

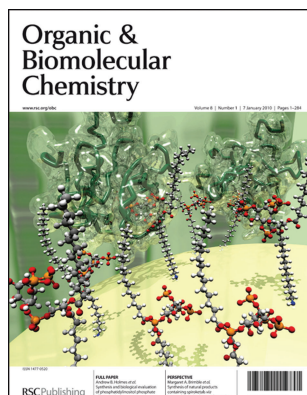
# Organic & Biomolecular Chemistry

An international journal of synthetic, physical and biomolecular organic chemistry  
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## IN THIS ISSUE

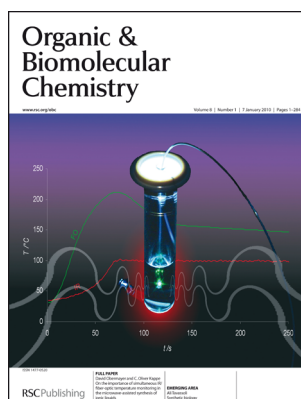
ISSN 1477-0520 CODEN OBCRAK 8(1) 1–284 (2010)



### Cover

See Andrew B. Holmes *et al.*, pp. 66–76.  
The cover page illustrates a phosphatidylinositol (3,4,5)-trisphosphate analogue bound to an affinity bead interacting with the PH domain of GRP1, representing the pulldown of intracellular signalling proteins from the cytosolic extracts of pig neutrophil and colon cancer cells (Created by Karl Harrison, University of Oxford).

Image reproduced by permission of Andrew B. Holmes from *Org. Biomol. Chem.*, 2010, **8**, 66.



### Inside cover

See David Obermayer and C. Oliver Kappe, pp. 114–121.  
Seeing is believing: infrared sensors used in most of today's microwave reactors can easily lead to incorrect reaction temperature measurements – internal fiber-optic probes do a much better job.

Image reproduced by permission of C. Oliver Kappe from *Org. Biomol. Chem.*, 2010, **8**, 114.

## EDITORIAL

21

### Warmest wishes to all *Organic & Biomolecular Chemistry* authors, referees and readers for 2010

Following the success of the last six years, 2009 was another superb year for *Organic & Biomolecular Chemistry*.

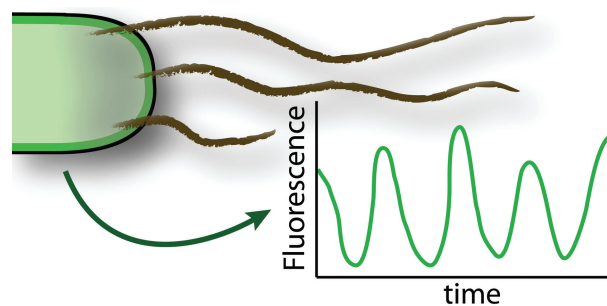
## EMERGING AREA

24

### Synthetic biology

Ali Tavassoli\*

There is currently much excitement surrounding the rapidly growing discipline of synthetic biology, which utilizes the design and construction principles of engineering to develop, evolve and standardize biological components and systems. Here we discuss the achievements of the field so far, and go on to outline its potential future directions.

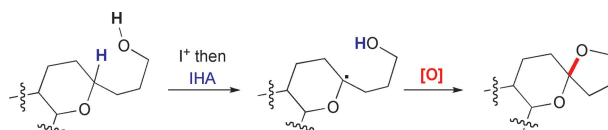


29

### Synthesis of natural products containing spiroketals via intramolecular hydrogen abstraction

Jonathan Sperry, Yen-Cheng (William) Liu and Margaret A. Brimble\*

Although known for over a quarter of a century, the oxidative radical cyclisation approach to spiroketals has found limited use in natural product synthesis in comparison to classical approaches. Its successful application in this field of research forms the subject of this perspective.



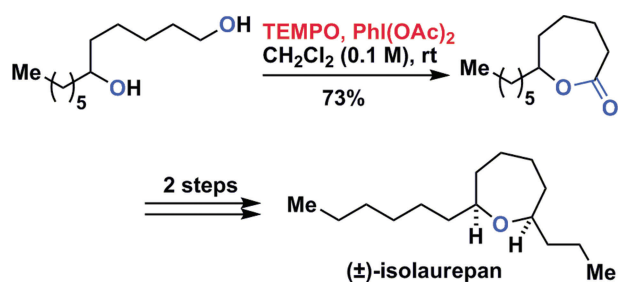
## COMMUNICATIONS

39

### Highly efficient synthesis of medium-sized lactones via oxidative lactonization: concise total synthesis of isolaurepan

Makoto Ebine, Yuto Suga, Haruhiko Fuwa\* and Makoto Sasaki

Oxidative lactonization of 1,6- and 1,7-diols under the influence of a catalytic amount of TEMPO in the presence of  $\text{PhI}(\text{OAc})_2$  afforded seven- and eight-membered lactones, respectively, in good yields. A concise total synthesis of ( $\pm$ )-isolaurepan has been achieved based on this methodology.

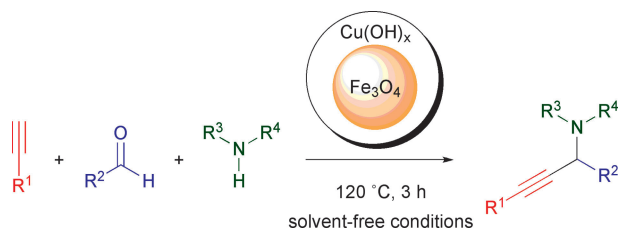


43

### Impregnated copper on magnetite: an efficient and green catalyst for the multicomponent preparation of propargylamines under solvent free conditions

María J. Aliaga, Diego J. Ramón\* and Miguel Yus

Impregnated copper on magnetite is an efficient and green catalyst for the multicomponent acetylene-Mannich reaction.

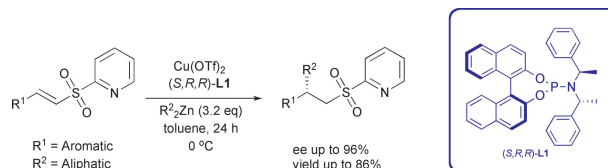


47

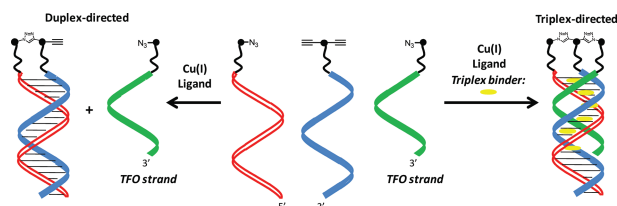
### Catalytic asymmetric conjugate addition of dialkylzinc reagents to $\alpha,\beta$ -unsaturated sulfones

Pieter H. Bos, Beatriz Maciá, M. Ángeles Fernández-Ibáñez, Adriaan J. Minnaard and Ben L. Feringa\*

An efficient method is reported for the highly enantioselective copper-catalyzed conjugate addition of dialkylzinc reagents to  $\alpha,\beta$ -unsaturated sulfones using a monodentate phosphoramidite ligand.



50

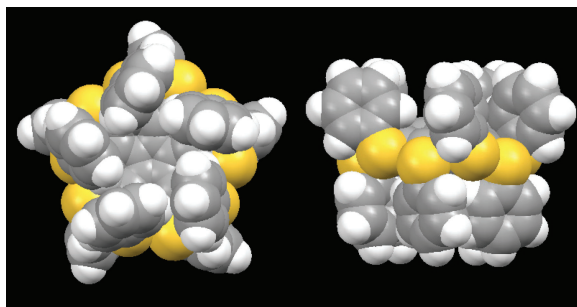


### Small molecule induced control in duplex and triplex DNA-directed chemical reactions

Mikkel F. Jacobsen, Jens B. Ravnsbæk and Kurt V. Gothelf\*

Triplex DNA binders can effectively control copper-catalysed alkyne–azide click reactions in DNA architecture, such that either duplex or triplex DNA directed reactions of terminally attached azides and alkynes occur, in the absence or presence of triplex DNA binder, respectively.

53

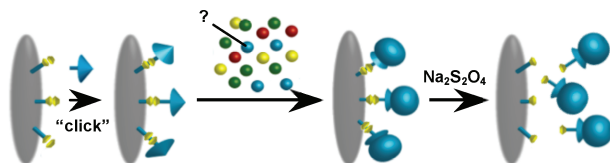


### Synthesis, structure and properties of decakis(phenylthio)corannulene

Kim K. Baldrige,\* Kenneth I. Hardcastle, T. Jon Seiders and Jay S. Siegel\*

Decakis(phenylthio)corannulene adopts a pinwheel conformation with multiple T-shaped (edge-to-face) arene interactions.

56

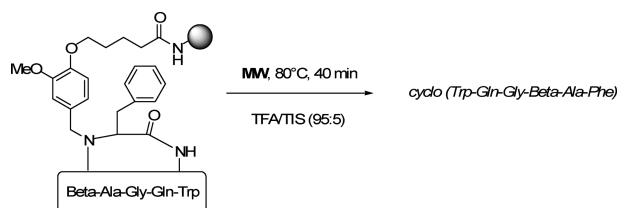


### Synthesis and application of a new cleavable linker for “click”-based affinity chromatography

Felicetta Landi, Conny M. Johansson, Dominic J. Campopiano and Alison N. Hulme\*

“Click” coupling of a ligand to an azo-functionalised linker allows affinity capture and separation of proteins from a complex mixture (such as fetal bovine serum) and mild release with sodium dithionite.

60

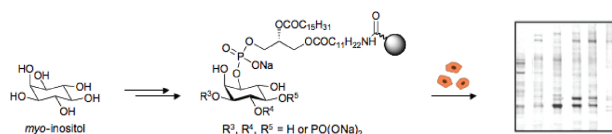


### Development of a new microwave-assisted cleavable backbone amide linker (BAL): a comparative study

Stijn Claerhout, Thibault Duchène, Dirk Tourwé and Erik V. Van der Eycken\*

A thorough comparative study to demonstrate the properties of a new microwave labile backbone amide linker is presented.

66

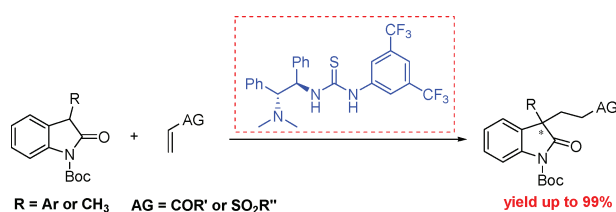


### Synthesis and biological evaluation of phosphatidylinositol phosphate affinity probes

S. J. Conway, J. Gardiner,\* S. J. A. Grove, M. K. Johns, Z.-Y. Lim, G. F. Painter, D. E. J. E. Robinson,\* C. Schieber, J. W. Thuring, L. S.-M. Wong, M.-X. Yin, A. W. Burgess, B. Catimel, P. T. Hawkins, N. T. Ktistakis, L. R. Stephens and A. B. Holmes\*

A versatile approach to the synthesis of the complete family of phosphatidylinositol phosphate (PIP) analogues and their use as affinity probes are described.

77

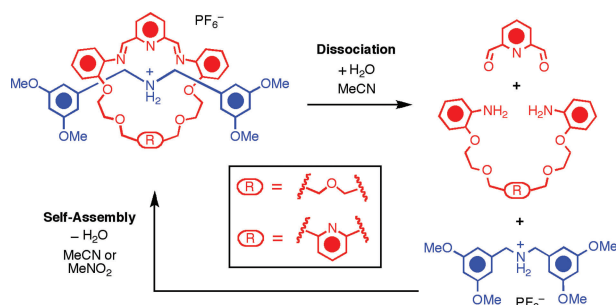


### Asymmetric Michael addition reaction of 3-substituted-*N*-Boc oxindoles to activated terminal alkenes catalyzed by a bifunctional tertiary-amine thiourea catalyst

Xin Li, Zhi-Guo Xi, Sanzhong Luo\* and Jin-Pei Cheng\*

An enantioselective Michael addition reaction of 3-substituted oxindoles to terminal alkenes which realized the construction of an all carbon-substituted quaternary stereocenter has been reported using catalysis by a bifunctional tertiary-amine thiourea organocatalyst.

83

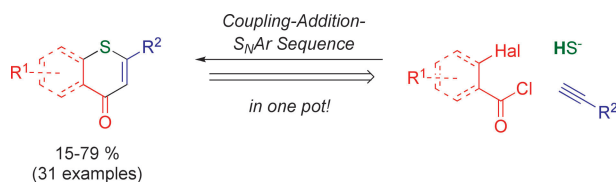


### The stability of imine-containing dynamic [2]rotaxanes to hydrolysis

Ken Cham-Fai Leung,\* Wing-Yan Wong, Fabio Aricó, Philip C. Haussmann and J. Fraser Stoddart\*

The self-assembly as well as the dissociation of two dynamic [2]rotaxanes have been demonstrated. Somewhat surprisingly, the [2]rotaxanes show remarkable relative stabilities in the presence of large amounts of water. In particular, the dissociation rates of the rotaxanes toward hydrolysis have been determined.

90



### Microwave-assisted three-component coupling-addition-S<sub>N</sub>Ar (CASNAR) sequences to annelated 4*H*-thiopyran-4-ones

Benjamin Willy, Walter Frank and Thomas J. J. Müller\*

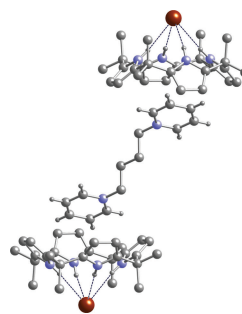
Annelated 4*H*-thiopyran-4-ones can be readily synthesized from readily available (het)aryl chlorides, alkynes and sodium sulfide nonahydrate in good yields by a microwave-assisted consecutive one-pot three-component reaction.

96

**Bis-cation salt complexation by *meso*-octamethylcalix[4]pyrrole: linking complexes in solution and in the solid state**

Claudia Caltagirone, Nathan L. Bill, Dustin E. Gross, Mark E. Light, Jonathan L. Sessler\* and Philip A. Gale\*

Bis-pyridinium and bis-imidazolium cations can be used to link calix[4]pyrrole anion complexes in solution and the solid state as the first step to producing ordered arrays of calixpyrroles for use in new materials applications.

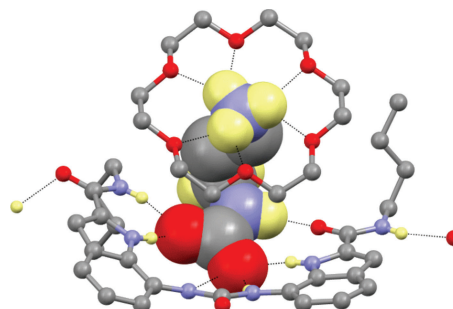


100

**Carbamate complexation by urea-based receptors: studies in solution and the solid state**

Peter R. Edwards, Jennifer R. Hiscock, Philip A. Gale\* and Mark E. Light

CO<sub>2</sub> can be captured by amines or tetrahydropyrimidine to form carbamates which can then be stabilised by complexation with receptors containing multiple hydrogen bond donors.

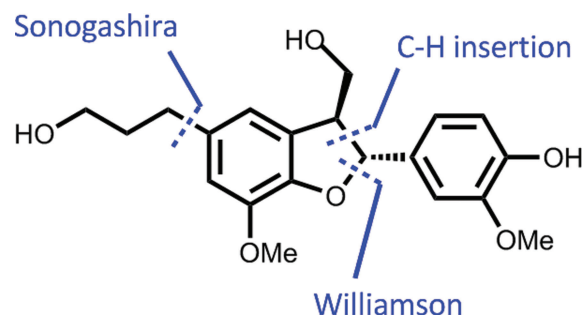


107

**Synthesis of dihydrodehydrodiconiferyl alcohol: the revised structure of lawsonicin**

Junxiu Meng, Tao Jiang, Huma Aslam Bhatti, Bina S. Siddiqui, Sally Dixon\* and Jeremy D. Kilburn\*

Synthesis of dihydrobenzo[*b*]furan neolignan, dihydrodehydrodiconiferyl alcohol, *via* a concise route involving Rh<sub>2</sub>[*S*-DOSP]<sub>2</sub>-catalysed intramolecular C–H insertion, is reported. The *rac*-2,3-*trans*-epimer is found to have identical spectral data to the earlier reported natural product, lawsonicin, whose structure is revised.

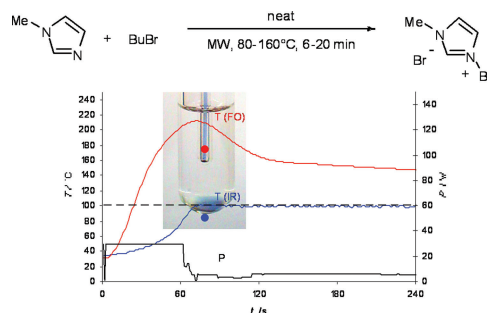


114

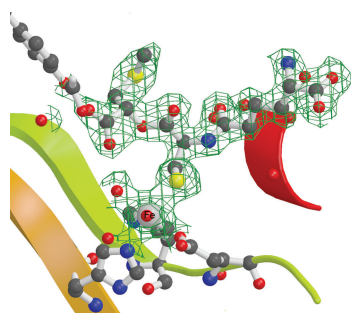
**On the importance of simultaneous infrared/fiber-optic temperature monitoring in the microwave-assisted synthesis of ionic liquids**

David Obermayer and C. Oliver Kappe\*

Infrared sensors give erroneous temperature readings and can not be used for microwave chemistry involving ionic liquids.



122

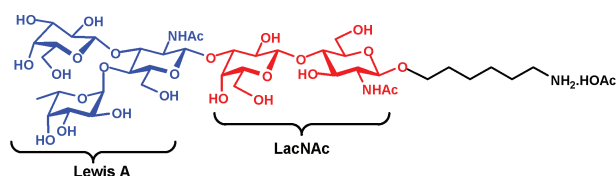


### The crystal structure of an LLL-configured depsipeptide substrate analogue bound to isopenicillin N synthase

Wei Ge, Ian J. Clifton, Jeanette E. Stok, Robert M. Adlington, Jack E. Baldwin\* and Peter J. Rutledge\*

Stereochemistry is all-important to enzyme catalysis, so what will isopenicillin N synthase, a key player in penicillin biosynthesis, make of an LLL-configured depsipeptide substrate analogue when its natural substrate is an LLD-configured tripeptide?

128

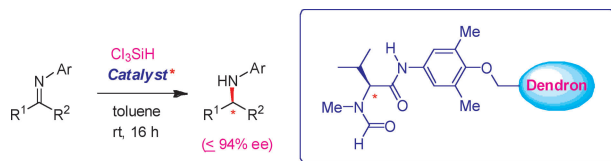


### Total synthesis of Le<sup>A</sup>-LacNAc pentasaccharide as a ligand for *Clostridium difficile* toxin A

Ping Zhang, Kenneth Ng and Chang-Chun Ling\*

Le<sup>A</sup>-LacNAc was found to be a ligand for toxin A released by *Clostridium difficile*. Here we report the efficient synthesis of the pentasaccharide for use to characterize the carbohydrate-binding site of the toxin by X-ray crystallography.

137

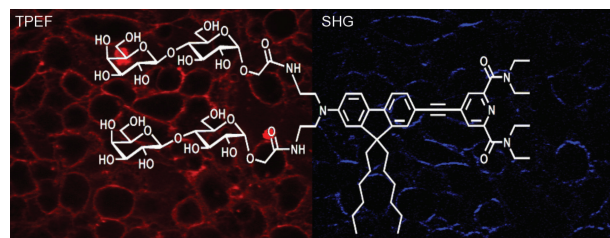


### Dendron-anchored organocatalysts: the asymmetric reduction of imines with trichlorosilane, catalysed by an amino acid-derived formamide appended to a dendron

Marek Figlus, Stuart T. Caldwell, Dawid Walas, Gulen Yesilbag, Graeme Cooke,\* Pavel Kočovský,\* Andrei V. Malkov\* and Amitav Sanyal\*

Ketimines **1a–f** can be reduced with Cl<sub>3</sub>SiH in the presence of the Lewis-basic *N*-methylvaline-derived formamide catalyst (5 mol%) anchored to a soluble dendron (**11c**) with ≤94% ee; this protocol represents a simplification of the isolation procedure and recovery of the catalyst.

142

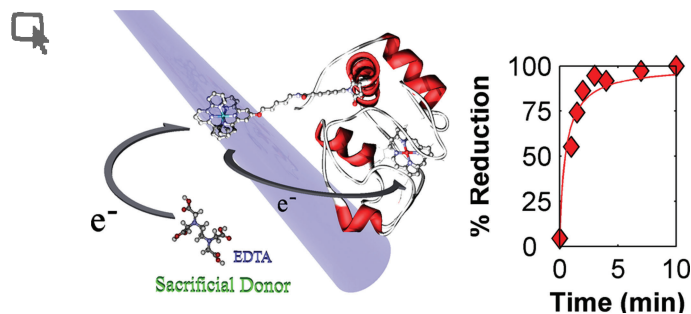


### Neutral push-pull chromophores for nonlinear optical imaging of cell membranes

Cyril Barsu, Rouba Cheaib, Stéphane Chambert, Yves Queneau, Olivier Maury, Davy Cottet, Hartmut Wege, Julien Douady, Yann Bretonnière\* and Chantal Andraud\*

A series of amphiphilic second order nonlinear probes for cell membrane imaging was studied by combined two-photon excited fluorescence (TPEF) and second harmonic generation (SHG) microscopies.

