Perkin 1 Abstracts: Natural Product Synthesis

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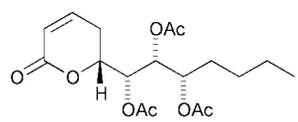
Perkin 1 Abstracts: Natural Product Synthesis aims to highlight syntheses that have been recently published. It includes brief descriptions of *biological activity* and *key steps*. A more comprehensive list of Natural Product syntheses and isolations can be found in *Natural Product Updates*.

(+)-Boronolide

Biological activity: isolated from *Tetradenia fruticosa* and *Tetradenia barberae*, the root extract of which is effective against malaria.

Key steps: (a) stereoselective reduction of an α-hydroxy ketone; (b) allylation of an α-hydroxy aldehyde; (c) ring closing olefin metathesis of a homoallylic alcohol derived acrylate ester.

A. K. Ghosh and G. Bilcer, *Tetrahedron Lett.*, 2000, **41**, 1003.

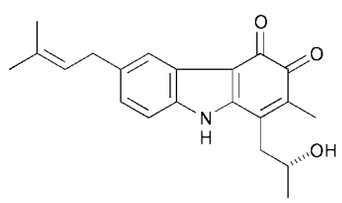


Carquinostatin A

Biological activity: (a) potent neuronal cell protecting substance; (b) free radical scavenger.

Key steps: (a) iron-mediated coupling of a cationic η^5-cyclohexyl iron complex with an arylamine to construct the carbazole framework; (b) coupling of bis[(μ-bromo)(η^3-prenyl)nickel] complex with a 6-bromocarbazole.

H.-J. Knölker, E. Baum and K. R. Reddy, *Tetrahedron Lett.*, 2000, **41**, 1171.

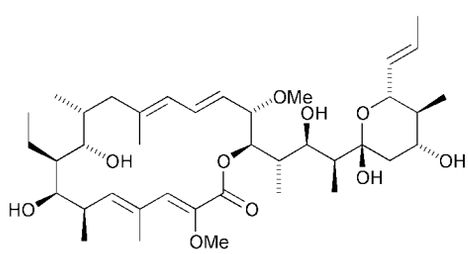


(+)-Concanamycin F

Biological activity: inhibits vacuolar (H^+) ATPase.

Key steps: (a) various directed aldol reactions; (b) Cu(I)-mediated macrocyclisation involving coupling of an iodoalkene and an alkenylstannane.

I. Paterson, V. A. Doughty, M. D. McLeod and T. Trieselmann, *Angew. Chem., Int. Ed.*, 2000, **39**, 1308.

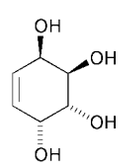


(–)-Conduritol E and F

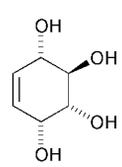
Biological activity: some conduritol derivatives (a) act as inhibitors of D-glycosidases; (b) are potent inhibitors of infection by human immunodeficiency virus (HIV).

Key steps: (a) intramolecular thiacyclisation of sugars to the corresponding thiepanes; (b) Ramberg-Bäcklund reaction.

V. Cerè, G. Mantovani, F. Peri, S. Pollicino and A. Ricci, *Tetrahedron*, 2000, **56**, 1225.



(–)-Conduritol E



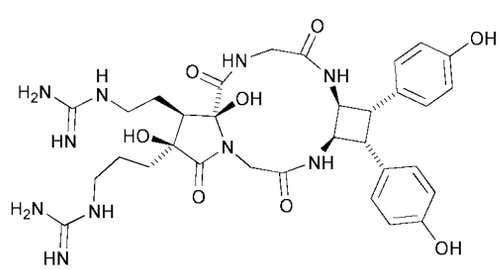
(–)-Conduritol F

(±)-Cycloanchinopeptolide D

Biological activity: not reported.

Key steps: (a) aldol dimerisation and hemiaminal formation of an α-keto amide; (b) head-to-head photodimerisation of two hydroxystyrylamides using the hydrophobic effect in water to force the two side chains into close proximity.

