Perkin 1 Abstracts: Natural Product Synthesis

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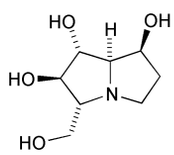
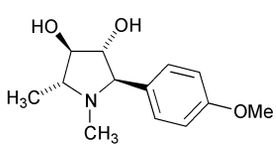
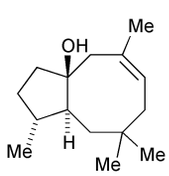
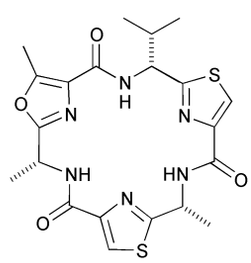
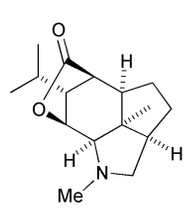
Perkin 1 Abstracts: Natural Product Synthesis aims to highlight syntheses that have been recently published. It includes brief descriptions of *biological activity* and *key steps*. A more comprehensive list of Natural Product syntheses and isolations can be found in *Natural Product Updates*.

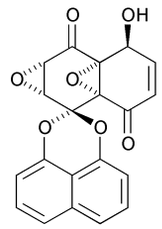
(+)-Australine *Biological activity*: (a) isolated from the legumes *Alexa leiopetala* and *Castanospermum australe*; (b) inhibitor of amyloglucosidase and the glycoprotein processing enzyme glucosidase I; (c) antiviral; (d) anti HIV activity. *Key steps*: (a) stereoselective Wittig reaction; (b) epoxidation; (c) reductive double-cyclisation of an azido epoxy tosylate to form a pyrrolizidine ring system. W. H. Pearson and J. V. Hines, *J. Org. Chem.*, 2000, **65**, 5785.	
(–)-Codonopsinine *Biological activity*: (a) isolated from *Codonopsis clematidea*; (b) antibiotic; (c) hypotensive; (d) displays no effect on the central nervous system in animal tests. *Key steps*: (a) stereoselective Heck arylation of an endocyclic enecarbamate with *p*-methoxybenzenediazonium tetrafluoroborate; (b) stereoselective epoxidation/epoxide opening sequence. E. A. Severino and C. R. D. Correia, *Org. Lett.*, 2000, **2**, 3039.	
(+)-Dactylol *Biological activity*: (a) isolated from the sea hare *Aplysia dactylomela*; (b) biological activity not reported. *Key steps*: stereocontrolled intramolecular 4+3 cycloaddition. M. Harmata and P. Rashatasakhon, *Org. Lett.*, 2000, **2**, 2913.	
Dendroamide A *Biological activity*: (a) isolated from the cyanobacterium *Stigonema dendroideum*; (b) exhibits multidrug-resistance reversing activity. *Key steps*: self-assembly of a 1:1:1 mixture of chiral thiazole and oxazole-based amino acids to form dendroamide A. A. Bertram and G. Pattenden, *Synlett*, 2000, **10**, 1519.	
(±)-Dendrobine *Biological activity*: (a) isolated from the Chinese ornamental orchid *Dendrobium nobile*; (b) antipyretic; (c) hypotensive; (d) convulsant. *Key steps*: stereocontrolled synthesis of the tricyclic core using an amidofuran cycloaddition/rearrangement. A. Padwa, M. Dimitroff and B. Liu, *Org. Lett.*, 2000, **2**, 3233.	

(+)-Diepoxin σ

Biological activity: (a) isolated from fermentation broths of a fungal culture, SCF-0642, *Nattrassia mangiferae,* and of a nonsporulating fungus, LL-07F257; (b) antifungal; (c) anticancer activity (IC_{50} of 0.75 μM against the invasion of HT 1080 human fibrosarcoma cells); (d) antibacterial (MICs of 4-32 μg mL^{-1} against a panel of selected bacteria).

Key steps: (a) Ullmann coupling; (b) oxidative spirocyclisation for the introduction of the naphthalene ketal; (c) retro-Diels–Alder reaction; (d) boron-mediated Diels–Alder.

P. Wipf and J.-K. Jung, *J. Org. Chem.*, 2000, **65**, 6319.

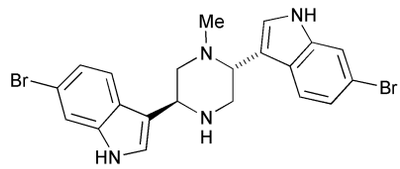


Dragmacidin A

Biological activity: (a) isolated from the deep water sponges *Dragmacidon*, *Halicortex*, *Hexadella*, *Spongosorites* and the tunicate *Didemnum candidum*; (b) anticancer; (c) antifungal; (d) antiviral; (e) antiinflammatory.

Key steps: condensation of an indoleglycine and its *N*-methyl derivative followed by cyclisation to form a *trans*-piperazine-2,5-dione.