151

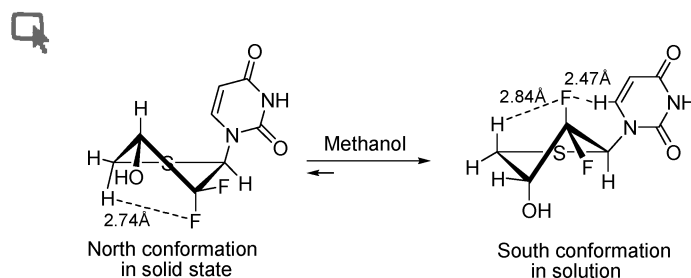


### Synthesis and room temperature photo-induced electron transfer in biologically active bis(terpyridine)ruthenium(II)-cytochrome *c* bioconjugates and the effect of solvents on the bioconjugation of cytochrome *c*

Joshua R. Peterson, Trevor A. Smith and Pall Thordarson\*

Room temperature photo-induced electron transfer studies of bis(terpyridine)ruthenium(II) cytochrome *c* bioconjugates show that the protein is effectively reduced within 5 min in the presence of 20 mM EDTA.

163

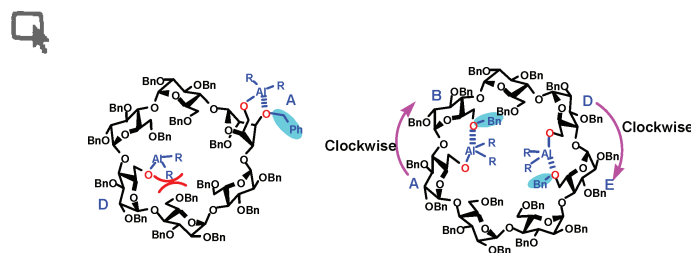


### Synthesis and conformational analysis of D-2'-deoxy-2',2'-difluoro-4'-thionucleosides

Feng Zheng, Lin Fu, Renxiao Wang and Feng-Ling Qing\*

An efficient synthesis of D-2'-deoxy-2',2'-difluoro-4'-thiouridine is described. The conformations of D-2'-deoxy-2',2'-difluoro-4'-thiouridine were studied by X-ray crystallography, NMR spectroscopy and molecular modeling in an attempt to explore the roles of the two *gem*-difluorine atoms in the conformer preferences of the thionucleosides.

171

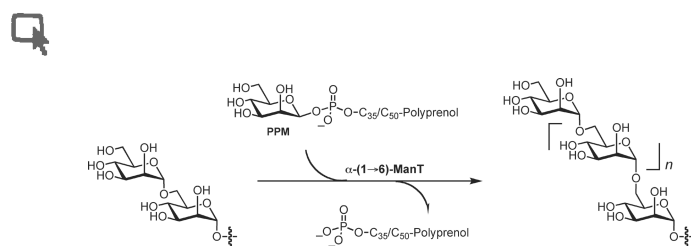


### DIBAL-H mediated triple and quadruple debenzylations of perbenzylated cyclodextrins

Girish K. Rawal, Shikha Rani, Sandra Ward and Chang-Chun Ling\*

Sequential triple and quadruple debenzylations by diisobutylaluminium hydride were investigated for  $\alpha$ -,  $\beta$ - and  $\gamma$ -cyclodextrins. A distinct regioselective debenzylation path was observed for  $\alpha$ -CD compared to  $\beta$ - and  $\gamma$ -cyclodextrins.

181



### Epimeric and amino disaccharide analogs as probes of an $\alpha$ -(1 $\rightarrow$ 6)-mannosyltransferase involved in mycobacterial lipoarabinomannan biosynthesis

Pui Hang Tam and Todd L. Lowary

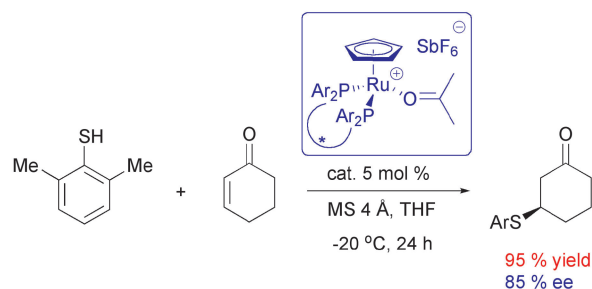
A panel of disaccharide analogs have been synthesized and used to probe a mannosyltransferase involved in lipoarabinomannan biosynthesis in mycobacteria, including the human pathogen *Mycobacterium tuberculosis*.

193

### Asymmetric ruthenium-catalyzed 1,4-additions of aryl thiols to enones

Andrei Bădoiu, Gerald Bernardinelli, Céline Besnard and E. Peter Kündig\*

Ruthenium half-sandwich Lewis-acids can efficiently catalyze 1,4-additions of aryl thiols to enones with remarkable levels of activity and selectivity, in spite of stereocontrol complexity and potential catalyst inhibition. NMR experiments provide an insight to the intricate equilibria governing the reaction mechanism.

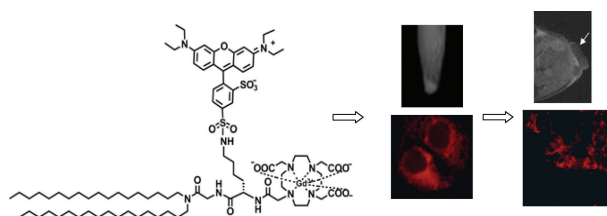


201

### A novel bimodal lipidic contrast agent for cellular labelling and tumour MRI

Nazila Kamaly, Tammy Kalber, Gavin Kenny, Jimmy Bell, Michael Jorgensen\* and Andrew Miller\*

Gd-DOTA-Rhoda-DSA: a novel bimodal lipidic MRI contrast agent.

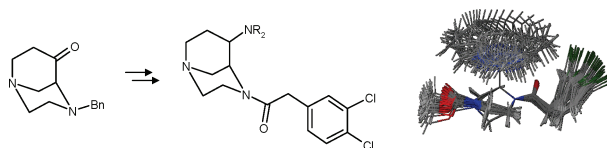


212

### Stereoselective synthesis and structure–affinity relationships of bicyclic $\kappa$ receptor agonists

Daniel Kracht, Elisabeth Rack, Dirk Schepmann, Roland Fröhlich and Bernhard Wünsch\*

The bioactive conformation of flexible  $\kappa$  agonists was approached by the design, synthesis and pharmacological evaluation of conformationally constrained 1,4-diazabicyclo[3.3.1]nonanes. It was shown that *endo*-orientation of the amino group is crucial for high  $\kappa$  receptor affinity.

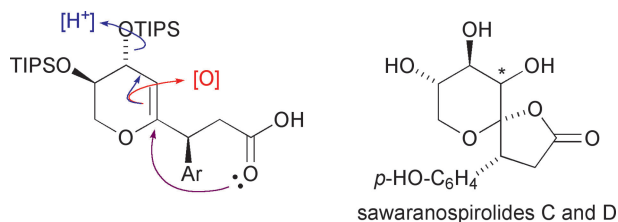


226

### Oxidative spirocyclisation routes towards the sawaranospirolides. Synthesis of *ent*-sawaranospirolides C and D

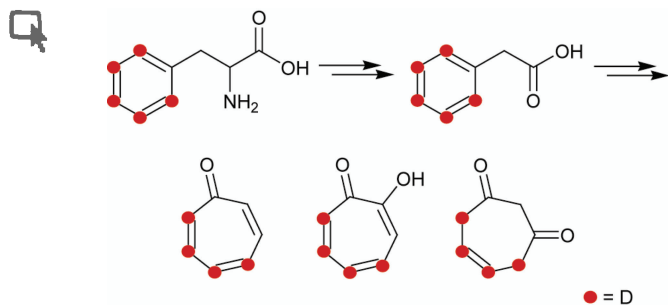
Jeremy Robertson,\* Praful T. Chovatia, Thomas G. Fowler, Jonathan M. Withey and Daniel J. Woollaston

*ent*-Sawaranospirolides C and D are prepared by the electrophilic spirocyclisation of a 3-(dihydropyran-2-yl)propanoic acid derivative.





234

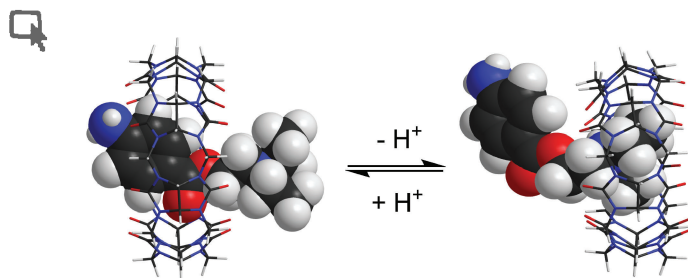


### Identification and biosynthesis of tropone derivatives and sulfur volatiles produced by bacteria of the marine *Roseobacter* clade

Verena Thiel, Thorsten Brinkhoff, Jeroen S. Dickschat, Susanne Wickel, Jörg Grunenberg, Irene Wagner-Döbler, Meinhard Simon and Stefan Schulz\*

The volatile tropone, its derivatives, and several thioesters are produced by *Phaeobacter gallaeciensis*, a bacterium of the *Roseobacter* clade that dominates many marine bacterial communities.

247

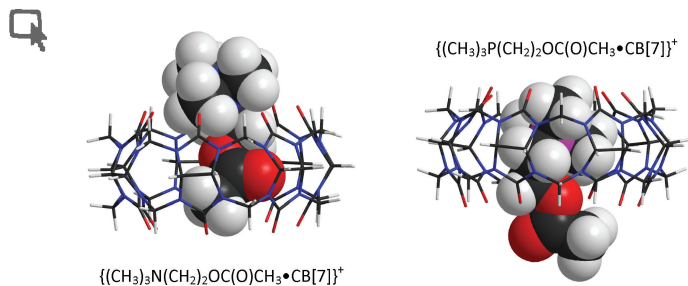


### Host-guest complexations of local anaesthetics by cucurbit[7]uril in aqueous solution

Ian W. Wyman and Donal H. Macartney\*

The cucurbit[7]uril host molecule binds to procaine, and other local anaesthetic drugs, 2–3 orders of magnitude stronger than β-cyclodextrin in aqueous solution, resulting in increases in the value of  $pK_1$  and enhanced fluorescence.

253

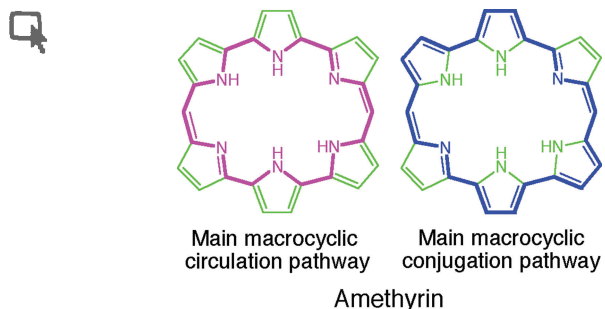


### Cucurbit[7]uril host-guest complexes of cholines and phosphonium cholines in aqueous solution

Ian W. Wyman and Donal H. Macartney\*

The cucurbit[7]uril host molecule forms host-guest complexes with a series of cholines and phosphonium cholines ( $\text{R}_3\text{XCH}_2\text{CHR}'\text{OR}''^+$ ) in aqueous solution, with stability constants and guest positioning that reflects the natures of the peralkylonium head groups ( $\text{R}_3\text{X}^+$ ) and substituents ( $\text{R}'$  and  $\text{R}''$ ).

261



### Prediction of the main macrocyclic conjugation pathway for porphyrinoids from the ring current distribution

Jun-ichi Aihara\* and Masakazu Makino

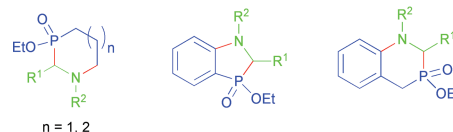
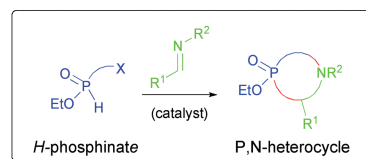
Using our analytical theory of ring-current diamagnetism, main macrocyclic conjugation pathways in porphyrinoids were successfully predicted from the global ring current distributions.

267

**Facile P,N-heterocycle synthesis via tandem aminomethylation–cyclization of *H*-phosphinate building blocks**

Clémence Queffélec and Jean-Luc Montchamp\*

Various heterocycles containing phosphorus and nitrogen are easily synthesized from readily available *H*-phosphinate building blocks via aminomethylation and *in situ* cyclization through substitution or cross-coupling.

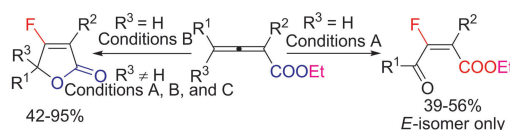


274

**Study on the selectivity in the electrophilic monofluorination of 2,3-allenoates with Selectfluor™: an efficient synthesis of 4-fluoro-2(5*H*)-furanones and 3-fluoro-4-oxo-2(*E*)-alkenoates**

Bo Lü, Chunling Fu and Shengming Ma\*


4-Fluoro-2(5*H*)-furanones and (*E*)-3-fluoro-4-oxo-2-alkenoates were highly selectively generated from 2,4-disubstituted 2,3-allenoates with Selectfluor™ in moderate to high yields under different reaction conditions. A mechanism has been proposed.



Conditions A: 3.0 equiv Selectfluor, 0.5 equiv H<sub>2</sub>O, MeCN, 80 °C. Conditions B: 1.7–2.5 equiv Selectfluor, MeCN/H<sub>2</sub>O = 2/1, 80 °C. Conditions C: 1.2 equiv Selectfluor, MeCN or MeNO<sub>2</sub>, 80 °C.

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\* Indicates the author for correspondence: see article for details.

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# Organic & Biomolecular Chemistry

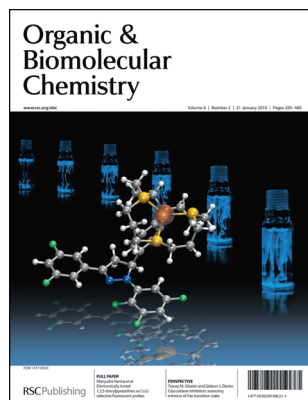
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## IN THIS ISSUE

ISSN 1477-0520 CODEN OBCRAK 8(2) 285–480 (2010)



### Cover

See Manjusha Verma *et al.*, pp. 363–370.

The fluorescence contrast of a Cu(I)-responsive probe was optimized through electronic tuning with varying numbers of fluorine substituents. The cuvettes show the time evolution of fluorescence titrations formed upon addition of the analyte.

Image reproduced by permission of Christoph J. Fahrni from *Organic & Biomolecular Chemistry*, 2010, **8**, 363.

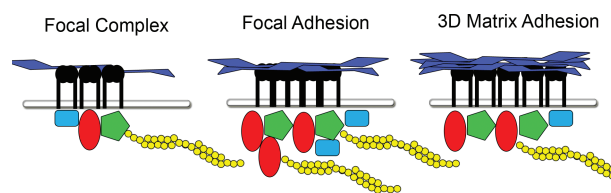
## EMERGING AREA

299

### Matrix mechanics and receptor–ligand interactions in cell adhesion

Dewi Harjanto and Muhammad H. Zaman\*

This Emerging Area explores how forces and the mechanics of the extracellular matrix affect the formation and maturation of cell–matrix adhesions.



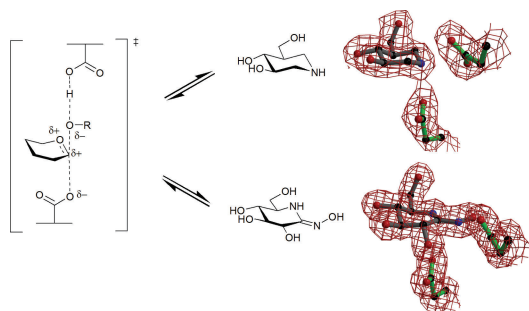
## PERSPECTIVE

305

### Glycosidase inhibition: assessing mimicry of the transition state

Tracey M. Gloster\* and Gideon J. Davies\*

A review of the progress made in tackling glycosidase inhibition, which has widespread application in a number of diseases, in particular by examining those inhibitors that may mimic the transition state.

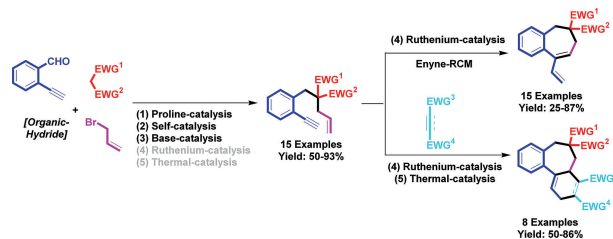


321

### Rapid two-step synthesis of drug-like polycyclic substances by sequential multi-catalysis cascade reactions

Dhevalapally B. Ramachary,\* Rumpa Mondal and Chintalapudi Venkaiah

An efficient multi-catalysis cascade process for the two-step synthesis of highly substituted drug-like carbocycles was achieved through combinations of cascade TCRA/*C*-allylation/enyne-RCM/Diels–Alder reactions as key steps starting from simple acyclic substrates *via* amino acid-/self-/base-/ruthenium-/thermal-catalysis.

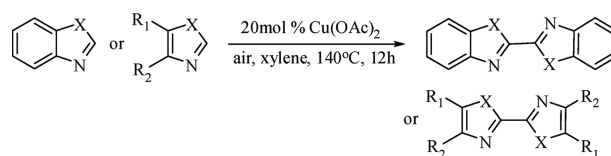


326

### An efficient and convenient Cu(OAc)<sub>2</sub>/air mediated oxidative coupling of azoles *via* C–H activation

Yan Li, Jun Jin, Weixing Qian\* and Weiliang Bao\*

An efficient and convenient approach to construct C–C bonds at the 2-position of azoles *via* Cu(OAc)<sub>2</sub>/air mediated oxidative homo- and cross-coupling reaction was reported. The corresponding products were obtained in good to excellent yield.

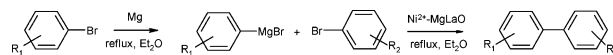


331

### Nickel/magnesium–lanthanum mixed oxide catalyst in the Kumada-coupling

Árpád Kiss, Zoltán Hell\* and Mária Bálint

A new, heterogeneous, magnesium–lanthanum mixed oxide solid base-supported nickel(II) catalyst was developed. The catalyst was successfully used in the Kumada coupling of aryl halides, especially aryl bromides. The optimal reaction conditions of the coupling were determined.

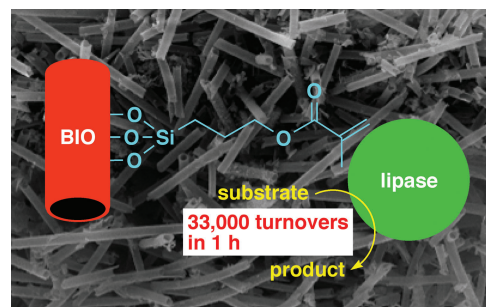


336

### Chemical modification of biogenous iron oxide to create an excellent enzyme scaffold

Takashi Sakai,\* Yuki Miyazaki, Ai Murakami, Noriko Sakamoto, Tadashi Ema,\* Hideki Hashimoto, Mitsuaki Furutani, Makoto Nakanishi, Tatsuo Fujii and Jun Takada\*

The biogenous iron oxide (BIO) from *Leptothrix ochracea* was transformed to an organic–inorganic hybrid support to prepare an excellent immobilized enzyme showing high catalytic performance.

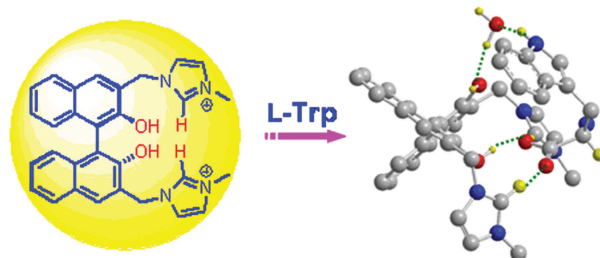


339

### 1,1'-Binaphthyl-based imidazolium chemosensors for highly selective recognition of tryptophan in aqueous solutions

Li Yang, Song Qin, Xiaoyu Su, Fei Yang, Jingsong You,\*  
Changwei Hu, Rugang Xie and Jingbo Lan\*

A type of 1,1'-binaphthyl-based imidazolium chemosensor module has been synthesized for the highly selective recognition of tryptophan (Trp) in aqueous solutions *via* synergistic effects of multiple hydrogen bonding and electrostatic interactions.

