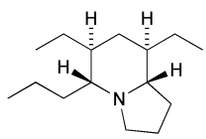
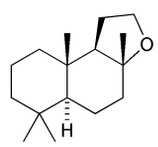
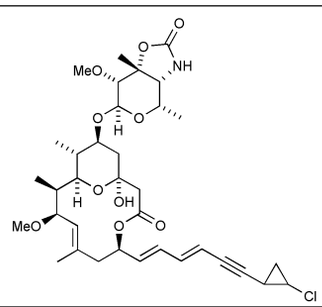
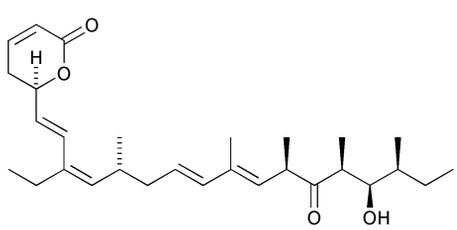
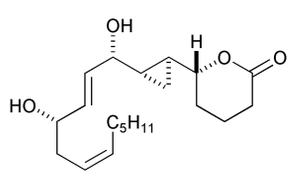
Perkin 1 Abstracts: Natural Product Synthesis

Jennifer Delaney, Stephen McAteer and Marcel de Puit

Department of Chemistry, Leeds University, Leeds, UK LS2 9JT

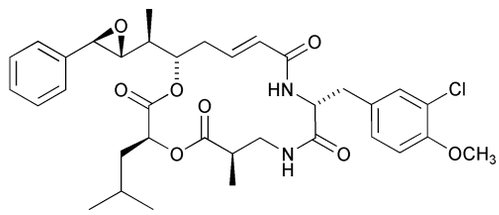
Perkin 1 Abstracts: Natural Product Synthesis aims to highlight syntheses that have been recently published. It includes brief descriptions of *biological activity* and *key steps*. A more comprehensive list of Natural Product syntheses and isolations can be found in *Natural Product Updates*.

Alkaloid 223A *Biological activity*: not reported. *Key steps*: sequential conjugate addition reactions to enamino esters. N. Toyooka, A. Fukutome, H. Nemoto, J. W. Daly, T. F. Spande, H. M. Garraffo and T. Kaneko, *Org. Lett.*, 2002, **4**, 1715.	
(–)-Ambrox *Biological activity*: not reported. *Key steps*: (a) Lewis and Brønsted acid mediated diastereoselective cyclisation; (b) regio- and stereoselective carboxylation of an allylic barium reagent. K. Ishihara, H. Ishibashi and H. Yamamoto, *J. Am. Chem. Soc.*, 2002, **124**, 3647.	
Callipeltoside A *Biological activity*: (a) cytotoxic against NSCLC-N6 human bronchopulmonary nonsmall-cell lung carcinoma cell lines; (b) cytotoxic against P388 cell lines. *Key steps*: enantioselective Cu-catalysed vinylogous aldol. D. A. Evans, E. Hu, J. D. Burch and G. Jaeschke, *J. Am. Chem. Soc.*, 2002, **124**, 5654.	
(–)-Callystatin A *Biological activity*: (a) cytotoxic against KB tumour cells (IC_{50} = 10 pg/mL); (b) cytotoxic against L1210 cells (IC_{50} = 20 pg/mL). *Key steps*: (a) BF_3•OEt_2 promoted addition of an allenylstannane to an aldehyde; (b) *in situ* generation of allenylzinc reagent and addition to an aldehyde; (c) sp^2-sp^3 Suzuki cross-coupling. J. A. Marshall and M. P. Bourbeau, *J. Org. Chem.*, 2002, **67**, 2751.	
Constanolactone A *Biological activity*: not reported. *Key steps*: (a) stereoselective bis-annulation; (b) β-oxido ylide homologation. J. Yu, J.-Y. Lai, J. Ye, N. Balu, L. M. Reddy, W. Duan, E. R. Fogel, J. H. Capdevila and J. R. Falck, *Tetrahedron Lett.*, 2002, **43**, 3939.	

Cryptophycin 1

Biological activity: solid tumor-selective cytotoxin.

Key steps: stereoconvergent hetero-Diels Alder cycloaddition.

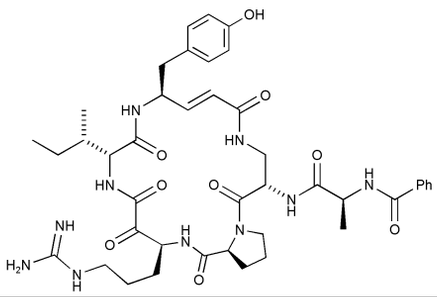


L. Li and M. A. Tuis, *Org. Lett.*, 2002, **4**, 1637.

Cyclotheonamide E_2

Biological activity: serine protease inhibitor.

Key steps: cyano ylide activation of a carboxy group for amide bond formation.

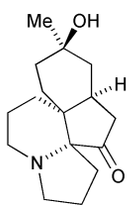


H. H. Wasserman and R. Zhang, *Tetrahedron Lett.*, 2002, **43**, 3743.

(±)-13-Deoxyserratine

Biological activity: not reported.

