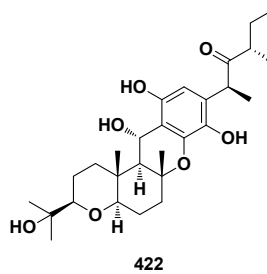
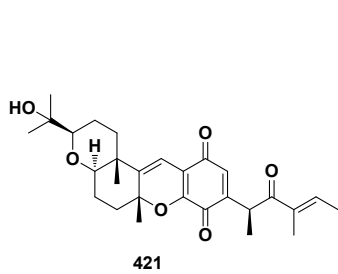
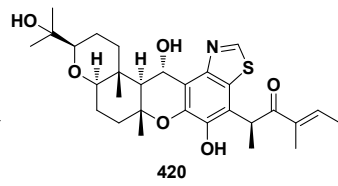
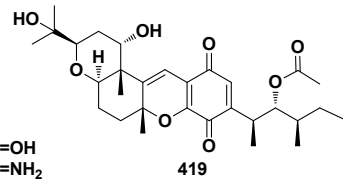
384 R=



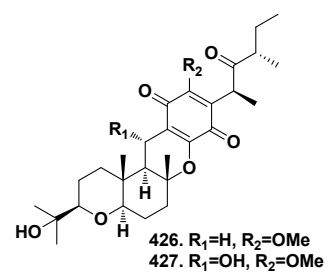




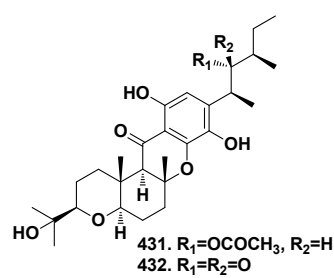
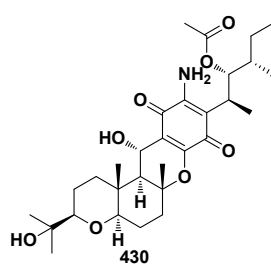
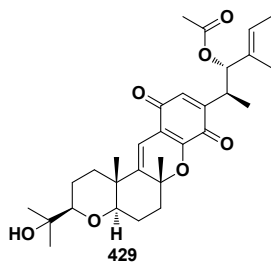
418. R=NH<sub>2</sub>



428. R<sub>1</sub>=OH, R<sub>2</sub>=OMe



427. R<sub>1</sub>=OH, R<sub>2</sub>=OMe



432. R<sub>1</sub>=R<sub>2</sub>=O