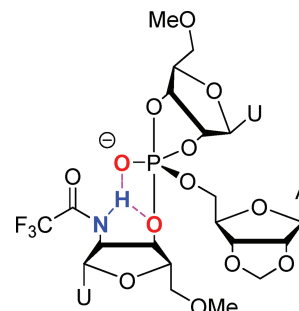


349

### Phosphorane intermediate *vs.* leaving group stabilization by intramolecular hydrogen bonding in the cleavage of trinucleoside monophosphates: implications for understanding catalysis by the large ribozymes

Tuomas Lönnberg\* and Maarit Laine

Hydrolysis of a trinucleoside monophosphate model with a 2'-trifluoroacetamido-modified 3'-leaving group has been followed by HPLC over a wide pH range to study the effects of potential hydrogen bonding interactions of the 2'-trifluoroacetamido function on the rate and product distribution of the reaction.

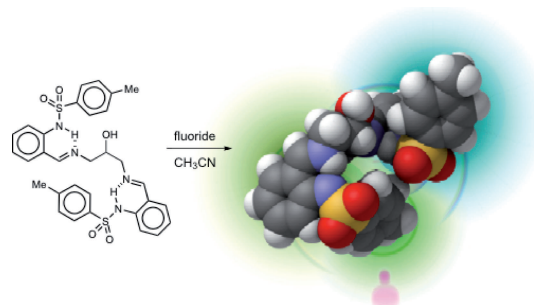


357

### Sulfonamide-imines as selective fluorescent chemosensors for the fluoride anion

Miguel Vázquez López,\* Manuel R. Bermejo,\*  
M. Eugenio Vázquez, Angelo Taglietti, Guillermo Zaragoza,  
Rosa Pedrido and Miguel Martínez-Calvo

A new class of sulfonamide fluorescent chemosensor in organic media is reported. This system displayed marked changes in the fluorescence emission intensities and showed selectivity for fluoride over other inorganic anions, such as acetate or dihydrogenphosphate.

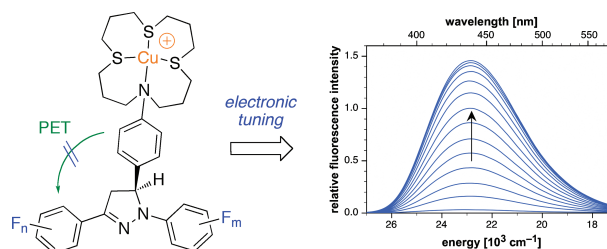


363

### Electronically tuned 1,3,5-triarylpyrazolines as Cu(I)-selective fluorescent probes

Manjusha Verma, Aneese F. Chaudhry, M. Thomas Morgan  
and Christoph J. Fahrni\*

A Cu(I)-responsive fluorescent probe, constructed using a large tetradentate, 16-membered thiazacrown ligand ([16]aneNS<sub>3</sub>) and 1,3,5-triaryl-substituted pyrazoline fluorophores has been prepared and characterized.

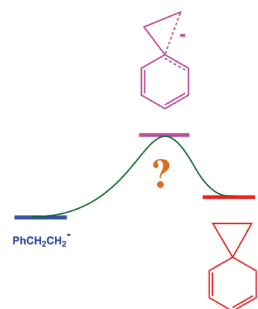


371

### Diagnostic fragmentations of adducts formed between carbanions and carbon disulfide in the gas phase. A joint experimental and theoretical study

Micheal J. Maclean, Scott Walker, Tianfang Wang, Peter C. H. Eichinger, Patrick J. Sherman and John H. Bowie\*

The structures of selected carbanions have been identified by collisionally activated decomposition reactions of the corresponding adducts with carbon disulfide in a modified LCQ ion trap mass spectrometer.

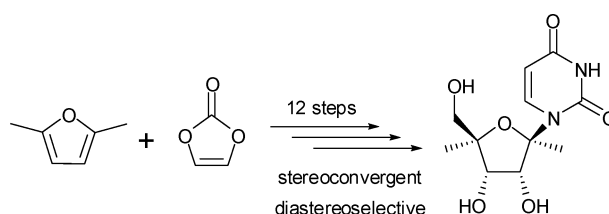


378

### Diastereoselective synthesis of ( $\pm$ )-1',4'-dimethyluridine

Guillaume Sautrey, Damien Bourgeois\* and Christian Périgaud

The diastereoselective total synthesis of the title compound is described. It is based on a new methodology involving the stereoconvergent preparation of a suitable sugar ring, followed by a selective Vorbrüggen glycosylation.

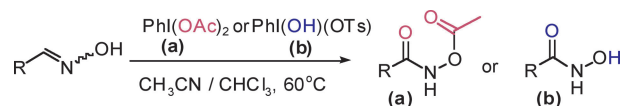


384

### Hypervalent iodine(III)-mediated oxidation of aldoximes to *N*-acetoxy or *N*-hydroxy amides

Harisadhan Ghosh and Bhisma K. Patel\*

Various aldoximes were converted to either *N*-acetoxy or *N*-hydroxy amides in good yield using the hypervalent iodine(III) reagents (diacetoxyiodo)benzene (DIB) or Koser's reagent [hydroxy(tosyloxy)iodo]benzene (HTIB). A plausible mechanism for this transformation involves the attack of acetate/hydroxy on the intermediate aryl nitrile oxides, which, upon rearrangement, gave the expected *N*-acetoxy or *N*-hydroxy amides.

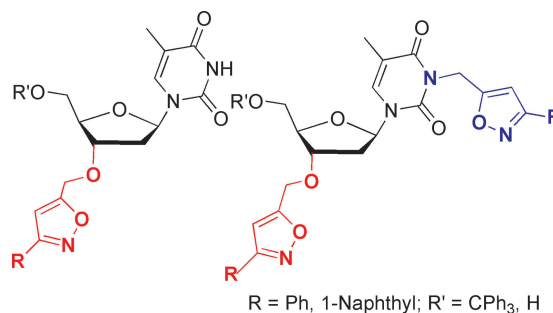


391

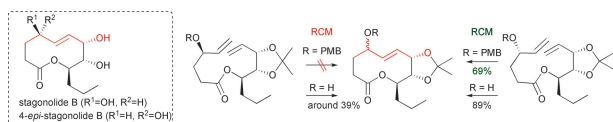
### Nucleoside and nucleotide analogues by catalyst free Huisgen nitrile oxide–alkyne 1,3-dipolar cycloaddition

Virginie Algay, Ishwar Singh and Frances Heaney\*

*C*<sup>3'</sup>-*O*-Isoxazole conjugated, and *C*<sup>3'</sup>-*O*,*N*<sup>3</sup>-bisoxazole nucleosides and nucleotides are prepared regioselectively, rapidly and in high yield under atmospheric conditions and in an aqueous environment; the protocol identifies chloramine-T as a practical reagent for *in situ* nitrile oxide formation, and the alkyne partner may be attached to the sugar residue or the nucleobase.



398

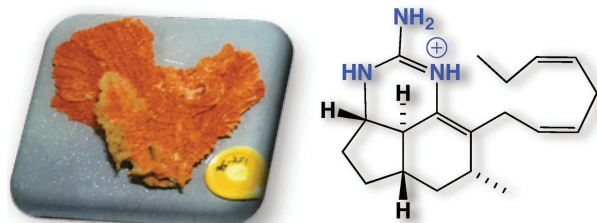


### Effect of the allylic substituents on ring closing metathesis: the total synthesis of stagonolide B and 4-*epi*-stagonolide B

Awadut G. Giri, Mohabul A. Mondal, Vedavati G. Puranik and Chepuri V. Ramana\*

The total syntheses of stagonolide B and its 4-*epi* were carried out to probe into how the relative stereochemistry of allylic hydroxy groups and their protecting groups influence the efficiency of the ring closing metathesis.

407

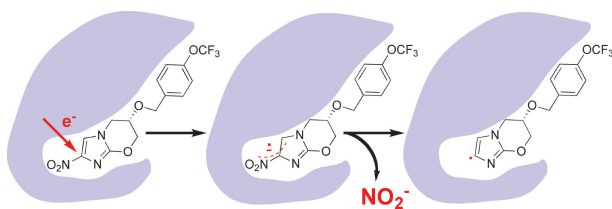


### Mirabilins revisited: polyketide alkaloids from a southern Australian marine sponge, *Clathria* sp.

Mohamed El-Naggar, Melissa Conte and Robert J. Capon\*

Chemical analysis of a southern Australian sponge, *Clathria* sp. yielded new examples of the mirabilin class of marine polyketide alkaloid.

413

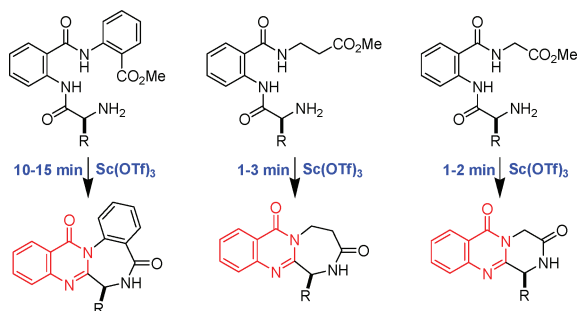


### Release of nitrite from the antitubercular nitroimidazole drug PA-824 and analogues upon one-electron reduction in protic, non-aqueous solvent

Andrej Maroz, Sujata S. Shinde, Scott G. Franzblau, Zhenkun Ma, William A. Denny, Brian D. Palmer and Robert F. Anderson\*

One-electron addition to the antituberculosis drug PA-824 in propan-2-ol leads to the release of nitrite. Such conditions may mimic the water-restricting active site of a reducing protein.

419



### Total synthesis of asperlicin C, circumdatin F, demethylbenzomalvin A, demethoxycircumdatin H, sclerotigenin, and other fused quinazolinones

Ming-Chung Tseng, Huei-Yun Yang and Yen-Ho Chu\*

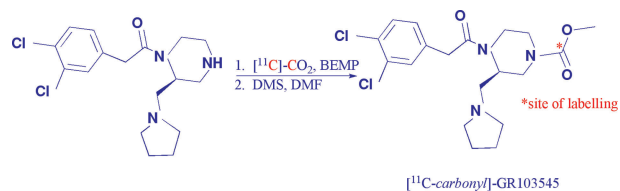
Using Sc(OTf)<sub>3</sub> and microwaves, direct double dehydrocyclization of anthranilate-containing tripeptides was efficiently achieved, to afford total syntheses of fused quinazolinones in short reaction times, with good overall isolated yields.

428

### Direct fixation of [ $^{11}\text{C}$ ]-CO $_2$ by amines: formation of [ $^{11}\text{C}$ -carbonyl]-methylcarbamates

Alan A. Wilson,\* Armando Garcia, Sylvain Houle and Neil Vasdev

A general method for the synthesis of [ $^{11}\text{C}$ -carbonyl]-radiolabelled carbamates from cyclotron-produced [ $^{11}\text{C}$ ]-CO $_2$  and primary or secondary amines is described. Using this method the selective kappa opioid agonist, [ $^{11}\text{C}$ -carbonyl]-GR103545, was prepared in high yield and at high specific activity, suitable for human positron emission tomography studies.

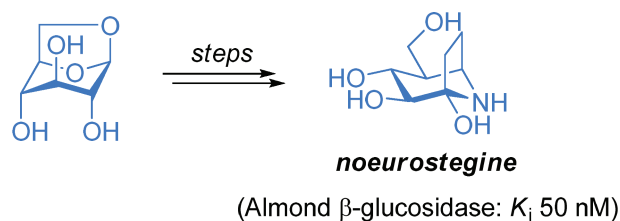


433

### Synthesis and glycosidase inhibitory activity of neurostegine—a new and potent inhibitor of $\beta$ -glucoside hydrolases

Tina Secher Rasmussen and Henrik Helligsø Jensen\*

A new, stable hemi-aminal nor-tropane christened neurostegine was synthesised in 22 steps from levoglucosan and tested for inhibitory activity against glycoside hydrolases.

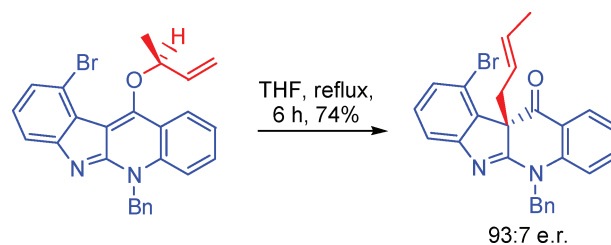


442

### Studies on the Claisen rearrangements in the indolo[2,3-*b*]quinoline system

Nicholas Voûte, Douglas Philp, Alexandra M. Z. Slawin and Nicholas J. Westwood\*

A study of the effect of substrate structure on a Claisen–aza-Cope reaction is presented including a rationalisation of the reaction outcome using computational techniques. An asymmetric version of the reaction is also described.

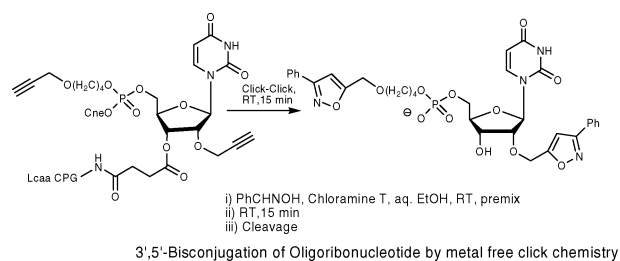


451

### Metal free, “click and click–click” conjugation of ribonucleosides and 2'-OMe oligoribonucleotides on the solid phase

Ishwar Singh and Frances Heaney\*

Nitrile oxide alkyne click cycloaddition is reported as a practical, metal free approach to conjugation of ribonucleosides and 2'-OMe 4-mer oligoribonucleotides on the solid phase, the methodology is suited to modification at either, or both, the 3'- or the 5'-terminus of the oligoribonucleotide substrate.



3',5'-Bisconjugation of Oligoribonucleotide by metal free click chemistry

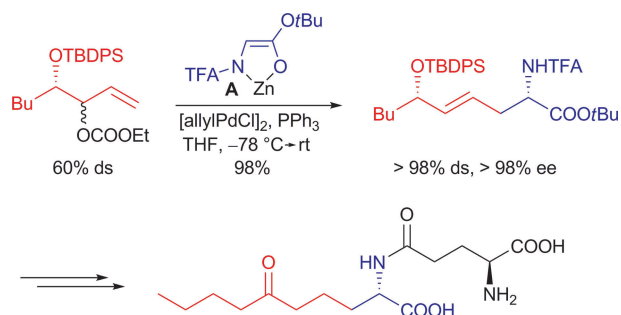


457

### Diastereotopos-differentiating allylic alkylation as a key step in the synthesis of $\gamma$ -glutamyl boletine

Dnyaneshwar Gawas and Uli Kazmaier\*

A straightforward approach towards  $\gamma$ -glutamyl boletine is described, based on a diastereotopos-differentiating allylic alkylation of chelated amino acid ester enolates. Independent of the configuration of the leaving group in the allylic substrate, the allylation product is obtained as a single stereoisomer.



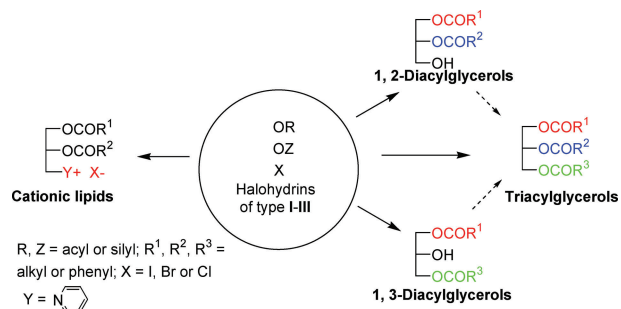
463



### *O*-Silylated C3-halohydrins as a novel class of protected building blocks for total, regio- and stereocontrolled synthesis of glycerolipid frameworks

Stephan D. Stamatov\* and Jacek Stawinski\*

Halohydrins of type I–III were developed as key intermediates for construction of diglycerides, triglycerides and cation glycerolipids.



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# Organic & Biomolecular Chemistry

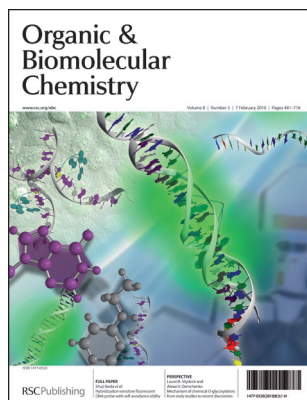
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## IN THIS ISSUE

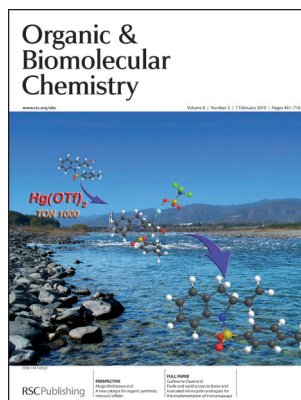
ISSN 1477-0520 CODEN OBCRAK 8(3) 481–716 (2010)



### Cover

See Shuji Ikeda *et al.*, pp. 546–551. Inosine (purple)–ethylcytosine (gray) base pair is unstable. The probes containing inosines, ethylcytosines and thiazole orange labels can avoid their self-dimerization (left) and emit hybridization-sensitive fluorescence by hybridization with the target RNA (center).

Image reproduced by permission of Akimitsu Okamoto from *Organic & Biomolecular Chemistry*, 2010, **8**, 546.



### Inside cover

See Mugio Nishizawa *et al.*, pp. 511–521. Rich and clean stream of Yoshino-gawa river, Tokushima, Japan. Hg(OTf)<sub>2</sub>-catalyzed reaction takes place smoothly in high catalytic turnover under mild conditions.

Image reproduced by permission of Mugio Nishizawa from *Organic & Biomolecular Chemistry*, 2010, **8**, 511.

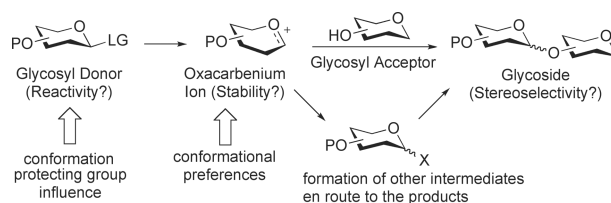
## PERSPECTIVES

497

### Mechanism of chemical *O*-glycosylation: from early studies to recent discoveries

Laurel K. Mydock and Alexei V. Demchenko\*

The main focus of this perspective lies in the discussion of the recent mechanistic theories and supporting experimental evidences that have been put forth in an attempt to advance our understanding of the factors affecting chemical glycosylation.

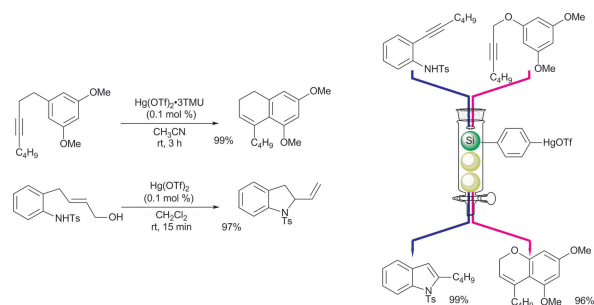


511

### A new catalyst for organic synthesis: mercuric triflate

Mugio Nishizawa,\* Hiroshi Imagawa and Hirofumi Yamamoto

Herein, we describe Hg(OTf)<sub>2</sub> as a new catalytic system for organic synthesis, which can achieve the hydration of alkynes, C–C bond forming cyclizations, heterocycle synthesis and cyclization initiated by allylic alcohols at very high catalytic turnovers under mild conditions. The first solid-supported mercuric salt, silaphenylmercuric triflate, was also developed and found to act as a powerful catalyst for most Hg(OTf)<sub>2</sub>-catalyzed reactions.

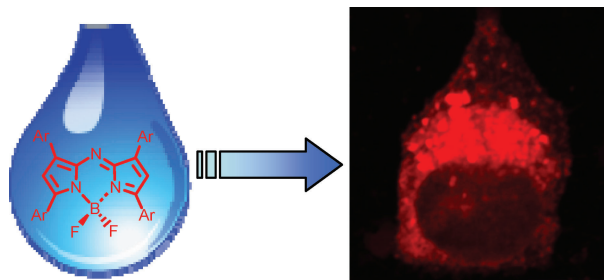


522

### Water-solubilised BF<sub>2</sub>-chelated tetraarylazadipyrromethenes

Mariusz Tasiar, Julie Murtagh, Daniel O. Frimannsson, Shane O. McDonnell and Donal F. O'Shea

Strategic incorporation of sulfonic acid, carboxylic acid or ammonium salt motifs generate water soluble BF<sub>2</sub>-chelated tetraarylazadipyrromethenes which exhibit strong near infra-red (NIR) emissions above 720 nm and can be readily imaged in both eukaryotic and prokaryotic cells.

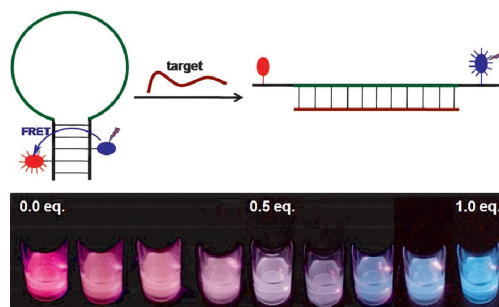


526

### Red–white–blue emission switching molecular beacons: ratiometric multicolour DNA hybridization probes

Reji Varghese and Hans-Achim Wagenknecht\*

Dual-fluorophore MB derived from pyrene (donor) and nile red (acceptor) exhibits red emission in the hairpin conformation due to FRET from pyrene to nile red that changes to blue through white with a dramatic shift of  $\approx 225$  nm upon binding to the target (see picture). This colour change can further be tuned by either incorporating mismatches in the stem region or reducing the loop of the beacon.