T. Kawasaki, H. Enoki, K. Matsumura, M. Ohyama, M. Inagawa and M. Sakamoto, *Org. Lett.*, 2000, **2**, 3027.

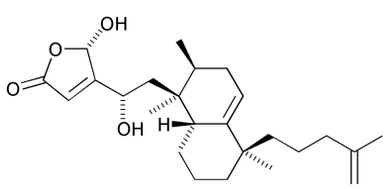


Dysidiolide

Biological activity: (a) isolated from the marine sponge *Dysidea etheria* de Laubenfels; (b) anticancer.

Key steps: (a) higher order cyanocuprate conjugate addition reaction; (b) annulation reaction forming a bicyclic enone; (c) diastereoselective conjugate addition reaction utilising a Gilman type reagent.

D. Demeke and C. J. Forsyth, *Org. Lett.*, 2000, **2**, 3177.

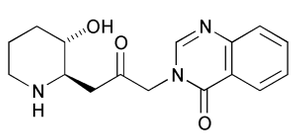


(+)-Febrifugine

Biological activity: (a) isolated from the Chinese medicinal plant *Dichroa febrifuga* Lour.; (b) antimalarial; (c) high activity against *Plasmodium* Malaria parasite.

Key steps: ring-closing metathesis reaction.

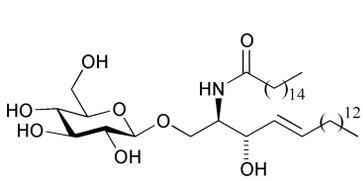
T. Taniguchi and K. Ogasawara, *Org. Lett.*, 2000, **2**, 3193.



D,L-Glucosylceramide

Biological activity: (a) structural support and shape determinants of the cell membrane; (b) mediates a variety of cellular recognition events *via* protein binding that are common to cancer, allergy, viral infection, inflammation and autoimmune disease.
Key steps: (a) reagent-controlled asymmetric Brown allylboration constructing two adjacent stereocentres; (b) silicon-tethered olefin metathesis employing a molybdenum Schrock carbene.

A. G. M. Barrett, J. C. Beall, D. C. Braddock, K. Flack, V. C. Gibson and M. M. Salter, *J. Org. Chem.*, 2000, **65**, 6508.

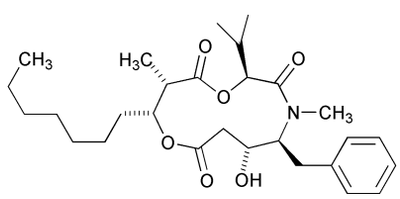


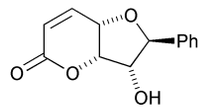
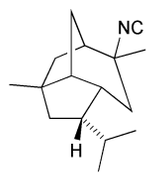
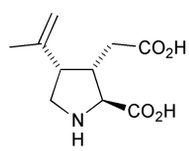
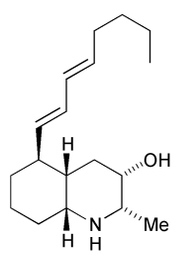
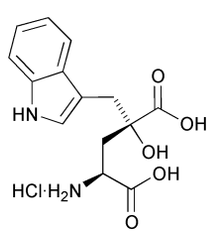
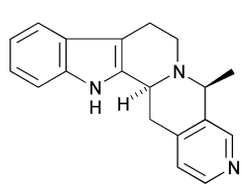
Hapalosin

Biological activity: MDR antagonist.

Key steps: macrolactamisation using diphenylphosphoryl azide.

C. Hermann, G. C. G. Pais, A. Geyer, S. M. Kühnert and M. E. Maier, *Tetrahedron*, 2000, **56**, 8461.



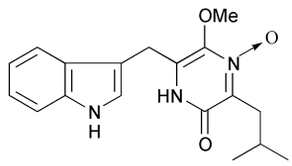
Isoaltholactone *Biological activity*: (a) antitumour; (b) antifungal; (c) antibiotic potential. *Key steps*: Sharpless catalytic asymmetric dihydroxylation. J. M. Harris and G. A. O'Doherty, *Org. Lett.*, 2000, **2**, 2983.	
(±)-2-Isocyanoallopupukeanane *Biological activity*: not reported. *Key steps*: (a) dibromocarbene addition; (b) intramolecular hetero-Diels–Alder reaction. T.-L. Ho, L.-R. Kung and R.-J. Chein, *J. Org. Chem.*, 2000, **65**, 5774.	
(–)-α-Kainic Acid *Biological activity*: (a) isolated from the marine algae *Digenea simplex* and *Centrocerus clavulatum* and from the Corsican moss *Alsidum helminthocorton*; (b) potent neurostimulant; (c) insecticidal; (d) anthelmintic. *Key steps*: stereoselective preparation of the substituted pyrrolidine ring using a titanium-mediated diene metallabicyclisation. A. D. Campbell, T. M. Raynham and R. J. K. Taylor, *J. Chem. Soc., Perkin Trans. 1*, 2000, 3194.	
(–)-Lepadin B *Biological activity*: (a) isolated from the flatworm *Prostheceraeus villatus* and its tunicate prey *Clavelina lepadiformis*; (b) *in vitro* cytotoxicity against human cancer cell lines. *Key steps*: (a) aqueous intramolecular acylnitroso Diels–Alder cyclisation to afford a *trans*-1,2-oxazinolactam; (b) Suzuki cross-coupling. T. Ozawa, S. Aoyagi and C. Kibayashi, *Org. Lett.*, 2000, **2**, 2955.	
Monatin *Biological activity*: (a) isolated from *Schlerochiton ilicifolius*; (b) a potent sweetener (1000 times sweeter than sucrose). *Key steps*: reaction of a Garner aldehyde with the enolate of a pivalidene derivative. K. Nakamura, T. J. Baker and M. Goodman, *Org. Lett.*, 2000, **2**, 2967.	
(–)-Normalindine *Biological activity*: (a) isolated from the root bark of *Strychnos johnsonii* (Loganiaceae) and the leaves of *Ophiorrhiza filistipula* (Rubiaceae); (b) biological activity not reported. *Key steps*: intramolecular oxazole-olefin Diels–Alder reaction. M. Ohba, H. Kubo and H. Ishibashi, *Tetrahedron*, 2000, **56**, 7751.	