Key steps: (a) diastereoselective Pauson-Khand reaction; (b) cascade radical cyclisation.

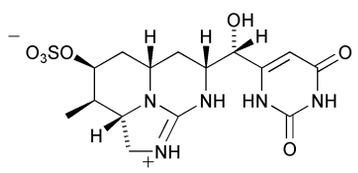


J. Cassayre, F. Gagosz and S. Z. Zard, *Angew. Chem., Int. Ed.*, 2002, **41**, 1783.

Epicylindrospermopsin

Biological activity: not reported.

Key steps: intramolecular [3+2] nitrone cycloaddition.

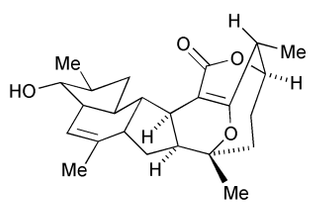


J. D. White and J. D. Hansen, *J. Am. Chem. Soc.*, 2002, **124**, 4950.

(+)-FR182877

Biological activity: not reported.

Key steps: (a) Stille coupling; (b) double transannular Diels-Alder reaction; (c) EDC mediated lactonisation.

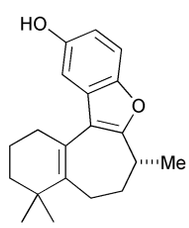


D. A. Vosburg, C. D. Vanderwal and E. J. Sorensen, *J. Am. Chem. Soc.*, 2002, **124**, 4552.

(–)-Frondosin B

Biological activity: (a) interleukin-8 inhibitor; (b) HIV-inhibitor.

Key steps: (a) Sonogashira coupling; (b) intramolecular Heck reaction.



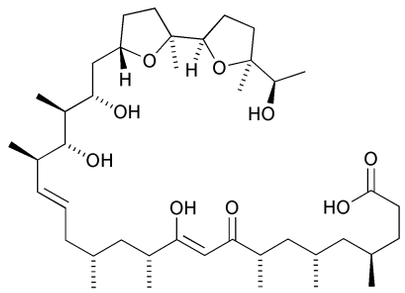
C. C. Hughes and D. Trauner, *Angew. Chem., Int. Ed.*, 2002, **41**, 1569.

Ionomycin

Biological activity: high binding affinity for Ca^{2+}.

Key steps: (a) Ni-catalysed reductive ring opening of an oxabicycle; (b) Pd-catalysed addition of dialkylzinc to an oxabicyclic alkene; (c) Julia-Kocienski olefination; (d) Evans boron-mediated aldol reaction.

M. Lautens, J. T. Colucci, S. Hiebert, N. D. Smith and G. Bouchain, *Org. Lett.*, 2002, **4**, 1879.

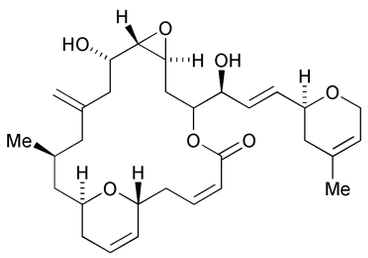


(–)-Laulimalide

Biological activity: (a) promotes abnormal tubilin polymerisation; (b) promotes apoptosis in vitro.

Key steps: (a) Yamamoto coupling; (b) asymmetric Sakurai reaction; (c) modified Seyferth-Gilbert reaction; (d) Yamaguchi macrolactonisation.

P. A. Wender, S. G. Hegde, R. D. Hubbard and L. Zhang, *J. Am. Chem. Soc.*, 2002, **124**, 4956.

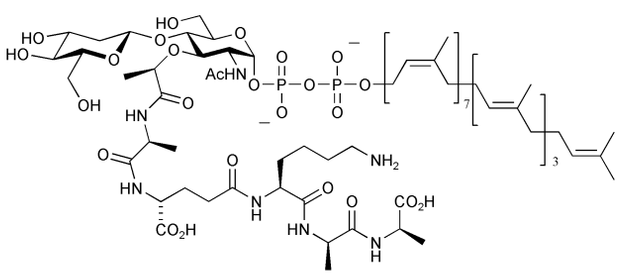


Lipid II

Biological activity: intermediate in bacterial cell wall biosynthesis.

Key steps: (a) formation of a 1, 2-*trans*-linked glycosyl phosphate; (b) lipid diphosphate linkage.

M. S. VanNieuwenhze, S. C. Mauldin, M. Zia-Ebrahimi, B. E. Winger, W. J. Hornback, S. L. Saha, J. A. Aikins and L. C. Blaszczak, *J. Am. Chem. Soc.*, 2002, **124**, 3656.

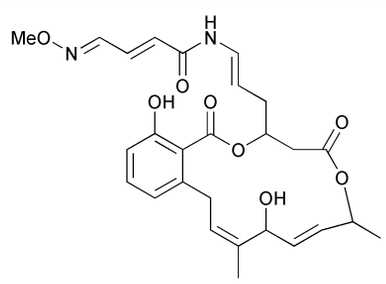


Lobatamide C

Biological activity: potent against human tumor cell lines (mean panel GI_{50} values approximately 1.6 nM).