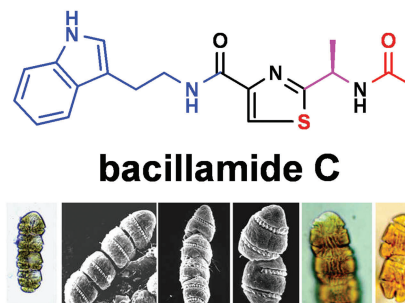


529

### (–)-Bacillamide C: the convergent approach

Wei Wang, Shannon Joyner, Kareem Andrew Sameer Khoury and Alexander Dömling\*

The newly discovered natural product bacillamide C and several derivatives were convergently synthesized for the first time and in only three steps; the key transformation constitutes a thiazole Ugi multicomponent reaction.

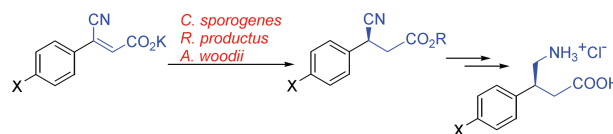


533

### A short, chemoenzymatic route to chiral $\beta$ -aryl- $\gamma$ -amino acids using reductases from anaerobic bacteria

Anna Fryszkowska,\* Karl Fisher, John M. Gardiner and Gill M. Stephens\*

A short chemoenzymatic synthesis of  $\beta$ -aryl- $\gamma$ -aminobutyric acids has been developed, based on a highly enantioselective biocatalytic reduction of  $\beta$ -aryl- $\beta$ -cyano- $\alpha,\beta$ -unsaturated carboxylic acids.

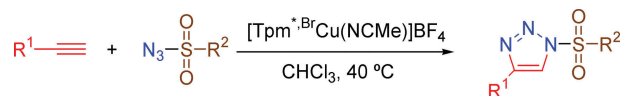


536

### Copper(I) complexes as catalysts for the synthesis of N-sulfonyl-1,2,3-triazoles from N-sulfonylazides and alkynes

Israel Cano, M. Carmen Nicasio\* and Pedro J. Pérez\*

The well-defined complex  $[\text{Tpm}^{\text{Br}}\text{Cu}(\text{NCMe})]\text{BF}_4$  efficiently catalyses the [3+2] cycloaddition between alkynes and N-sulfonylazides under mild conditions, with conversions comparable to others obtained with *in situ* generated catalytic systems previously described for this transformation.

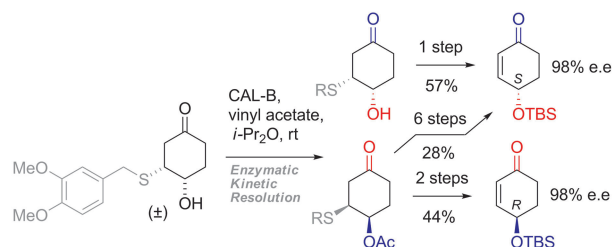


539

### The thio-adduct facilitated, enzymatic kinetic resolution of 4-hydroxycyclopentenone and 4-hydroxycyclohexenone

Aisling O'Byrne, Cian Murray, Dearbhla Keegan, Carole Palacio, Paul Evans\* and Ben S. Morgan

The use of a sulfide as a temporary steric buttress facilitated the enzymatic kinetic resolution of cyclic secondary alcohols. This unit may then be removed, in several ways, to afford the enantioenriched alkenols.

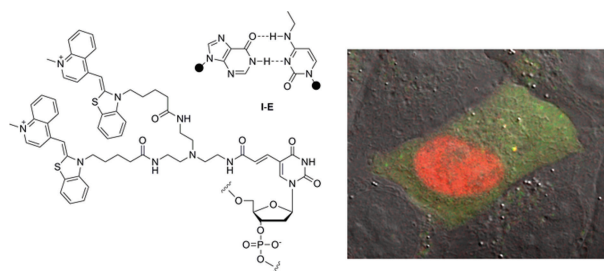


546

### Hybridization-sensitive fluorescent DNA probe with self-avoidance ability

Shuji Ikeda, Takeshi Kubota, Mizue Yuki, Hiroyuki Yanagisawa, Shizuho Tsuruma and Akimitsu Okamoto\*

New hybridization-sensitive fluorescent probes, IE probes, were synthesized containing three unnatural nucleotides: 2'-deoxyinosine, N<sup>4</sup>-ethyl-2'-deoxycytidine and a doubly thiazole orange-labeled nucleotide to avoid self-dimerization and background fluorescence.



552

### Simple 1-dicyanomethylene-2-chloro-3-aminoindene push-pull chromophores: applications in cation and anion sensing

Sara Basurto, Daniel Miguel, Daniel Moreno, Ana G. Neo, Roberto Quesada and Tomás Torroba\*

New indene push-pull chromophores are effective copper(II) sensors displaying colour changes upon coordination to metal cations and are also selective cyanide dosimeters through nucleophilic addition of the anion to the indene moiety.

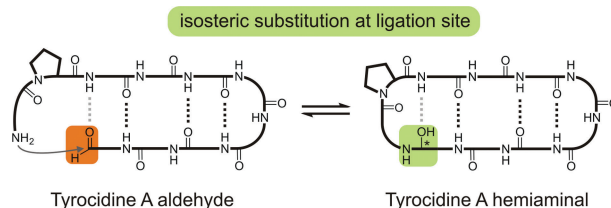


559

**The reversible macrocyclization of Tyrocidine A aldehyde: a hemiaminal reminiscent of the tetrahedral intermediate of macrolactamization**

Sebastian Enck, Florian Kopp, Mohamed A. Marahiel\* and Armin Geyer\*

The carboxylate at the native ligation site of Tyrocidine A was isosterically substituted by an aldehyde, which subsequently closes reversibly and stereoselectively to a stable hemiaminal, enabling the NMR spectroscopic analysis of the macrocyclization equilibrium.

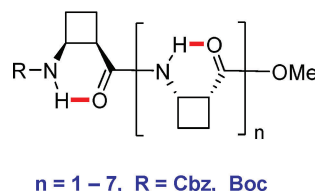


564

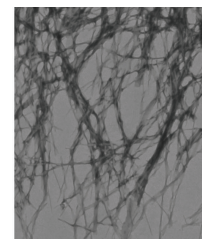
**Folding and self-assembling with  $\beta$ -oligomers based on (1*R*,2*S*)-2-aminocyclobutane-1-carboxylic acid**

Elisabeth Torres, Esther Gorrea, Kepa K. Burusco, Eric Da Silva, Pau Nolis, Federico Rúa, Stéphanie Boussett, Ismael Díez-Pérez, Samantha Dannenberg, Sandra Izquierdo, Ernest Giralt, Carlos Jaime, Vicenç Branchadell and Rosa M. Ortuno\*

All *cis*-cyclobutane  $\beta$ -oligomers show a strand-type preferential conformation in solution. These compounds self-assemble to give nano-sized fibres and some of them also form gels.



strand-type conformation



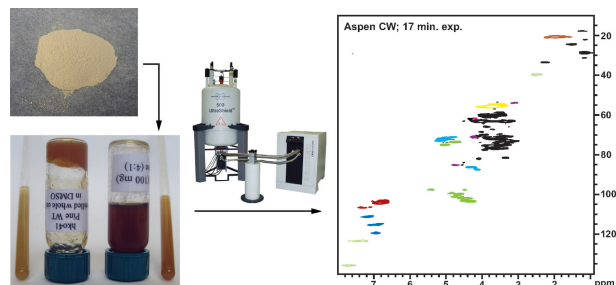
nano-sized fibres

576

**Solution-state 2D NMR of ball-milled plant cell wall gels in  $\text{DMSO-}d_6/\text{pyridine-}d_5$**

Hoon Kim\* and John Ralph

2D solution-state NMR (HSQC) fingerprinting of entire plant cell wall fractions (*i.e.* without component fractionation) has been improved by using  $\text{DMSO-}d_6/\text{pyridine-}d_5$  (4 : 1, v/v) gels.

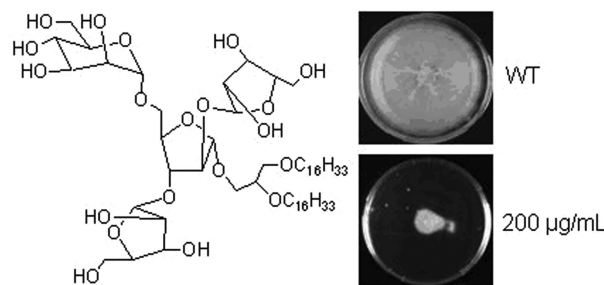


592

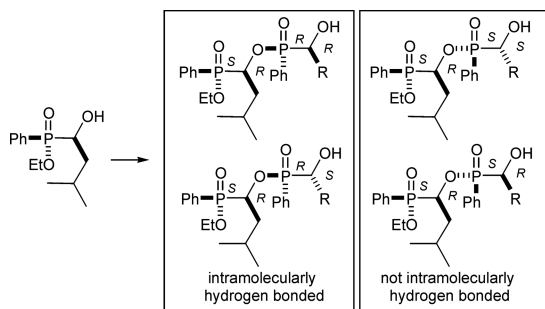
**Synthetic arabinomannan glycolipids and their effects on growth and motility of the *Mycobacterium smegmatis***

Kottari Naresh, Binod Kumar Bharati, Prakash Gouda Avaji, Narayanaswamy Jayaraman\* and Dipankar Chatterji\*

Synthetic arabinomannan glycolipids, relevant to mycobacterial cell-wall components, acted as inhibitors of growth through reduced biofilm formation and impaired motility of bacteria.



600

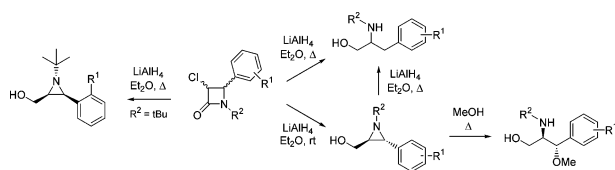


### A synthesis of oligomeric $\alpha$ -hydroxy phenylphosphinates and a study of the conformational preferences of the dimers

Kamyar Afarinkia,\* Martin Royappa, Ian J. Scowen, Jonathan W. Steed and Hiu-wan Yu

A combination of NMR spectroscopy, X-ray crystallography and computational methods is used to show that the folding patterns of a novel class of oligomers is determined by relative configuration of the carbon and phosphorus stereocenters.

607

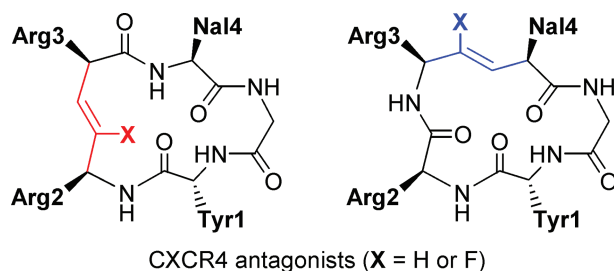


### Stereoselective synthesis of *trans*- and *cis*-2-aryl-3-(hydroxymethyl)aziridines through transformation of 4-aryl-3-chloro- $\beta$ -lactams and study of their ring opening

Matthias D'hooghe, Karen Mollet, Stijn Dekeukeleire and Norbert De Kimpe\*

*trans*- and *cis*-1-Alkyl-4-aryl-3-chloroazetidin-2-ones were transformed into *trans*- and *cis*-2-aryl-3-(hydroxymethyl)aziridines via reductive ring contraction.

616

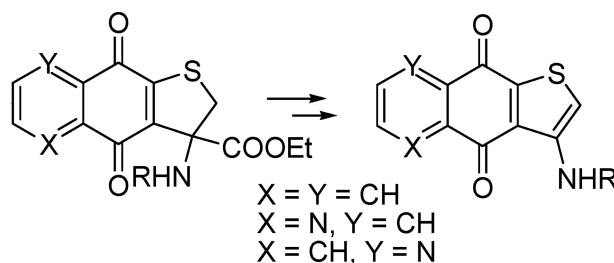


### Synthesis and biological evaluation of selective CXCR4 antagonists containing alkene dipeptide isosteres

Tetsuo Narumi, Ryoko Hayashi, Kenji Tomita, Kazuya Kobayashi, Noriko Tanahara, Hiroaki Ohno, Takeshi Naito, Eiichi Kodama, Masao Matsuoka, Shinya Oishi\* and Nobutaka Fujii\*

A set of cyclic peptide analogues of a selective CXCR4 antagonist FC131 were synthesized and bioevaluated. The CXCR4 antagonism and anti-HIV activity was demonstrated. FC131 and the analogues were shown to selectively inhibit SDF-1 binding to CXCR4.

622



### Unprecedented synthesis of a novel amino quinone ring system via oxidative decarboxylation of quinone-based $\alpha, \alpha$ -amino esters

Pietro Campiglia, Claudio Aquino, Alessia Bertamino, Nicoletta De Simone, Marina Sala, Sabrina Castellano, Marisabella Santoriello, Paolo Grieco, Ettore Novellino and Isabel M. Gomez-Monterrey\*

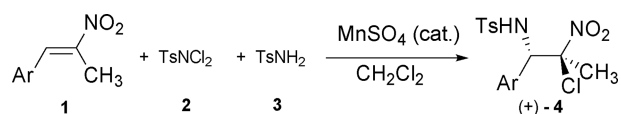
An efficient synthesis of new quinone derivatives through an  $\alpha, \alpha$ -amino ester oxidative decarboxylation provides access to new building blocks for the development of potential antitumoral agents.

628

### New catalytic system for aminohalogenation of $\beta$ -methyl- $\beta$ -nitrostyrenes to give opposite regiochemistry

San-Jun Zhi, Hao Sun, Guangqian Zhang, Guigen Li\* and Yi Pan\*

A new combination of catalyst and co-additive was found for the aminohalogenation of  $\beta$ -methyl- $\beta$ -nitrostyrenes with 4-TsNCl<sub>2</sub> by using MnSO<sub>4</sub> as the catalyst. A mechanism involving the formation of chloronium intermediate was proposed.

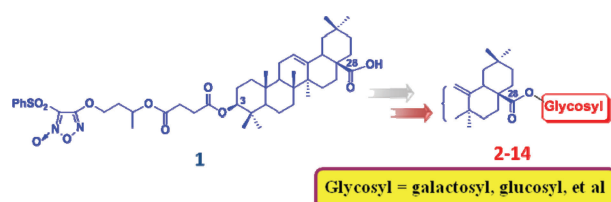


632

### Synthesis and *anti*-human hepatocellular carcinoma activity of new nitric oxide-releasing glycosyl derivatives of oleanolic acid

Zhangjian Huang, Yihua Zhang,\* Li Zhao, Yongwang Jing, Yisheng Lai, Luyong Zhang,\* Qinglong Guo, Shengtao Yuan, Jianjun Zhang, Li Chen, Sixun Peng and Jide Tian

A series of NO-releasing glycosyl derivatives (2–14) of oleanolic acid were synthesized, and 3 exhibited better solubility and strong cytotoxicity against human HCC than the active compound 1.

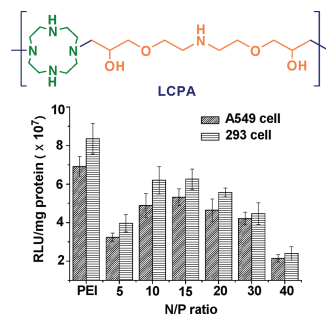


640

### Linear cyclen-based polyamine as a novel and efficient reagent in gene delivery

Yong-Zhe Xiang, Zhi-Hua Feng, Ji Zhang,\* Yi-Le Liao, Chuan-Jiang Yu, Wen-Jing Yi, Wen Zhu\* and Xiao-Qi Yu\*

Novel linear cyclen-based polyamine (LCPA) could act as an effective non-viral gene vector towards both A549 and 293 cell lines.

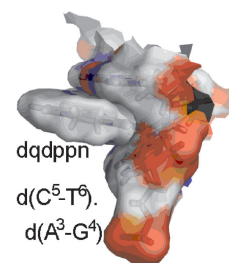
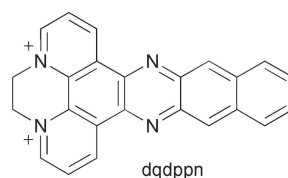


648

### Structural analysis of the binding of the diquaternary pyridophenazine derivative dqpdpn to B-DNA oligonucleotides

Philip Waywell, James A. Thomas\* and Mike P. Williamson\*

The interaction of dqpdpn with several hexa- and octanucleotide duplexes has been studied. The NMR-derived structural model of two of the binding complexes demonstrates that dqpdpn intercalates from the major groove in an unusual 'side-on' geometry, rather than threading through the helix.

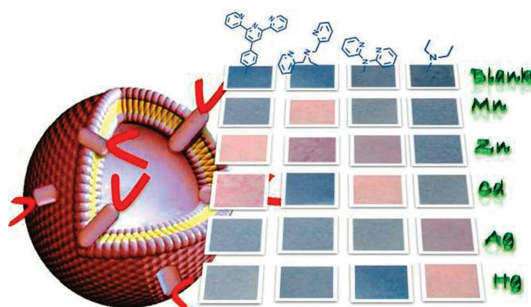


655

### Polydiacetylene vesicles functionalized with N-heterocyclic ligands for metal cation binding

D. Amilan Jose and Burkhard König\*

Self assembled poly diacetylene based blue vesicles with embedded N-heterocyclic ligands respond selectively to metal cations in aqueous solution by a visible colour change. The metal ion binding selectivity of the ligands at the vesicle surface is slightly altered at the special environment of the lipid–solution interface.

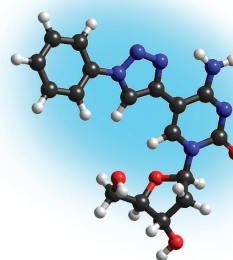


663

### Blue fluorescent deoxycytidine analogues: convergent synthesis, solid-state and electronic structure, and solvatochromism

David W. Dodd, Kalen N. Swanick, Jacquelyn T. Price, Allison L. Brazeau, M. J. Ferguson, Nathan D. Jones\* and Robert H. E. Hudson\*

Intrinsically fluorescent 5-aryltriazolyldeoxycytidine nucleosides are conveniently accessed by “click” chemistry between 5-ethynylcytidine and aryl azides.

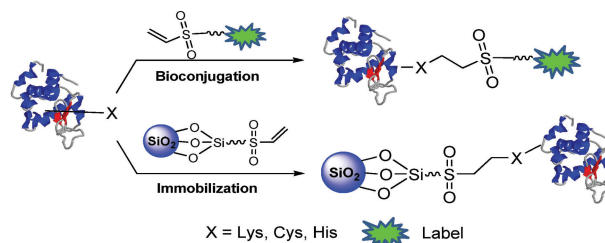


667

### Vinyl sulfone: a versatile function for simple bioconjugation and immobilization

Julia Morales-Sanfrutos, Javier Lopez-Jaramillo, Mariano Ortega-Muñoz, Alicia Megia-Fernandez, Francisco Perez-Balderas, Fernando Hernandez-Mateo and Francisco Santoyo-Gonzalez\*

The easy functionalization of tags and solid supports with the vinyl sulfone function is a valuable tool in *omic* sciences that allows their coupling, in the absence of metal catalysis and in mild conditions, with the amine and thiol groups of the proteogenic residues of proteins.

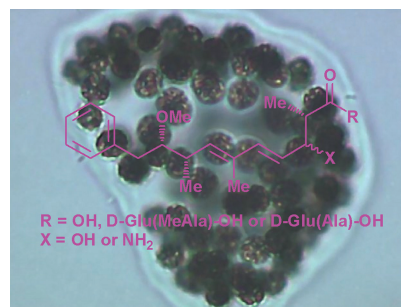


676

### Facile and rapid access to linear and truncated microcystin analogues for the implementation of immunoassays

G. Clavé, C. Ronco, H. Boutal, N. Kreich, H. Volland, X. Franck, A. Romieu\* and P.-Y. Renard\*

$\beta$ -Amino acid Adda was used to rapidly prepare novel simplified microcystin analogues through peptide coupling or *trans*-amidification reactions. Cross-reactivity experiments aimed at evaluating their recognition by mAbs directed against microcystin-LR were performed. One of the microcystin-LR analogues was successfully used to prepare immunosensors suitable for sensitive detection of such cyanotoxins.



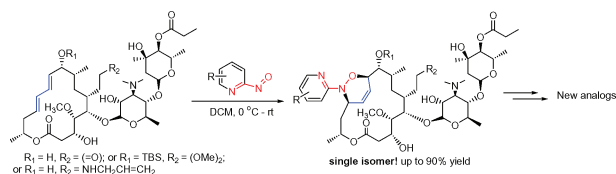


691

### Preparation and biological evaluation of novel leucomycin analogs derived from nitroso Diels–Alder reactions

Baiyuan Yang, Tina Zöllner, Peter Gebhardt, Ute Möllmann and Marvin J. Miller\*

Novel macrolide analogs were synthesized using nitroso Diels–Alder reactions of leucomycin A7 and subsequent chemical modifications. Hetero cycloaddition reactions proceeded in a highly regio- and stereoselective fashion. Most analogs retained antibiotic profiles similar to leucomycin A7, and, in contrast to leucomycin itself, several exhibited moderate antiproliferative and cytotoxic activity.