OCP-15161

Biological activity: (a) isolated from the culture broth of fungus Thielavia *minor* OFR-1561; (b) novel inhibitor against superoxide anion generation.

Key steps: novel lithium thiolate-mediated pyrazine ring forming reaction between an oxime-nitrogen and an ester.

K. Shinhama, K. Matoba, Y. Torisawa and J. Minamikawa, *Tetrahedron*, 2000, **56**, 7427.

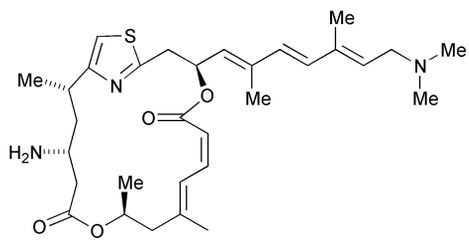


(–)-Pateamine

Biological activity: (a) isolated from the marine sponge *Mycale* sp.; (b) potent immunosuppressant with low cytotoxicity.

Key steps: intra- and intermolecular Stille sp^2-sp^2 coupling.

M. J. Remuiñán and G. Pattenden, *Tetrahedron Lett.*, 2000, **41**, 7367.

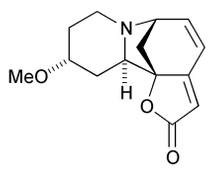


Phyllanthine

Biological activity: not reported.

Key steps: (a) intramolecular pinacol-type coupling of a ketonitrile using SmI_2 to generate the B/C azabicyclo[3.2.1]octane nucleus; (b) regioselective radical-based generation of *N*-acyliminium ions from simple amines; (c) stereoselective $Yb(OTf)_3$-promoted hetero Diels–Alder reaction of an imine with Danishefsky's diene.

G. Han, M. G. LaPorte, J. J. Folmer, K. M. Werner and S. M. Weinreb, *J. Org. Chem.*, 2000, **65**, 6293.

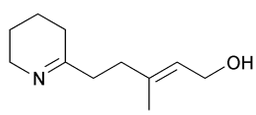


Polonicumtoxin C

Biological activity: (a) isolated from *Peridinium polonicum*; (b) exhibits extremely potent toxicity towards fish.

Key steps: intramolecular transimination process.

T. N. Van and N. De Kimpe, *Tetrahedron*, 2000, **56**, 7969.

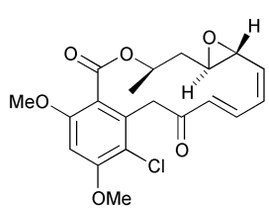


Radicicol dimethyl ether

Biological activity: (a) Radicicol is isolated from *Monocillium nordinii*; (b) Radicicol is an antitumour antibiotic which has the ability to morphologically revert the tumour phenotype of *src*[2] and *ras*[3] transformed cell lines back to normal tissue; (c) Radicicol binds with nanomolar affinity to the Hsp90 molecular chaperone and inhibits its ATPase activity, resulting in the inability of Hsp90 to participate in the signal transduction pathways vital for tumour cell growth.

Key steps: stereospecific ring-closing metathesis of an olefin with a vinyl epoxide.

R. M. Garbaccio and S. J. Danishefsky, *Org. Lett.*, 2000, **2**, 3127.



(+)-Sambutoxin

Biological activity: (a) isolated from wheat cultures of *Fusarium sambucinum* PZF-4; (b) produces hemorrhagic lesions of the gastrointestinal tract.

Key steps: (a) asymmetric conjugate addition reaction; (b) Paterson *anti*-aldol reaction; (c) tandem Saegusa oxidation-cyclisation.

D. R. Williams and R. A. Turske, *Org. Lett.*, 2000, **2**, 3217.