Key steps: (a) sp^2-sp^3 coupling of vinylstannane and benzylic bromide; (b) Cu(I)-catalysed amidation of a vinyl iodide; (c) Mitsunobu macrolactonisation.

R. Shen, C. T. Lin and J. A. Porco Jr., *J. Am. Chem. Soc.*, 2002, **124**, 5650.

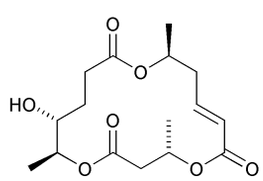


(+)-Macrosphelide C

Biological activity: inhibit adhesion of human leukaemia HL-60 cells to human umbilical-vein endothelial cells.

Key steps: (a) chemoenzymatic hydrolysis; (b) Steglich esterification; (c) Yamaguchi macrolactonization.

H. Nakamura, M. Ono, Y. Shida and H. Akita, *Tetrahedron: Asymmetry*, 2002, **13**, 705.

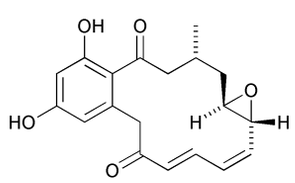


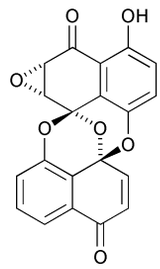
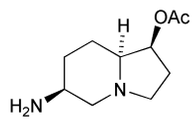
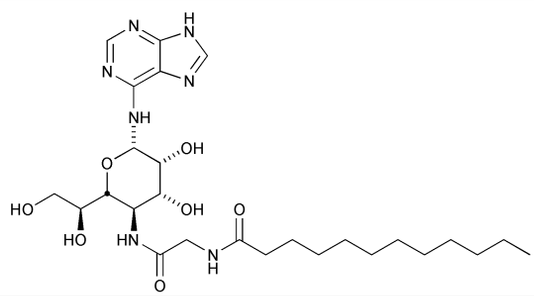
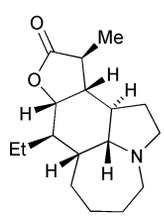
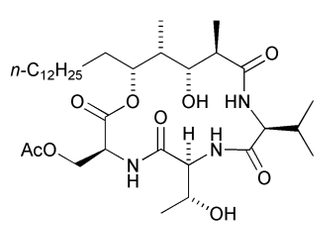
Monocillin I

Biological activity: not reported.

Key steps: (a) Pd-catalysed coupling of a chloromethylisocoumarin with a functionalised vinylstannane; (b) Mitsunobu macrolactonisation.

I. Tichkowsky and R. Lett, *Tetrahedron Lett.*, 2002, **43**, 3997.



(–)-Preussomerin G *Biological activity*: ras-farnesyl transferase activity. *Key steps*: (a) asymmetric phase transfer catalysed epoxidation of a cyclic enone; (b) biomimetic oxidative spirocyclisation. A. G. M. Barrett, F. Blaney, A. D. Campbell, D. Hamprecht, T. Meyer, A. J. P. White, D. Witty and D. J. Williams, *J. Org. Chem.*, 2002, **67**, 2735.	
(–)-Slaframine *Biological activity*: stimulates muscarinic acetylcholine receptors on oxidation. *Key steps*: (a) enantioselective allyltitanation; (b) Mitsunobu reaction; (c) reductive double cyclisation of a bis-mesylate. J. Cossy, C. Willis, V. Bellosta and L. Saint-Jalmes, *Synthesis*, 2002, **7**, 951.	
Spicamycin *Biological activity*: (a) potent differentiation inducer of HL-60 human promyelocytic leukemia cells; (b) antitumor activity against human gastric cancer SC-9. *Key steps*: palladium-catalysed coupling of an amine with a halopurine. T. Suzuki, S. T. Suzuki, I. Yamada, Y. Koashi, K. Yamada and N. Chida, *J. Org. Chem.*, 2002, **67**, 2874.	
(±)-Stenine *Biological activity*: not reported. *Key steps*: (a) intramolecular [4 + 2]cycloaddition of a 2-methylthio-5-amidofuran; (b) directed hydrogenation; (c) iodolactonisation; (d) Keck allylation. J. D. Ginn and A. Padwa, *Org. Lett.*, 2002, **4**, 1515.	
(–)-Stevastelin B *Biological activity*: potent immunosuppressive activity. *Key steps*: (a) Me_3Al *trans*-diaxial epoxide opening; (b) Shioiri macro-lactamisation. K. Kurosawa, T. Nagase and N. Chida, *Chem. Commun.*, 2002, 1280.	
Typhoniside A *Biological activity*: not reported. *Key steps*: opening of a hemiacetal by a Wittig reagent. X. Chen, Y.-L. Wu and D. Chen, *Tetrahedron Lett.*, 2002, **43**, 3529.