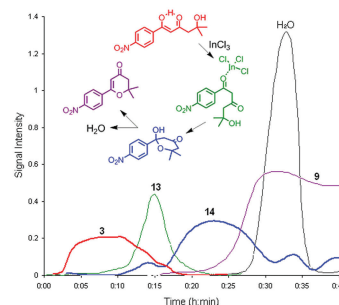


698

### Highly efficient indium(III)-mediated cyclisation of 5-hydroxy-1,3-diketones to 2,3-dihydro-4H-pyran-4-ones; mechanistic insights from *in situ* Fourier transform infrared spectroscopy

P. C. Andrews,\* W. J. Gee, P. C. Junk and H. Krautscheid

Cyclisation of  $\delta$ -hydroxy- $\beta$ -diketones to 2,3-dihydro-4H-pyran-4-ones occurs efficiently in the presence of a catalytic amount of anhydrous  $\text{InCl}_3$  and a dehydrating agent, with *in situ* FTIR studies indicating a reaction mechanism sensitive to both temperature and reagent concentration.

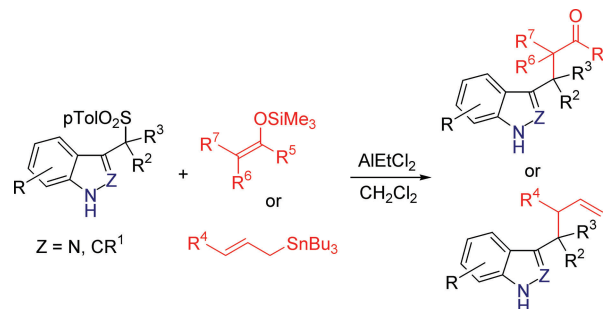


706

### Reaction of carbon nucleophiles with alkylideneindazolium and alkylideneindolium ions generated from their 3-(1-arylsulfonylalkyl) indazole and indole precursors

Laura Marsili, Alessandro Palmieri and Marino Petrini\*

Nucleophilic substitution of *p*-toluenesulfonate anion on sulfonyl indazoles and sulfonyl indoles is carried out *via* the corresponding iminium ion generated by reaction with  $\text{AlEtCl}_2$ .



# Organic & Biomolecular Chemistry

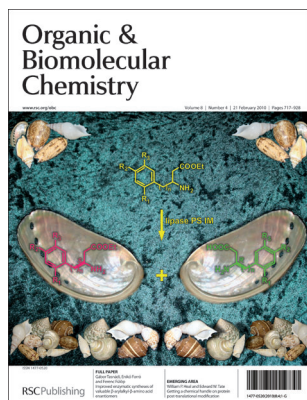
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## IN THIS ISSUE

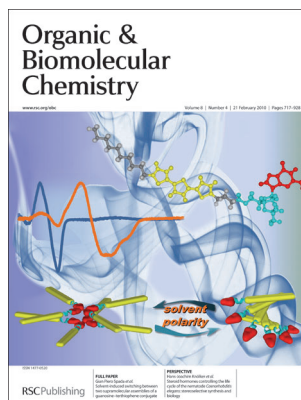
ISSN 1477-0520 CODEN OBCRAK 8(4) 717–928 (2010)



### Cover

See Ferenc Fülöp *et al.*, pp. 793–799.  
The enantioselective *Burkholderia cepacia*-catalysed hydrolyses of biologically relevant  $\beta$ -arylalkyl-substituted  $\beta$ -amino esters were performed with high enantiomeric excesses and in good yields.

Image reproduced by permission of Gábor Tasnádi, Enikő Forró and Ferenc Fülöp from *Org. Biomol. Chem.*, 2010, **8**, 793.



### Inside cover

See Gian Piero Spada *et al.*, pp. 774–781.  
Guanine or terthienyl: which one leads the self-assembly of the guanosine–terthiophene conjugate? Upon increasing solvent polarity, the supramolecular aggregate directed by guanine stacking is reversibly converted into a terthienyl stacked architecture.

Image reproduced by permission of Gian Piero Spada *et al.* from *Org. Biomol. Chem.*, 2010, **8**, 774.

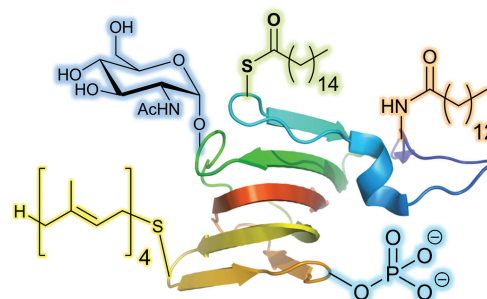
## EMERGING AREA

731

### Getting a chemical handle on protein post-translational modification

William P. Heal and Edward W. Tate\*

Chemical proteomics is a powerful technology for the study of post- and co-translational modification of proteins. Here, we review techniques that combine protein-modifying enzymes with bioorthogonal chemoselective elaboration to enable new advances in our understanding of protein modification.



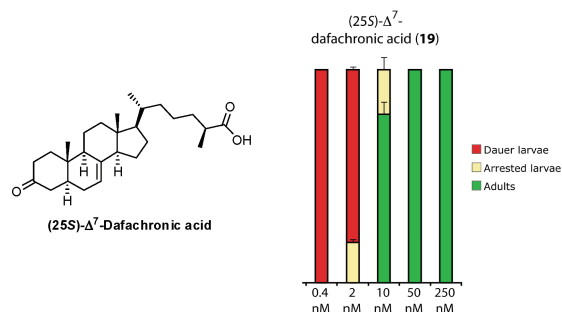
## PERSPECTIVE

739

### Steroid hormones controlling the life cycle of the nematode *Caenorhabditis elegans*: stereoselective synthesis and biology

René Martin, Eugeni V. Entchev, Teymuraz V. Kurzchalia and Hans-Joachim Knölker\*

Cholesterol-derived hormones, the dafachronic acids, play a major role in controlling the life cycle and initiating dauer larva formation of the nematode *Caenorhabditis elegans*. This Perspective describes recent progress in the synthesis of these steroid hormones and their biological function.

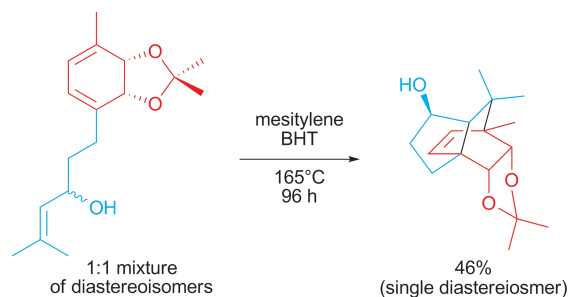


751

**Chemoenzymatic and enantiodivergent routes to 1,2-ring-fused bicyclo[2.2.2]octane and related tricyclic frameworks**

Kerrie A. B. Austin, Jon D. Elsworth, Martin G. Banwell\* and Anthony C. Willis

The chemoenzymatically derived triene undergoes a facially-selective IMDA reaction to give an adduct incorporating the carbocyclic framework of the sesquiterpene (–)-khusiol.

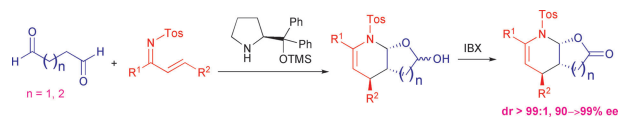


755

**Enantioselective construction of lactone[2,3-*b*]piperidine skeletons via organocatalytic tandem reactions**

Zhao-Quan He, Bo Han, Rui Li,\* Li Wu and Ying-Chun Chen\*

A highly enantioselective construction of  $\delta$ - and  $\gamma$ -lactone[2,3-*b*]piperidine skeletons was accomplished by tandem aza-Diels–Alder reaction–hemiacetal formation–oxidation from *N*-Tos-1-aza-1,3-butadienes and aliphatic dialdehydes.

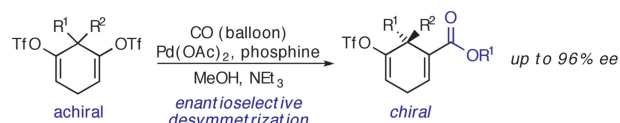


758

**Enantioselective desymmetrizing palladium catalyzed carbonylation reactions: the catalytic asymmetric synthesis of quaternary carbon center containing 1,3-dienes**

Simon J. Byrne, Anthony J. Fletcher, Paul Hebeisen and Michael C. Willis\*

A desymmetrization protocol has been used to develop a palladium catalyzed enantioselective carbonylation process. Achiral cyclic bis-alkenyltriflates are converted to their corresponding monoester derivatives with selectivities of up to 96% ee.

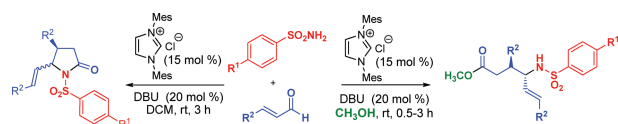


761

**A novel pseudo four component reaction involving homoenolate for the synthesis of  $\gamma$ -aminobutyric acid (GABA) derivatives**

Vijay Nair,\* Vimal Varghese, Beneesh P. Babu, C. R. Sinu and Eringathodi Suresh

Homoenolate generated from  $\alpha,\beta$ -unsaturated aldehydes by NHC catalysis underwent facile addition to conjugated sulfonimines and subsequent methanolysis to afford protected GABA derivatives stereoselectively and in high yields, thus constituting a novel pseudo four component reaction.

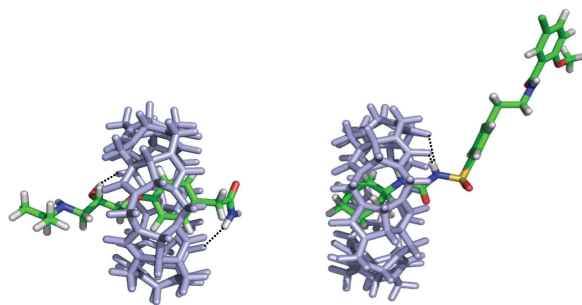


765

**Solid state stabilisation of the orally delivered drugs atenolol, glibenclamide, memantine and paracetamol through their complexation with cucurbit[7]uril**

Fiona J. McInnes, Nahoum G. Anthony, Alan R. Kennedy and Nial J. Wheate\*

The inclusion of the cardiovascular  $\beta$ -blocker drug atenolol, the antidiabetic drug glibenclamide, the Alzheimer's drug memantine and the analgesic paracetamol by cucurbit[7]uril has been studied by NMR, ESI-MS, molecular modelling, fluorescence displacement assays and DSC.

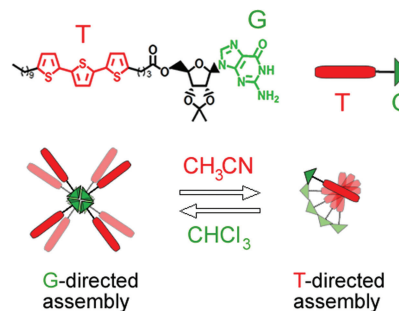


774

**Solvent-induced switching between two supramolecular assemblies of a guanosine–terthiophene conjugate**

Silvia Pieraccini, Sara Bonacchi, Stefano Lena, Stefano Masiero, Marco Montalti, Nelsi Zaccheroni and Gian Piero Spada\*

The guanosine–terthiophene conjugate undergoes a pronounced variation of its supramolecular organisation from a guanine-directed to a terthienyl-directed assembly by changing the polarity of the solvent.

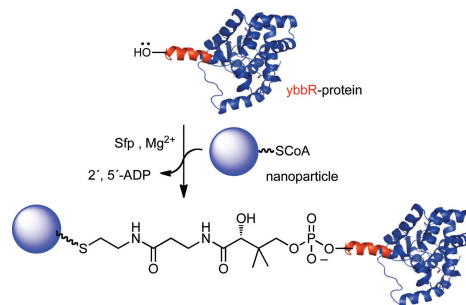


782

**Site-selective immobilisation of functional enzymes on to polystyrene nanoparticles**

Lu Shin Wong,\* Krzysztof Okrasa and Jason Micklefield\*

Site-selective covalent immobilisation of ybbR tagged proteins, including functional enzymes, on to nanoparticles derivatised with CoA is achieved in a mild and efficient reaction catalysed by the promiscuous phosphopantetheinyl transferase Sfp.

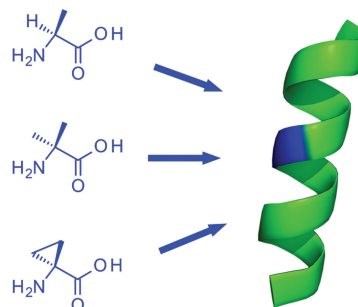


788

**Helix propensities of conformationally restricted amino acids. Non-natural substitutes for helix breaking proline and helix forming alanine**

Miriam Alías, Sara Ayuso-Tejedor, Juan Fernández-Recio, Carlos Cativiela\* and Javier Sancho\*

Helix propagation parameters of the conformationally restricted amino acids Aib and Ac3c as an aid for helical peptide designing.

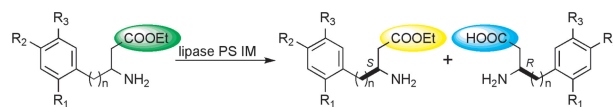


793

### Improved enzymatic syntheses of valuable $\beta$ -arylalkyl- $\beta$ -amino acid enantiomers

Gábor Tasnádi, Enikő Forró and Ferenc Fülöp\*

The enantioselective ( $E \sim 200$ ) *Burkholderia cepacia*-catalysed hydrolyses of  $\beta$ -amino esters with  $\text{H}_2\text{O}$  (0.5 equiv.) in *t*-BuOMe or in *i*-Pr<sub>2</sub>O at 45 °C are described. The enantiomers were prepared with high enantiomeric excesses ( $ee > 96\%$ ) and in good yields ( $> 42\%$ ).



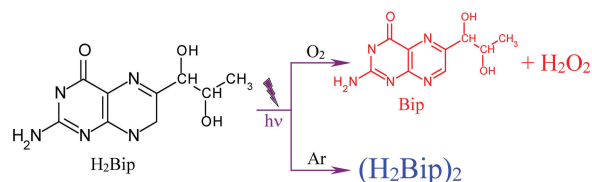
800



### Photochemistry of dihydrobiopterin in aqueous solution

Mariana Vignoni, Franco M. Cabrerizo, Carolina Lorente, Catherine Claparols, Esther Oliveros\* and Andrés H. Thomas\*

Photooxidation of pterins takes place *in vivo* under pathological conditions. We have investigated the photochemistry of dihydrobiopterin and discuss the mechanisms involved.



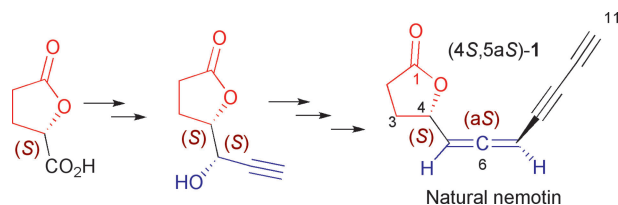
811



### The enantioselective total synthesis of nemotin

Ya-Jun Jian and Yikang Wu\*

The gross structure of nemotin was established in the 1950s, but the stereochemistry remains unknown to date. Now, with the aid of an enantioselective synthesis, the (4*S*,5*aS*) configuration among the four possible alternatives is shown to represent the natural product.



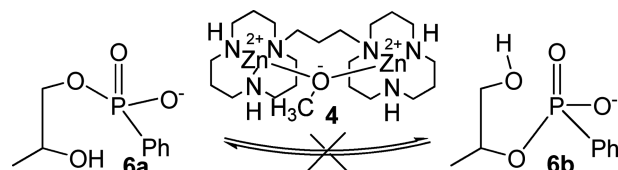
822



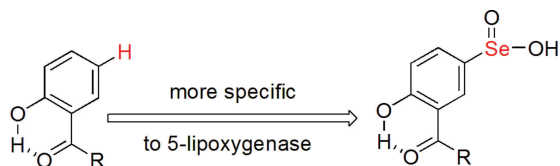
### On the question of stepwise *vs.* concerted cleavage of RNA models promoted by a synthetic dinuclear Zn(II) complex in methanol: implementation of a noncleavable phosphonate probe

David R. Edwards, Wing-Yin Tsang, Alexei A. Neverov and R. Stan Brown\*

$\text{Zn}(\text{II})_2$  complex (**4**) does not promote the interconversion of isomeric phosphonates (**6a**, **6b**), the only products of the reaction being 1,2-propanediol and *O*-methyl phenylphosphonate.



828



R = acid, amide or ester

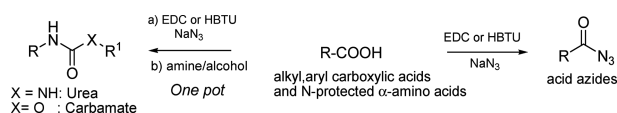
or its anhydride

### 5-Selenization of salicylic acid derivatives yielded isoform-specific 5-lipoxygenase inhibitors

Sun-Chol Yu, Hartmut Kuhn,\* Constantin-Gabriel Daniliuc, Igor Ivanov, Peter G. Jones and Wolf-Walther du Mont\*

5-Seleninic acids or anhydrides of salicylic acid amides or esters are promising inhibitors more selective to recombinant human 5-lipoxygenase than to rabbit reticulocyte 12/15-lipoxygenase.

835



X = NH: Urea

X = O : Carbamate

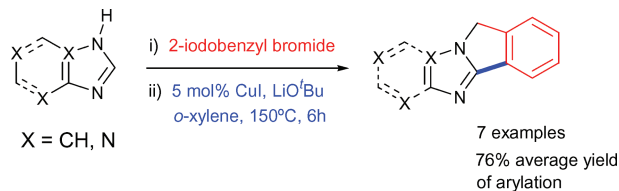
alkyl, aryl carboxylic acids and N-protected  $\alpha$ -amino acids

### New and simple synthesis of acid azides, ureas and carbamates from carboxylic acids: application of peptide coupling agents EDC and HBTU

Vommina V. Sureshbabu,\* H. S. Lalithamba, N. Narendra and H. P. Hemantha

Acid azides have been efficiently prepared from carboxylic acids using peptide coupling agents EDC or HBTU; and the reaction has been extended to the one pot synthesis of ureas and carbamates from carboxylic acids

841



X = CH, N

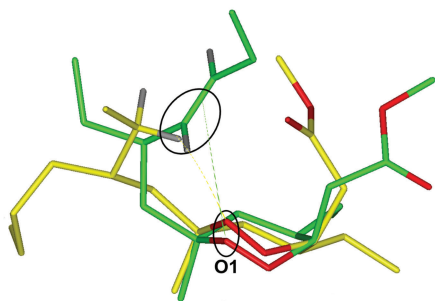
7 examples  
76% average yield of arylation

### Ligand-free copper(I)-catalysed intramolecular direct C–H functionalization of azoles

Nekane Barbero, Raul SanMartin\* and Esther Domínguez\*

The first examples of copper-catalysed intramolecular direct C-arylation of azaheterocycles for the synthesis of complex heterofused compounds is presented, featuring an unprecedented arylation *via* C–H activation of 9H-purine and 4-azabenzimidazole.

846



### Insight into the mechanism of action of plakortins, simple 1,2-dioxane antimalarials

Orazio Tagliatela-Scafati, Ernesto Fattorusso, Adriana Romano, Fernando Scala, Vincenzo Barone, Paola Cimino, Emiliano Stendardo, Bruno Catalanotti, Marco Persico and Caterina Fattorusso\*

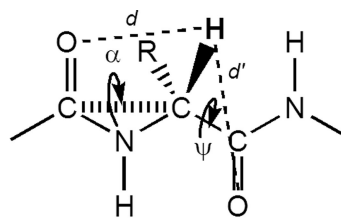
Computational calculations and chemical reactions give insight into the mechanism of the antimalarial action of plakortin and dihydroplakortin, simple 1,2-dioxanes isolated from a marine sponge.

857

### A new model for mapping the peptide backbone: predicting proton chemical shifts in proteins

José Luis Barneto,\* Martín Avalos, Reyes Babiano, Pedro Cintas, José Luis Jiménez and Juan Carlos Palacios

This study provides a methodology to correlate empirical chemical shifts (at the alpha-proton) in proteins with geometrical data (distances and dihedral angles) calculated at the B3PW91/6-31G\* level.



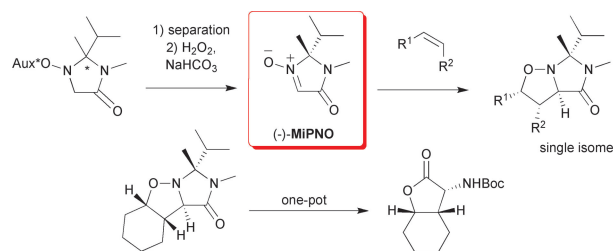
$$\delta = 2.87 + \sigma_R + 1.32 \cos^2 \frac{(\alpha - 25)}{d} + 0.75 \cos^2 \frac{(\psi - 10)/2}{d'}$$

864

### MiPNO, a new chiral cyclic nitrone for enantioselective amino acid synthesis: the cycloaddition approach

Maryse Thiverny, Christian Philouze, Pierre Yves Chavant and Véronique Blandin\*

Totally regio- and diastereo-selective 1,3-dipolar cycloaddition reaction of various alkenes with MiPNO, a new chiral cyclic nitrone, provides an expeditious enantioselective access to unusual  $\gamma$ -hydroxy  $\alpha$ -amino acids.