B. B. Snider, F. Song and B. M. Foxman, *J. Org. Chem.*, 2000, **65**, 793.

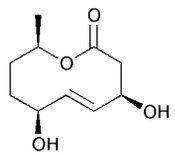


(–)-(3*R*,6*S*,9*R*)-Decarestrictine C_2

Biological activity: inhibits cholesterol biosynthesis in HEP-G2 liver cells.

Key steps: diastereoselective aldol reaction of a tin(II) enolate of (4*S*)-acetyl-4-isopropyl-1,3-thiazolidine-2-thione with an α,β-unsaturated aldehyde.

M. Arai, N. Morita, S. Aoyagi and C. Kibayashi, *Tetrahedron Lett.*, 2000, **41**, 1199.

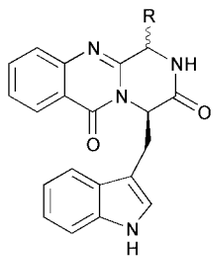


Glyantrypine, Fumiquinazoline F, Fumiquinazoline G and Fiscalin B

Biological activity: (a) fumiquinazolines are cytotoxic against the P388 leukemia cell line; (b) fiscalin B is a substance P antagonist.

Key steps: the anthranilamide residue in a linear tripeptide is dehydrated to a benzoxazine by reaction with triphenylphosphine, iodine and a tertiary amine.

H. Wang and A. Ganesan, *J. Org. Chem.*, 2000, **65**, 1022.



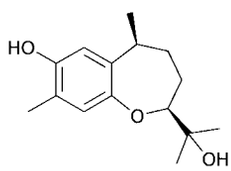
Glyantrypine	R = H
Fumiquinazoline F	R = (α)- Me
Fumiquinazoline G	R = (β)- Me
Fiscalin	R = (α)- iPr

(±)-Heliannuol D

Biological activity: (a) allelochemical isolated from the sunflower *Helianthus annuus*; (b) growth regulator in dicotyledon plant species.

Key steps: (a) palladium-catalysed coupling of a vinyl triflate and an aryl zinc species; (b) biomimetic opening of an epoxide by a phenol.

J. R. Vyvyan and R. E. Looper, *Tetrahedron Lett.*, 2000, **41**, 1151.

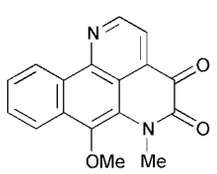


Imbiline 1

Biological activity: not reported.

Key steps: synthesised in seven steps from 1-amino-4-methoxynaphthalene hydrochloride.

Y. Kitahara, M. Mochii, M. Mori and A. Kubo, *Tetrahedron Lett.*, 2000, **41**, 1481.

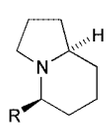


(–)-Indolizidines 167B and 209D

Biological activity: not reported.

Key steps: (a) $TiCl_4$-mediated allylation of a tricyclic *N*-acyl-*N*,*O*-acetal incorporating an (*S*)-2-(1-aminoethyl)phenol chiral auxiliary to yield a (5*S*)-allylpyrrolidinone; (b) Horner-Emmons condensation.

N. Yamazaki, T. Ito and C. Kibayashi, *Org. Lett.*, 2000, **2**, 465.



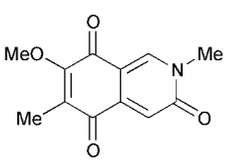
(–)-Indolizidine 167B: R = *n*-Pr
(–)-Indolizidine 209D: R = *n*-Hex

Mimosamycin

Biological activity: (a) active against mycobacteria; (b) active against some Gram-positive bacteria; (c) inactive against Gram-negative bacteria and most fungi except *Cladosporium cucumerinum*.

Key steps: (a) regioselective introduction of a methoxycarbonylmethyl group *via* reaction of ketene dimethyl acetal with a *p*-benzoquinone; (b) regioselective chloromethylation mediated by zinc(II) chloride; (c) CAN oxidation of a trimethoxybenzene derivative to afford the *p*-quinone moiety.