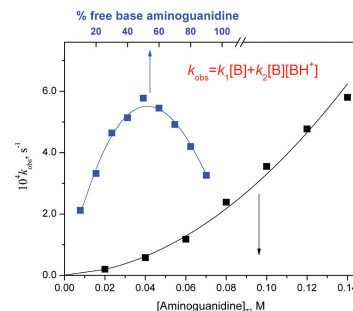


873

### Mechanism of general acid–base catalysis in transesterification of an RNA model phosphodiester studied with strongly basic catalysts

David O. Corona-Martínez, Olga Taran and Anatoly K. Yatsimirsky\*

Classical “bell-shaped” second-order kinetics of general acid–base catalysis in transesterification of an RNA model substrate absent in aqueous buffers is observed in guanidine and amidine buffers in 80% vol aqueous DMSO.

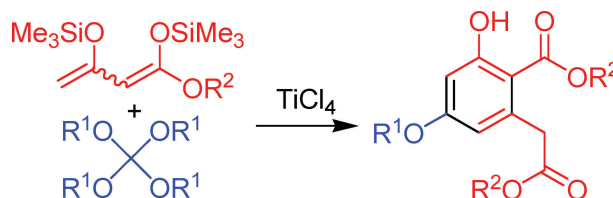


881

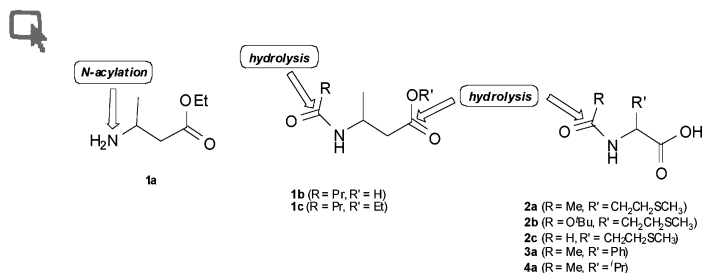
### Synthesis of 3-hydroxy-5-alkoxyhomophthalates by domino ‘2 : 1-coupling/intramolecular aldol condensation’ reactions of 1,3-bis(trimethylsilyloxy)-1,3-butadienes with tetraalkoxymethanes

Mathias Lubbe and Peter Langer\*

The first domino ‘2 : 1 condensation/intramolecular aldol’ reactions of 1,3-bis(trimethylsilyloxy)-1,3-butadiene with tetraalkoxymethanes provide a convenient approach to 3-hydroxy-5-alkoxyhomophthalates.



886

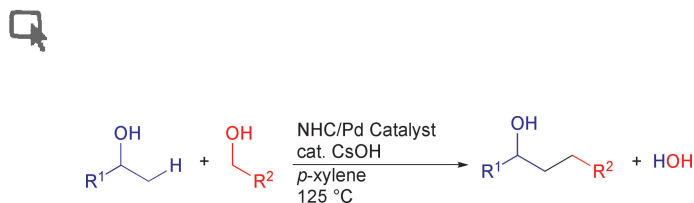


### Formation and hydrolysis of amide bonds by lipase A from *Candida antarctica*; exceptional features

Arto Liljeblad,\* Pauli Kallio, Marita Vainio, Jarmo Niemi and Liisa T. Kanerva

Exceptional lipase: the ability of lipase A from *Candida antarctica* (CAL-A) to form and hydrolyze amide bonds was studied with **1a–c**, **2a–c**, **3a** and **4a**. The possible role of enzyme contaminants in the reactions was studied by fractionation and sequence-based identification of the commercial CAL-A preparation Cat#ICR-112 (Codexis).

896

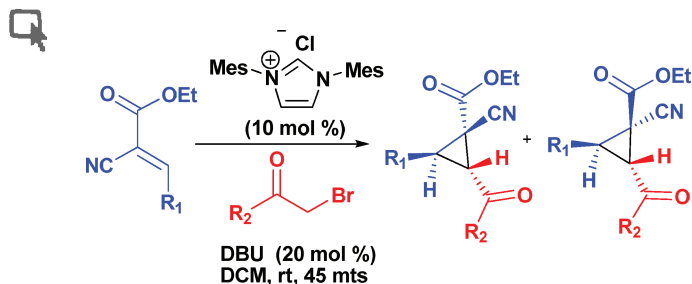


### Cross-coupling reaction of alcohols for carbon–carbon bond formation using pincer-type NHC/palladium catalysts

Osamu Kose and Susumu Saito\*

A cross-coupling reaction of different alcohols was achieved using a pincer-type NHC/PdBr complex as the catalyst precursor, and the reaction, under either Ar or H<sub>2</sub> gas, displayed a broad substrate scope with respect to both primary and secondary alcohol components, with high product alcohol selectivity.

901

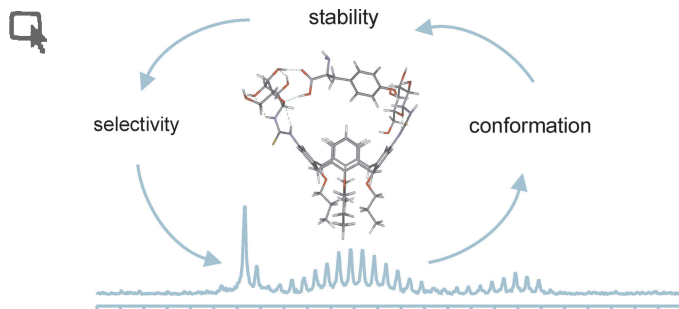


### Nucleophilic heterocyclic carbene as a novel catalyst for cyclopropanation of cyano acrylates

Anabha E. Raveendran, Rony Rajan Paul, Eringathodi Suresh and Vijay Nair\*

Nucleophilic heterocyclic carbenes (NHCs) have been used for the first time as catalysts in the cyclopropanation of ethyl cyanoacrylates with phenacyl bromide by Michael-initiated ring-closure (MIRC).

906




### Glucosylthioureidocalix[4]arenes: Synthesis, conformations and gas phase recognition of amino acids

Mika Torvinen, Raisa Neitola, Francesco Sansone, Laura Baldini, Rocco Ungaro, Alessandro Casnati,\* Pirjo Vainiotalo\* and Elina Kalenius\*

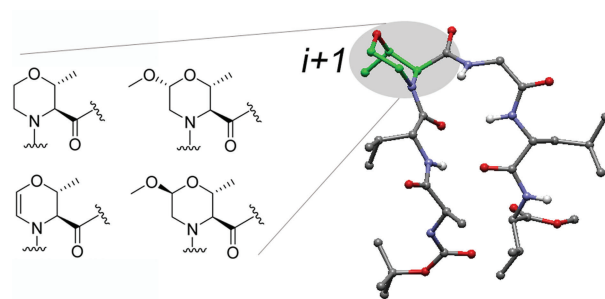
Conformational properties of glucosylcalixarenes and their selective complexation with amino acids have been clarified in solution and gas-phase.



 **Evaluation of stereochemically dense morpholine-based scaffolds as proline surrogates in  $\beta$ -turn peptides**

Filippo Sladojevich, Antonio Guarna and Andrea Trabocchi\*

NMR analysis of stereochemically dense morpholine-based scaffolds as proline surrogates in  $\beta$ -turn peptides revealed an adaptive behaviour in generating turn conformations stabilized by intramolecular hydrogen-bonds with no significant loss of the secondary framework.



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\* Indicates the author for correspondence: see article for details.



Electronic supplementary information (ESI) is available *via* the online article (see <http://www.rsc.org/esi> for general information about ESI).

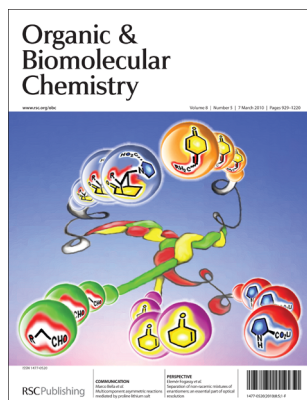
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## IN THIS ISSUE

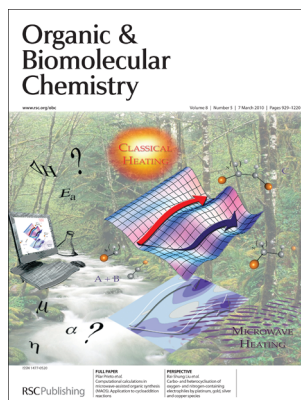
ISSN 1477-0520 CODEN OBCRAK 8(5) 929–1220 (2010)



### Cover

See Marco Bella *et al.*, pp. 980–983.  
Bicyclic adducts bearing five stereocenters and novel fragrances are produced by the multicomponent reaction between proline lithium salt, aliphatic aldehydes and 2-cyclohexen-1-one. Authors thank Miss Susy Piovesana for designing this cover.

Image reproduced by permission of Polyssena Renzi, Jacob Overgaard and Marco Bella from *Org. Biomol. Chem.*, 2010, **8**, 980.



### Inside cover

See Pilar Prieto *et al.*, pp. 1000–1009.  
The occurrence of thermal and non-thermal effects of microwave irradiation in some reactions could be studied using computational calculations.

Image reproduced by permission of A. de Cózar, M. C. Millán, C. Cebrián, P. Prieto, A. Díaz-Ortiz, A. de la Hoz and F. P. Cossío from *Org. Biomol. Chem.*, 2010, **8**, 1000.

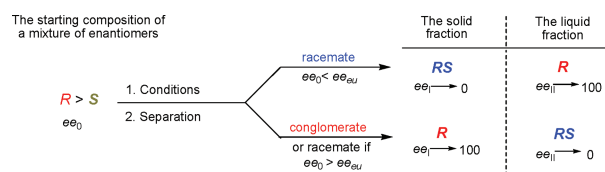
## PERSPECTIVES

947

### Separation of non-racemic mixtures of enantiomers: an essential part of optical resolution

Ferenc Faigl, Elemér Fogassy,\* Mihály Nógrádi, Emese Pálovics and József Schindler

Enrichment of non-racemic mixtures of enantiomers is an important part of resolution processes. All purification methods are based on the racemate- or conglomerate-like behaviour of enantiomers. In this compilation we review the most often used and some throughout uncommon methods based on momentous recognitions.

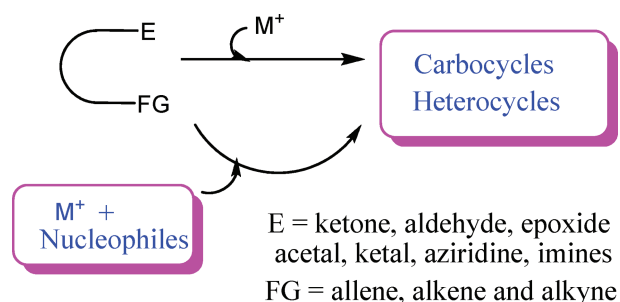


960

### Carbo- and heterocyclisation of oxygen- and nitrogen-containing electrophiles by platinum, gold, silver and copper species

Arindam Das, Shariar Md. Abu Sohel and Rai-Shung Liu\*

In this present perspective, we summarise the recent progress on the use of gold, platinum, silver and copper complexes to activate common oxygen and nitrogen electrophiles.

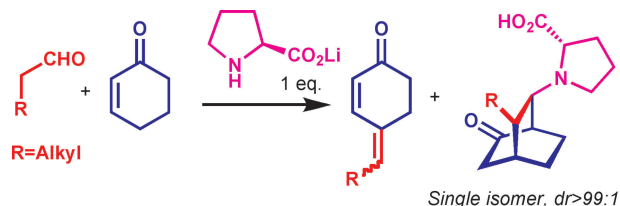


980

### Multicomponent asymmetric reactions mediated by proline lithium salt

Polysyena Renzi, Jacob Overgaard and Marco Bella\*

Bicyclic adducts bearing five stereocenters and novel fragrances are produced by the multicomponent reaction between proline lithium salt, aliphatic aldehydes and 2-cyclohexen-1-one.

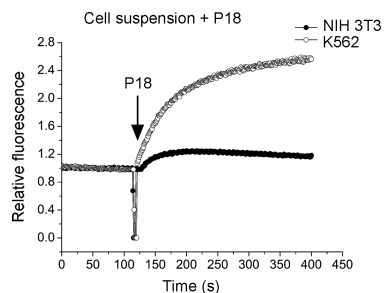


984

### Anticancer mechanism of peptide P18 in human leukemia K562 cells

Chengkang Tang, Ximing Shao, Binbin Sun, Wenli Huang, Feng Qiu, Yongzhu Chen, Ying-kang Shi, Er-yong Zhang, Chen Wang and Xiaojun Zhao\*

Studies on the anticancer mechanism of peptide P18 in human leukemia K562 cells revealed that P18 causes the K562 cell death by depolarizing plasma membrane potential and enhancing membrane permeability, rather than activating the classical apoptosis pathway.

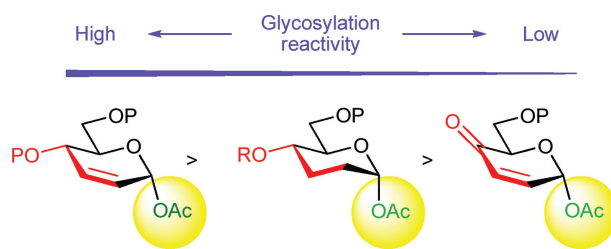


988

### Chemoselective glycosylations using 2,3-unsaturated-4-keto glycosyl donors

Shunichi Kusumi, Sainan Wang, Tatsuya Watanabe, Kaname Sasaki, Daisuke Takahashi and Kazunobu Toshima\*

Chemoselective glycosylations were effectively performed using 2,3-unsaturated glycosyl and 2,3-dideoxy glycosyl acetates as armed glycosyl donors, and 2,3-unsaturated-4-keto glycosyl acetates as disarmed glycosyl donors.

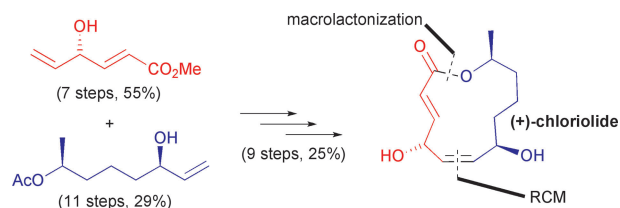


991

### Total synthesis of (+)-chloriolide

Timm T. Haug and Stefan F. Kirsch\*

The first total synthesis of (+)-chloriolide, a 12-membered macrolide from *Chloridium virescens* (var. *chlamydosporum*), was accomplished in a longest linear sequence of 20 steps from commercial materials in 7% overall yield.

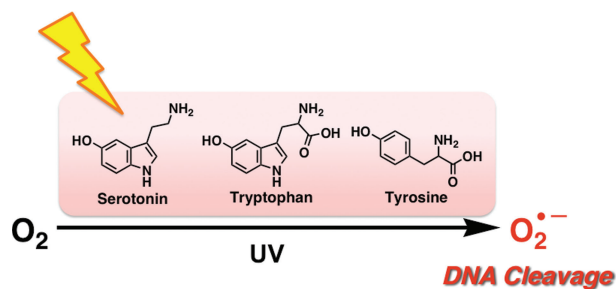


994

**Photoinduced DNA cleavage by formation of ROS from oxygen with a neurotransmitter and aromatic amino acids**

Tomonori Kawashima, Kei Ohkubo and Shunichi Fukuzumi\*

UV-B photoirradiation of serotonin, tryptophan and tyrosine with oxygen results in DNA cleavage by generation of reactive oxygen species as demonstrated by agarose gel electrophoresis with pBR 322 DNA.

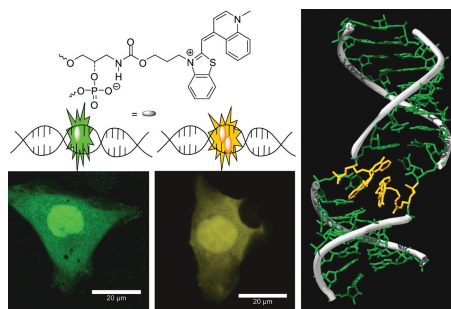


997

**Imaging of RNA delivery to cells by thiazole orange as a fluorescent RNA base substitution**

Sina Berndl, Miriam Breunig, Achim Göpferich and Hans-Achim Wagenknecht\*

A fluorescent chameleon for RNA imaging: interstrand thiazole orange dimers in RNA show a yellow-colored emission that can be distinguished from the green TO monomer emission in RNA by confocal microscopy.



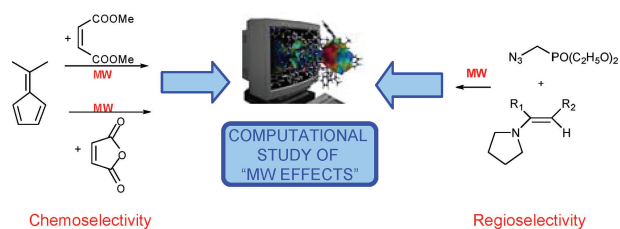
## PAPERS

1000

**Computational calculations in microwave-assisted organic synthesis (MAOS). Application to cycloaddition reactions**

A. de Cózar, M. C. Millán, C. Cebrián, P. Prieto,\* A. Díaz-Ortiz,\* A. de la Hoz and F. P. Cossío

A DFT computational study of two pericyclic reactions is reported. The computational calculations represent a very useful tool to study separately the occurrence of thermal and non-thermal effects of microwave irradiation.

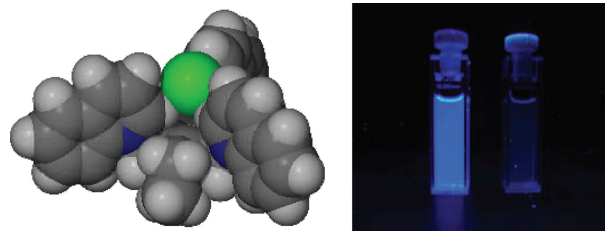


1010

**A quinolinium-derived turn-off fluorescent anion sensor**

Adam N. Swinburne, Martin J. Paterson, Andrew Beeby\* and Jonathan W. Steed\*

A quinolinium-derived anion sensor has been synthesised which shows a turn-off fluorescence response in the presence of anions, with selectivity for acetate. The compound exhibits complex anion binding comprising of a host dimer, 2 : 1 and 1 : 1 host : guest species.

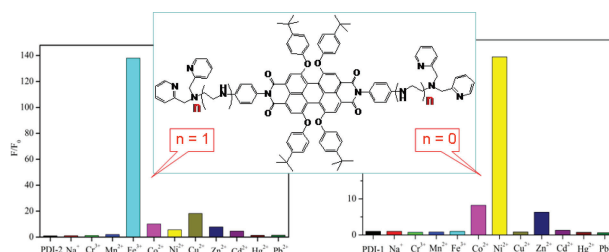


1017

### Nickel(II) and iron(III) selective off-on-type fluorescence probes based on perylene tetracarboxylic diimide

Haixia Wang, Delou Wang, Qi Wang, Xiyou Li\* and Christoph A. Schalley\*

Two novel fluorescent probes based on perylene tetracarboxylic diimide (PDI) with turn-on output have been prepared. Because of the different linkers between the receptor and the fluorophore, the selectivity of the probes is significantly altered.

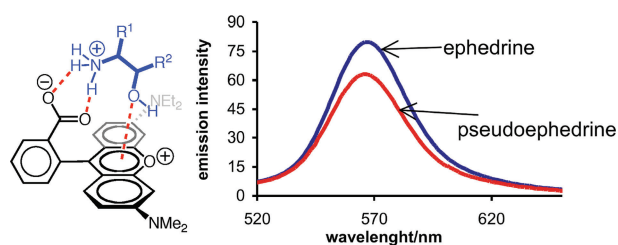


1027

### A fluorescent diastereoselective molecular sensor for 1,2-aminoalcohols based on the rhodamine B lactone-zwitterion equilibrium

Clifton J. Stephenson and Ken D. Shimizu\*

Rhodamine dye was shown to be able to differentiate and measure the diastereoselectivity of 1,2-aminoalcohols by monitoring the fluorescence of the zwitterionic form.

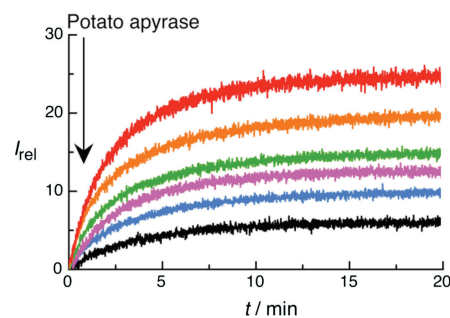


1033

### Implementation of anion-receptor macrocycles in supramolecular tandem assays for enzymes involving nucleotides as substrates, products, and cofactors

Mara Florea and Werner M. Nau\*

Anion-receptor macrocycles, in combination with fluorescent dyes, can be exploited for the kinetic monitoring of the activity of nucleotide triphosphate-dependent enzymes such as apyrases.

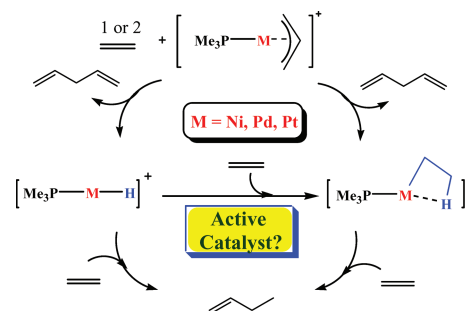


1040

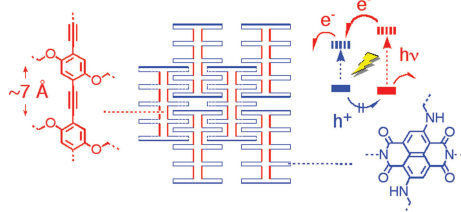
### Ni-, Pd-, or Pt-catalyzed ethylene dimerization: a mechanistic description of the catalytic cycle and the active species

Dipankar Roy and Raghavan B. Sunoj\*

Mechanistic insights on ethylene dimerization by using  $[M(\eta_3\text{-allyl})(PMe_3)]^+$ , where  $M = Ni(II), Pd(II), \text{ and } Pt(II)$ , are presented. The computed DFT energies have been employed to propose the likely nature of the 'active catalyst' in the catalytic cycle.



1052

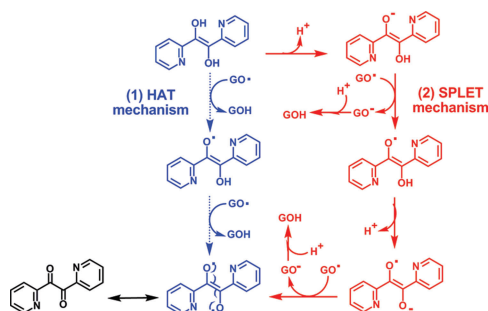


### Optoelectronically mismatched oligophenylethynyl-naphthalenediimide SHJ architectures

Santanu Maity, Rajesh Bhosale, Natalie Banerji, Eric Vauthey, Naomi Sakai\* and Stefan Matile\*

Components of synthetic organic photosystems that are not integrated into supramolecular *n/p*-heterojunctions are shown to generate weak photocurrents only, whereas SHJ-compatible components are operational in the same system.

1058

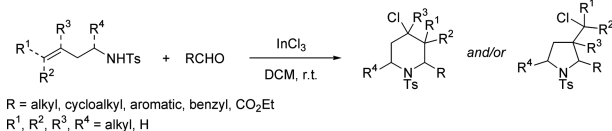


### Antioxidant activity of $\alpha$ -pyridoin and its derivatives: possible mechanism

Li-Xia Cheng, Xiao-Ling Jin, Qing-Feng Teng, Jin Chang, Xiao-Jun Yao, Fang Dai,\* Yi-Ping Qian, Jiang-Jiang Tang, Xiu-Zhuang Li and Bo Zhou\*

This work demonstrates that  $\alpha$ -pyridoin and its derivatives are effective antioxidants, and the hydrogen atom transfer (HAT) and sequential proton loss electron transfer (SPLET) mechanisms are responsible for antioxidant reaction.

1064

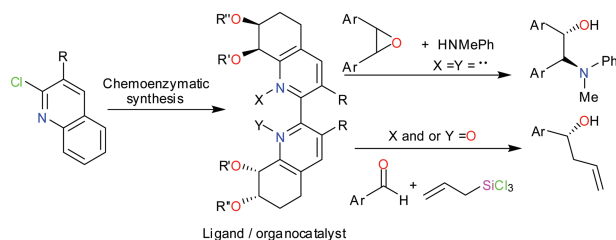


### A detailed investigation of the aza-Prins reaction

Adrian P. Dobbs,\* Sebastien J. J. Guesné, Robert J. Parker, John Skidmore, Richard A. Stephenson and Mike B. Hursthouse

Indium trichloride has been found to be a highly successful and mild Lewis acid for promoting the aza-Prins reaction, and a thorough mechanistic investigation is described.

1081



### Chemoenzymatic synthesis of chiral 2,2'-bipyridine ligands and their *N*-oxide derivatives: applications in the asymmetric aminolysis of epoxides and asymmetric allylation of aldehydes

D. R. Boyd,\* N. D. Sharma, L. Sbircea, D. Murphy, J. F. Malone, S. L. James, C. C. R. Allen and J. T. G. Hamilton

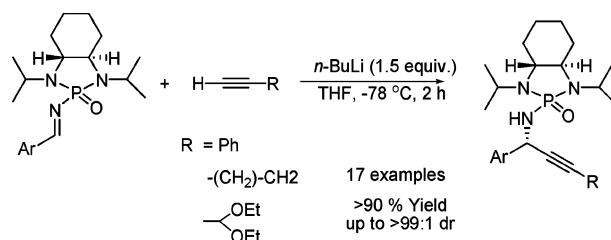
Enantiopure 2,2'-bipyridine *N*-oxides, derived from 2-chloroquinolines, are used in the asymmetric aminolysis of *meso*-epoxides and the asymmetric allylation of aldehydes

1091

### Chiral *N*-phosphonyl imine chemistry: an efficient asymmetric synthesis of chiral *N*-phosphonyl propargylamines

Parminder Kaur, Gaurav Shakya, Hao Sun, Yi Pan\* and Guigen Li\*

Chiral *N*-phosphonylimines were reacted with lithium acetylides to give substituted chiral propargylamines. The types of bases for generating acetylides and solvents are crucial for effectiveness of this asymmetric reaction. Seventeen examples were studied to give excellent yields (>90%) and diastereoselectivities (>96:4 to >99:1).

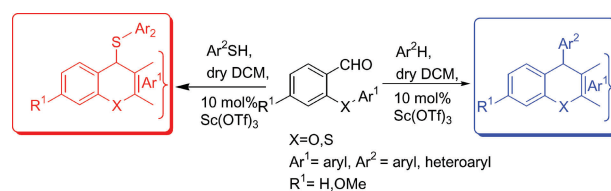


1097

### Scandium triflate-catalyzed one-pot domino approach towards general and efficient syntheses of unsymmetrical 9-substituted xanthenes derivatives

Ritesh Singh and Gautam Panda\*

A general and efficient one-pot cascade/tandem approach to synthesize unsymmetrical 9-aryl/heteroaryl xanthenes as well as 9-(thioaryl) xanthenes has been developed under extremely mild reaction conditions using 10 mol% Sc(OTf)<sub>3</sub> as a catalyst.

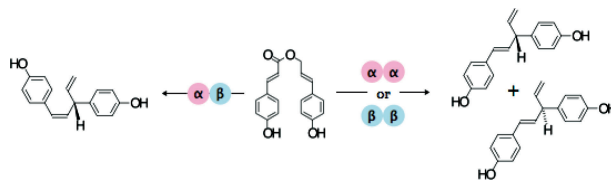


1106

### Subunit composition of hinokiresinol synthase controls enantiomeric selectivity in hinokiresinol formation

Masaomi Yamamura, Shiro Suzuki, Takefumi Hattori and Toshiaki Umezawa\*

Subunit composition of hinokiresinol synthase can control not only *cis/trans* isomerism but also enantioselectivity in hinokiresinol formation

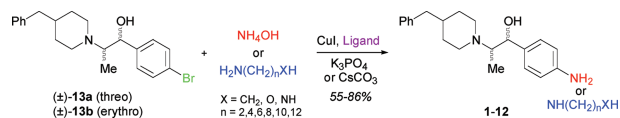


1111

### Copper-catalyzed amination of (bromophenyl)ethanolamine for a concise synthesis of aniline-containing analogues of NMDA NR2B antagonist ifenprodil

Cédric Bouteiller, Javier Becerril-Ortega, Patrice Marchand, Olivier Nicole, Louisa Barré, Alain Buisson and Cécile Perrio\*

Anilines **1–12** were prepared by copper-catalyzed amination of bromoarenes **13** using CuI and *N,N*-diethylsalicylamide, 2,4-pentadione or 2-acetylcyclohexanone as catalytic systems, and were evaluated as NR2B antagonists.

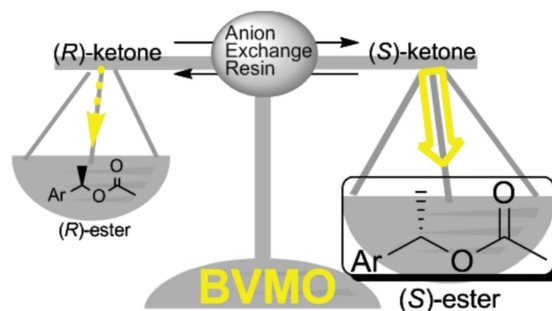


1121

### BVMO-catalysed dynamic kinetic resolution of racemic benzyl ketones in the presence of anion exchange resins

Cristina Rodríguez, Gonzalo de Gonzalo, Ana Rioz-Martínez, Daniel E. Torres Pazmiño, Marco W. Fraaije and Vicente Gotor\*

Dynamic kinetic resolutions of different benzyl ketones were performed by combining the selective Baeyer–Villiger oxidation catalysed by HAPMO with anion exchange racemisation in order to obtain the corresponding (*S*)-benzyl esters with high yields and optical purities.

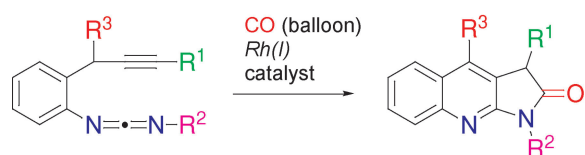


1126

### A facile synthesis of pyrrolo[2,3-*b*]quinolines via a Rh(I)-catalyzed carbodiimide–Pauson–Khand-type reaction

Takao Saito,\* Naoki Furukawa and Takashi Otani

A Rh(I)-catalyzed Pauson–Khand-type [2 + 2 + 1] cocyclization of *N*-[2-(2-alkyn-1-yl)phenyl]carbodiimides provides a new, straightforward synthetic method for pyrrolo[2,3-*b*]quinolin-2-ones.



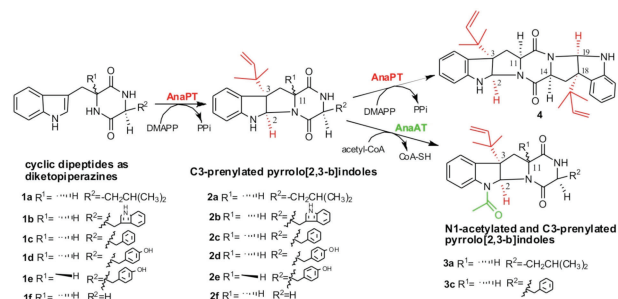
$R^1$  = Pent, Me, *t*-Bu, Ph, or TBS,  $R^2$  = Pr, Bn, Cy, or Ph,  $R^3$  = H or Me

1133

### Reconstruction of pyrrolo[2,3-*b*]indoles carrying an $\alpha$ -configured reverse C3-dimethylallyl moiety by using recombinant enzymes

Wen-Bing Yin, Xiu-Lan Xie, Marco Matuschek and Shu-Ming Li\*

Nine reversely C3-prenylated pyrrolo[2,3-*b*]indoles were successfully prepared by using recombinant AnaPT and AnaAT. An  $\alpha$ -configured fused ring between the indoline and the diketopiperazine rings was introduced.

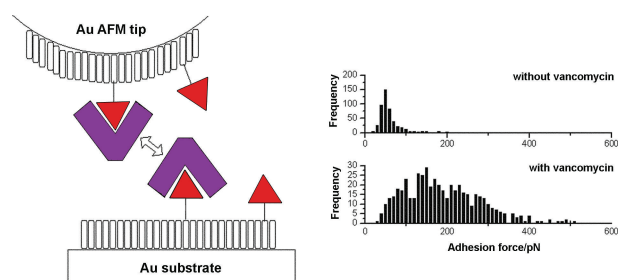


1142

### Vancomycin dimer formation between analogues of bacterial peptidoglycan surfaces probed by force spectroscopy

Matthew Batchelor,\* Dejian Zhou, Matthew A. Cooper, Chris Abell and Trevor Rayment

Force spectroscopy was used to investigate the rupture of interfacial vancomycin dimer complexes formed between pairs of vancomycin molecules when bound to model bacterial cell-wall surfaces.





1149

### A new facile synthesis of 3-amidoindole derivatives and their evaluation as potential GSK-3 $\beta$ inhibitors

Anahit Pews-Davtyan, Annegret Tillack, Anne-Caroline Schmöle, Stefanie Ortinau, Moritz J. Frech, Arndt Rolfs\* and Matthias Beller\*

3-Amidoindoles were synthesized from commercially available arylhydrazines and propargylamines over Zn-salt mediated one pot procedure in excellent regioselectivity and up to 94% yield.

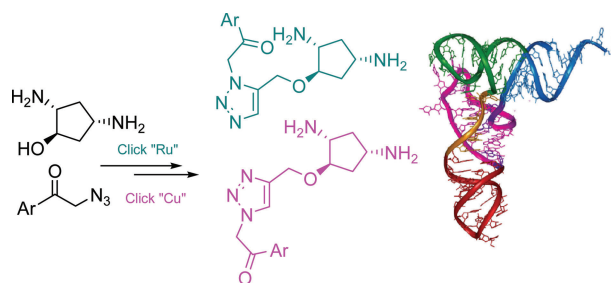


1154

### Tether influence on the binding properties of tRNA<sup>Lys</sup><sub>3</sub> ligands designed by a fragment-based approach

Roba Moumné, Valéry Larue, Bili Seijo, Thomas Lecourt, Laurent Micouin\* and Carine Tisné\*

1,5 triazole derivatives bind to tRNA<sup>Lys</sup><sub>3</sub> with similar affinity but different selectivity than their corresponding 1,4 isomers.

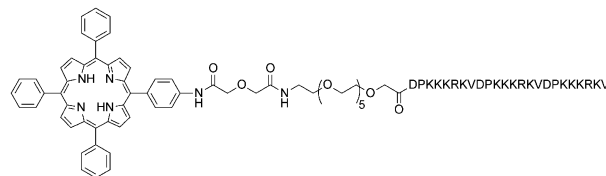


1160

### Influence of the number and distribution of NLS peptides on the photosensitizing activity of multimeric porphyrin–NLS

Martha Sibrian-Vazquez, Timothy J. Jensen and M. Graça H. Vicente\*

The total synthesis and *in vitro* biological properties of a new series of multimeric porphyrin–NLS conjugates bearing two, three or four peptides with the minimum sequence PKKKRKV are described. The mono- and di-substituted photosensitizers bearing one or two PEG linkers and up to three peptide sequences were found to be the most phototoxic toward human carcinoma HEP2 cells.

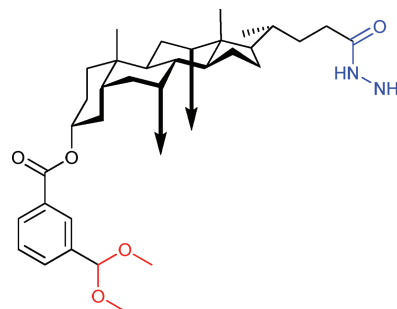


1173

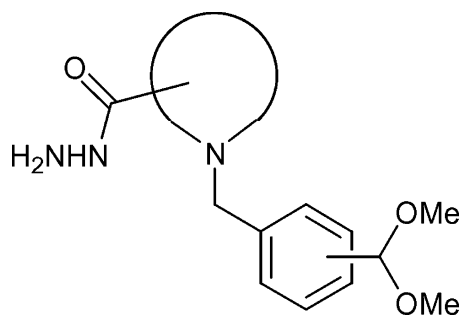
### Dynamic combinatorial chemistry with hydrazones: cholate-based building blocks and libraries

Mark G. Simpson, Michael Pittelkow,\* Stephen P. Watson and Jeremy K. M. Sanders\*

The synthesis and properties of a series of cholate-based building blocks for dynamic combinatorial libraries utilising hydrazone chemistry are described along with a number of exchange experiments demonstrating self-sorting.



1181

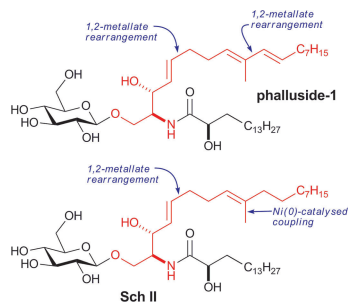


### Dynamic combinatorial chemistry with hydrazones: libraries incorporating heterocyclic and steroidal motifs

Mark G. Simpson, Michael Pittelkow,\* Stephen P. Watson and Jeremy K. M. Sanders\*

The synthesis and properties of a series of heterocycle-based building blocks for dynamic combinatorial libraries utilising hydrazone chemistry is described along with mixing experiments with steroid based hydrazone building blocks.

1188

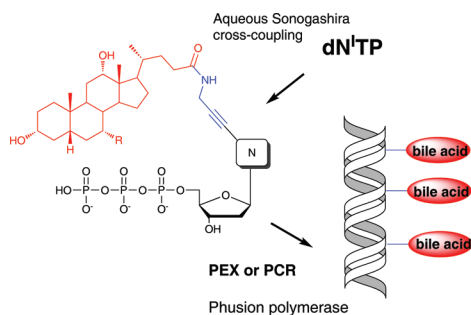


### Synthesis of phalluside-1 and Sch II using 1,2-metallate rearrangements

Fiona J. Black and Philip J. Kocienski\*

For the first time a synthesis of (4*E*,8*E*,10*E*)-9-methyl-4,8,10-sphingatrienine, the acid-labile core component of marine sphingolipids, has been achieved using a fragment linkage strategy based on copper-mediated 1,2-metallate rearrangements. A related synthesis of Sch II was also accomplished.

1194

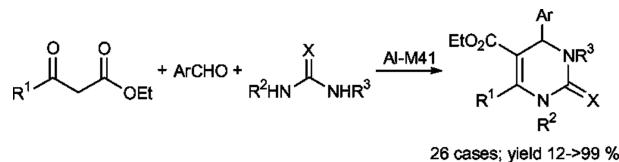


### Synthesis of nucleoside and nucleotide conjugates of bile acids, and polymerase construction of bile acid-functionalized DNA

Satu Ikonen, Hana Macíčková-Cahová, Radek Pohl, Miloslav Šanda and Michal Hocek\*

Sonogashira cross-couplings of halogenated nucleosides and nucleoside triphosphates with bile-acid acetylenes gave steroid–nucleos(t)ide conjugates that were incorporated to DNA by polymerase.

1202



### Synthesis of Biginelli dihydropyrimidinone derivatives with various substituents on aluminium-planted mesoporous silica catalyst

Hiroaki Murata, Haruro Ishitani and Masakazu Iwamoto\*

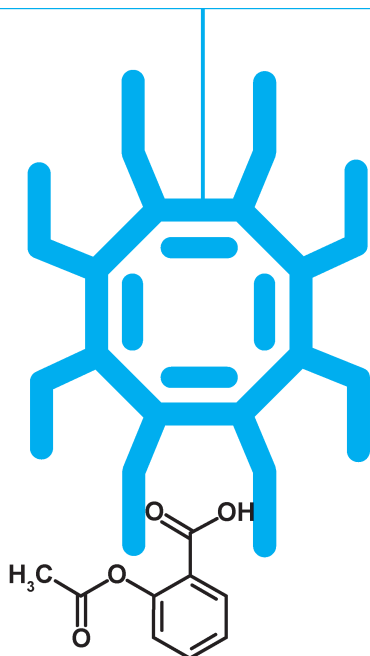
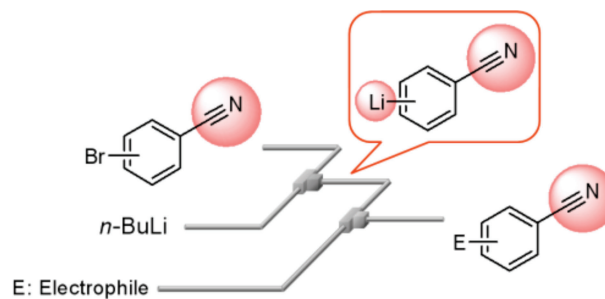
Al-planted mesoporous silica with Si/Al ratios of 45–35 catalyzed the title reaction with good to excellent yields; some of the products have been very difficult to synthesize until now.

1212

### Generation and reaction of cyano-substituted aryllithium compounds using microreactors

Aiichiro Nagaki, Heejin Kim, Hirotsugu Usutani,  
Chika Matsuo and Jun-ichi Yoshida\*

An effective method for the generation and reaction of aryllithium compounds bearing a cyano group has been developed using microflow systems.