B. Kesteleyn and N. De Kimpe, *J. Org. Chem.*, 2000, **65**, 635.

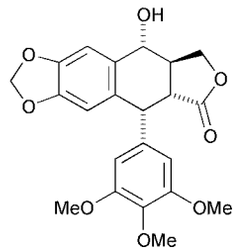


(–)-Podophyllotoxin

Biological activity: (a) potent antimitotic; (b) binds to tubuline; (c) inhibits microtubule formation.

Key steps: enzymatic desymmetrisation of an advanced *meso* diacetate.

D. B. Berkowitz, S. Choi and J.-H. Maeng, *J. Org. Chem.*, 2000, **65**, 847.

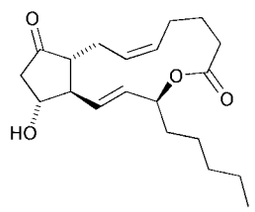


(–)-Prostaglandin E_2-1,15-Lactone

Biological activity: causes a decrease in gastric secretion.

Key steps: ring closing metathesis of a diyne to generate a 13-membered cyclic alkyne which is semihydrogenated to a *cis*-alkene.

A. Fürstner and K. Grela, *Angew. Chem., Int. Ed.*, 2000, **39**, 1234.

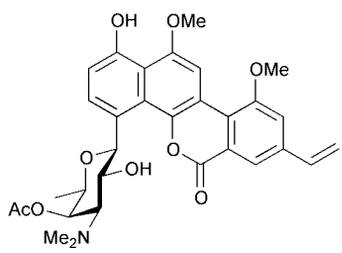


Ravidomycin

Biological activity: antitumour activity.

Key steps: (a) Hf-promoted reaction of a fluorinated sugar at the anomeric position with an iodophenol; (b) benzyne-furan [4+2] cycloaddition; (c) formation of the biaryl bond under Harayama conditions, using stoichiometric $Pd(OAc)_2$ coupled with Bu_3P and 1,3-bis(diphenylphosphino)propane in the presence of Ag_2CO_3.

S. Futagami, Y. Ohashi, K. Imura, T. Hosoya, K. Ohmori, T. Matsumoto and K. Suzuki, *Tetrahedron Lett.*, 2000, **41**, 1063.

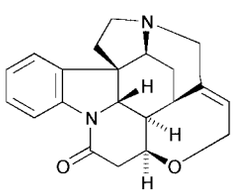


(–)-Strychnine

Biological activity: poison.

Key steps: (a) enantioselective construction of the 3a-(2-nitrophenyl)octahydroindol-4-one ring system by ozonolysis of 2-allyl-2-arylcyclohexane-1,3-dione followed by a double reductive amination; (b) closure of the piperidine ring by a reductive Heck cyclisation.

D. Solé, J. Bonjoch, S. García-Rubio, E. Peidró and J. Bosch, *Chem. Eur. J.*, 2000, **6**, 655.

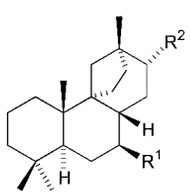


(–)-Methyl Thyrsiflorin A, (–)-Methyl Thyrsiflorin B Acetate and (–)-Thyrsiflorin C

Biological activity: not reported.

Key steps: (a) intramolecular cyclopropanation of a diazoketone using bis(*N*-*tert*-butylsalicylaldiminato)copper(II); (b) regioselective cleavage of a cyclopropane ring.

M. Arnó, M. A. González, M. L. Marín and R. J. Zaragozá, *J. Org. Chem.*, 2000, **65**, 840.



(·)-Methyl Thyrsiflorin A R^1 = H, R^2 = $OCOCH_2CO_2Me$
(·)-Methyl Thyrsiflorin B Acetate R^1 = OAc, R^2 = $OCOCH_2CO_2Me$
(·)-Thyrsiflorin C R^1 = OH, R^2 = OH

Trunkamide A

Biological activity: suspected antitumour activity.

Key steps: (a) Lewis acid-assisted aziridine opening for the preparation of the novel reverse-prenylated serine and threonine side chains; (b) oxazoline-thiazoline interconversion on the macrocyclic skeleton.

P. Wipf and Y. Uto, *J. Org. Chem.*, 2000, **65**, 1037.