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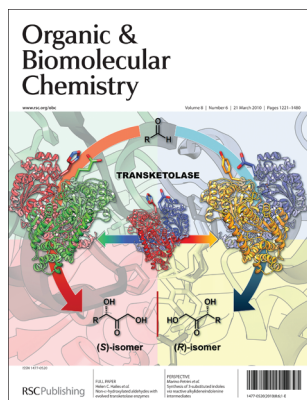
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## IN THIS ISSUE

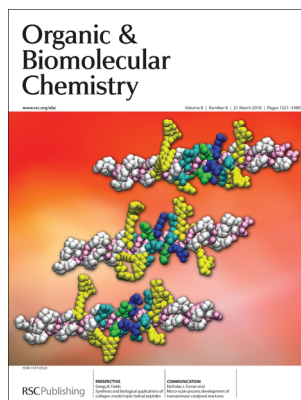
ISSN 1477-0520 CODEN OBCRAK 8(6) 1221–1480 (2010)



### Cover

See Helen C. Hailes *et al.*, pp. 1301–1309.  
Single-point active site transketolase mutants enhanced and reversed the stereoselectivity of the wild-type enzyme in the conversion of linear and cyclic aliphatic aldehydes to  $\alpha,\alpha'$ -dihydroxyketones.

Image reproduced by permission of Helen C. Hailes from *Org. Biomol. Chem.*, 2010, **8**, 1301.



### Inside cover

See Greg B. Fields, pp. 1237–1258.  
Dr Fields' research interests are in the use of chemical approaches to better understand how protein three-dimensional structures influence cellular and enzymatic behaviours.

Image reproduced by permission of Greg B. Fields from *Org. Biomol. Chem.*, 2010, **8**, 1237.

## PERSPECTIVES

1237

### Synthesis and biological applications of collagen-model triple-helical peptides

Gregg B. Fields\*

Triple-helical peptides (THPs) have been utilized as collagen models since the 1960s. In the last two decades, virtually all aspects of collagen structural biochemistry have been explored with THP models.

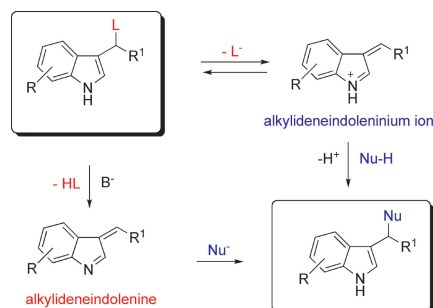


1259

### Synthesis of 3-substituted indoles *via* reactive alkylideneindolenine intermediates

Alessandro Palmieri, Marino Petrini\* and Rafik R. Shaikh

Elimination of suitable leaving groups from 3-substituted indoles under basic or acid conditions readily provides alkylideneindolenine intermediates that may react with a large variety of nucleophilic reagents. This article highlights some recent developments of this synthetic approach for the preparation of functionalized indole derivatives.

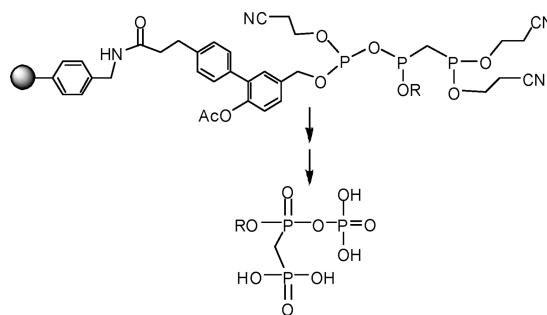


1271

### Synthesis of nucleoside 5'-O- $\alpha,\beta$ -methylene- $\beta$ -triphosphates and evaluation of their potency towards inhibition of HIV-1 reverse transcriptase

Y. Ahmadibeni, C. Dash, M. J. Hanley, S. F. J. Le Grice, H. K. Agarwal and K. Parang\*

Herein, we report the solid-phase synthesis of 5'-O-nucleoside  $\beta$ -triphosphates containing an  $\alpha,\beta$ -methylene triphosphate bridge by using a novel solid-phase phosphitylating reagent. Cytidine 5'-O- $\alpha,\beta$ -methylene- $\beta$ -triphosphate inhibited RNase H activity of HIV-1 reverse transcriptase with a  $K_i$  value of 225  $\mu$ M.

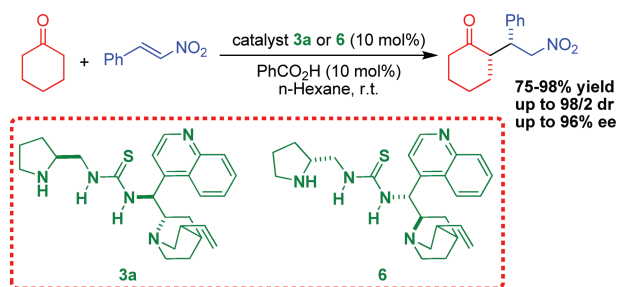


1275

### Novel thiourea-amine bifunctional catalysts for asymmetric conjugate addition of ketones/aldehydes to nitroalkenes: rational structural combination for high catalytic efficiency

Jia-Rong Chen,\* Yi-Ju Cao, You-Quan Zou, Fen Tan, Liang Fu, Xiao-Yu Zhu and Wen-Jing Xiao\*

A series of thiourea-amine bifunctional catalysts have been developed by a rational combination of prolines with cinchona alkaloids, which are found to be highly efficient catalysts for the conjugate addition of ketones/aldehydes to a wide range of nitroalkenes.

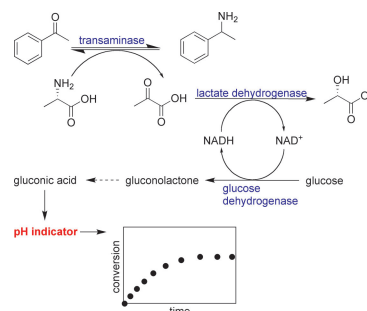


1280

### Micro-scale process development of transaminase catalysed reactions

Matthew D. Truppo\* and Nicholas J. Turner\*

A micro-scale, pH indicator based, colorimetric assay has been developed for the process development of transaminase catalysed reactions. Enzyme activity and stability as a function of multiple reaction parameters have been determined at 100  $\mu$ L scale.

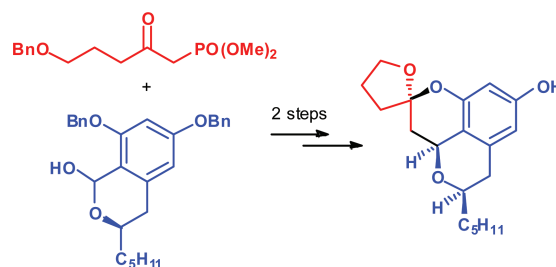


1284

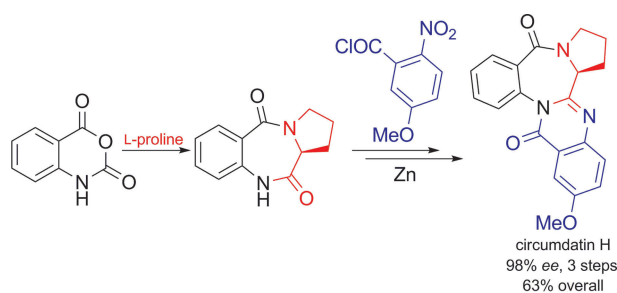
### A flexible asymmetric synthesis of the tetracyclic core of berkeley acid using a Horner–Wadsworth–Emmons/oxa-Michael cascade

Zoe E. Wilson and Margaret A. Brimble\*

The one-pot Horner–Wadsworth–Emmons/oxa-Michael cascade followed by spiroketalisation affords the tetracyclic benzannulated spiroketal core of berkeley acid, an extremophile natural product with selective activity against ovarian cancer.



1287

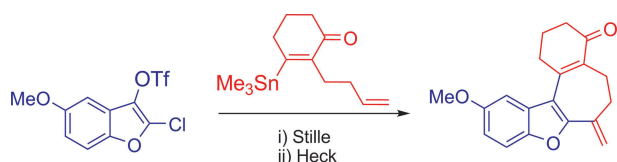


### A concise synthesis of enantiopure circumdatins E, H and J

Paul E. Zhichkin,\* Xiaomin Jin, Honglu Zhang, Lisa H. Peterson, Catherine Ramirez, Tara M. Snyder and Hilde S. Burton

Enantiopure circumdatins E, H and J were prepared in 3 steps from isatoic anhydrides, L-proline and 2-nitrobenzoic acids.

1290

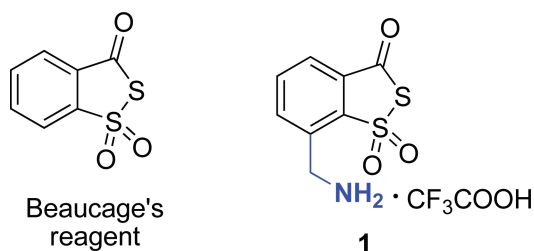


### An efficient synthesis of (±)-frondosin B using a Stille–Heck reaction sequence

Kye-Simeon Masters and Bernard L. Flynn\*

An efficient synthesis of (±)-frondosin B (34% overall yield) has been developed based on the application of a Stille–Heck reaction sequence of 2-chloro-5-methoxybenzo[*b*]furan-3-yl triflate and 2-(3-butenyl)-3-(trimethylstannyl)cyclohex-2-enone.

1293



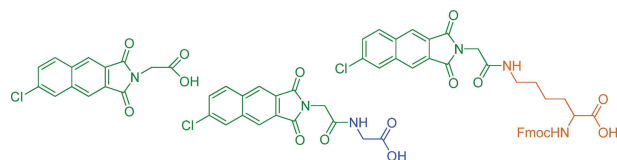
### Thiol-dependent DNA cleavage by aminomethylated Beaucage's reagent

Jiahui Zheng, Xiaoqian Liu, Qing Yuan, Yoon-Joo Shin, Daekyu Sun and Yixin Lu\*

Aminomethylated Beaucage's reagent **1** was found to be more potent than Beaucage's reagent in causing DNA cleavage. This study demonstrated the importance of the amino functionality in enhancing DNA-cleaving activities, and such findings may facilitate development of novel sulfur-containing DNA-cleaving molecules in cancer therapy.

## PAPERS

1296

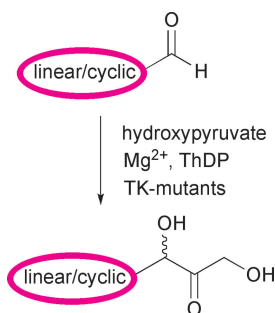


### Synthesis and fluorescence of the new environment-sensitive fluorophore 6-chloro-2,3-naphthalimide derivative

Alan R. Katritzky,\* Sevil Ozcan and Ekaterina Todadze

Convenient and efficient synthesis of a novel environmentally sensitive chlorine substituted naphthalimide-based fluorophore which can be utilized for the labeling of amino acids is described.

1301

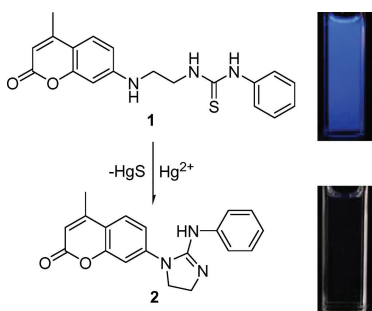


### Non- $\alpha$ -hydroxylated aldehydes with evolved transketolase enzymes

Armando Cázares, James L. Galman, Lydia G. Crago, Mark E. B. Smith, John Strafford, Leonardo Rios-Solís, Gary J. Lye, Paul A. Dalby and Helen C. Hailes\*

Transketolase mutants have been used with a series of linear and cyclic aliphatic aldehydes, and excellent stereoselectivities observed.

1310

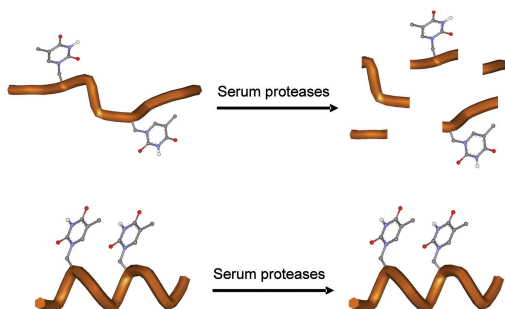


### A coumarin–thiourea conjugate as a fluorescent probe for Hg(II) in aqueous media with a broad pH range 2–12

Yasuhiro Shiraishi,\* Shigehiro Sumiya and Takayuki Hirai

A coumarin–thiourea conjugate (1) behaves as a highly selective fluorescent probe for Hg<sup>2+</sup> in aqueous media with a broad pH range, 2–12.

1315

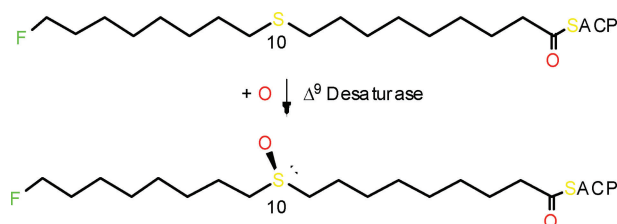


### Replacement of Ala by Aib improves structuration and biological stability in thymine-based $\alpha$ -nucleopeptides

Piero Geotti-Bianchini, Alessandro Moretto, Cristina Peggion, Julien Beyrath, Alberto Bianco\* and Fernando Formaggio\*

Thymine-based nucleo-heptapeptides, containing zero, one or four Aib residues, have been synthesized. A single Aib residue is enough to increase structuration and resistance towards enzymatic degradation.

1322

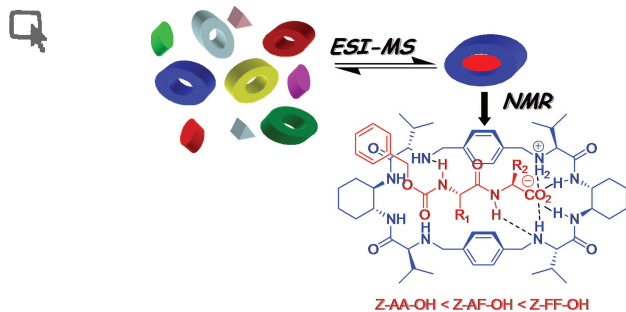


### Stereochemistry of 10-sulfoxidation catalyzed by a soluble $\Delta^9$ desaturase

Amy E. Tremblay, Nigel Tan, Ed Whittle, Derek J. Hodgson, Brian Dawson, Peter H. Buist\* and John Shanklin\*

<sup>1</sup>H-decoupled <sup>19</sup>F NMR is used, in combination with substrate fluorine-tagging, to elucidate the enantioselectivity of soluble  $\Delta^9$  desaturase-mediated sulfoxidation at the nanomole level of detection.

1329

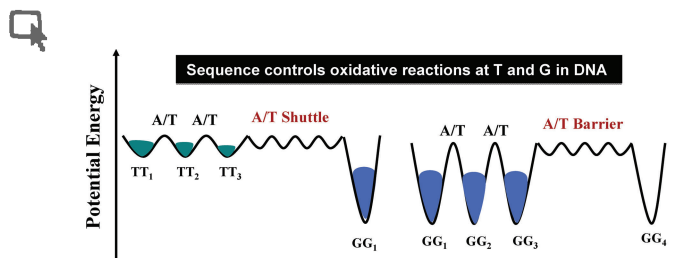


### Molecular recognition of *N*-protected dipeptides by pseudopeptidic macrocycles: a comparative study of the supramolecular complexes by ESI-MS and NMR

Ignacio Alfonso,\* Michael Bolte, Miriam Bru, M. Isabel Burguete, Santiago V. Luis\* and Cristian Vicent

Different experiments based on ESI-MS (competition and CID) and NMR (titration, NOESY and DOSY) were used to study the molecular recognition of *N*-protected amino acids and dipeptides by pseudopeptidic macrocycles.

1340

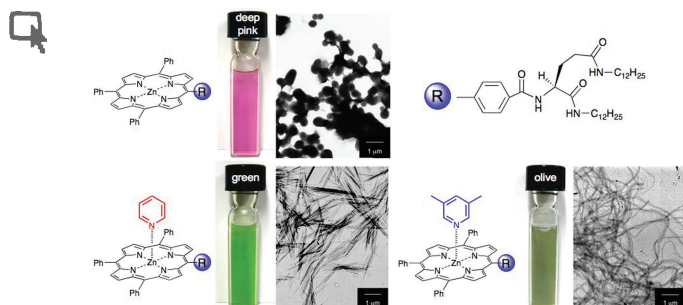


### One-electron oxidation of DNA: thymine *versus* guanine reactivity

Siram Kanvah and Gary B. Schuster\*

One-electron oxidation of DNA leads to reaction at guanine because it is the nucleobase with lowest *E*<sub>ox</sub>. In the absence of guanine, reaction occurs primarily at TT steps. We find that remote guanines “protect” thymines.

1344

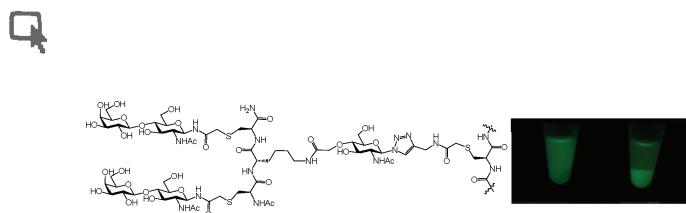


### Versatile chiroptics of peptide-induced assemblies of metalloporphyrins

Hirokuni Jintoku, Takashi Sagawa, Tsuyoshi Sawada, Makoto Takafuji and Hirotaka Ihara\*

Zinc porphyrin functionalized with *L*-glutamide has been newly synthesized and its unique responses such as ligand-specific induction of secondary chirality through the aggregation morphology change are reported.

1351



### Exploring neoglycoprotein assembly through native chemical ligation using neoglycopeptide thioesters prepared *via* N→S acyl transfer

Jonathan P. Richardson, Chung-Hei Chan, Javier Blanc, Mona Saadi and Derek Macmillan\*

Sugars and simplified oligosaccharide “mimics” can be joined with protein fragments at pre-defined sites and assembled into potential neoglycoprotein therapeutics using native chemical ligation.

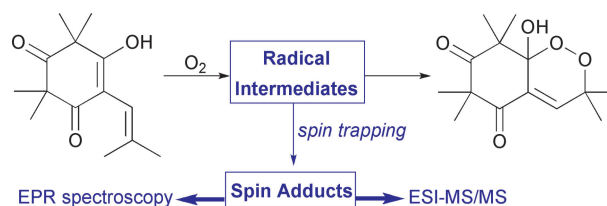


1361

**A combined spin trapping/EPR/mass spectrometry approach to study the formation of a cyclic peroxide by dienolic precursor autoxidation**

Mathilde Triquigneaux, Laurence Charles, Christiane André-Barrès and Béatrice Tuccio\*

Radical intermediates occurring during endoperoxide formation were trapped and the spin adducts were characterised by both EPR and tandem mass spectrometry.

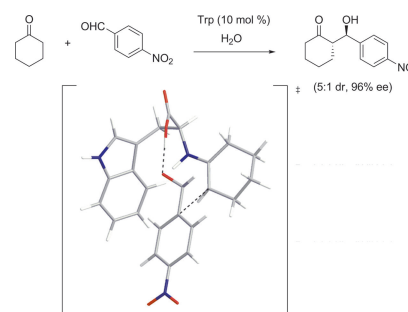


1368

**Direct asymmetric aldol reactions between aldehydes and ketones catalyzed by L-tryptophan in the presence of water**

Zhaoqin Jiang, Hui Yang, Xiao Han, Jie Luo, Ming Wah Wong\* and Yixin Lu\*

Primary amino acids and their derivatives were investigated as catalysts for the direct asymmetric aldol reactions between ketones and aldehydes in the presence of water, and L-tryptophan was shown to be the best catalyst. Solvent effects, substrate scope and the influence of water on the reactions were investigated. Quantum chemical calculations were performed to understand the origin of the observed stereoselectivity.

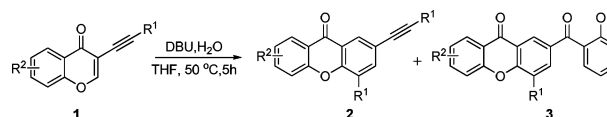


1378

**A base-promoted desalicyloylative dimerization of 3-(1-alkynyl)chromones: An unusual approach to 2-alkynyl xanthenes**

Fuchun Xie, Xuan Pan, Shijun Lin and Youhong Hu\*

A novel base-promoted cascade desalicyloylative dimerization of 3-(1-alkynyl)chromones to produce 2-alkynyl xanthenes has been developed. This tandem process involves multiple reactions, such as Michael additions/cyclizations/desalicyloylation without a transition metal catalyst and inert atmosphere.

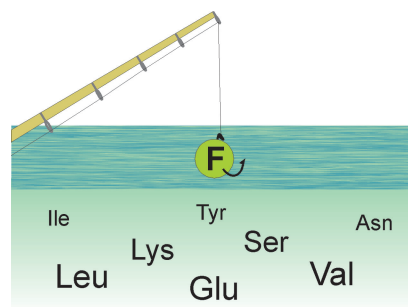


1382

**Towards identifying preferred interaction partners of fluorinated amino acids within the hydrophobic environment of a dimeric coiled coil peptide**

Toni Vagt, Elisabeth Nyakatura, Mario Salwiczek, Christian Jäckel and Beate Kokschr\*

A phage display technique was used to select preferred interaction partners of fluorinated amino acids within the hydrophobic core of a coiled coil peptide from the pool of canonical amino acids.

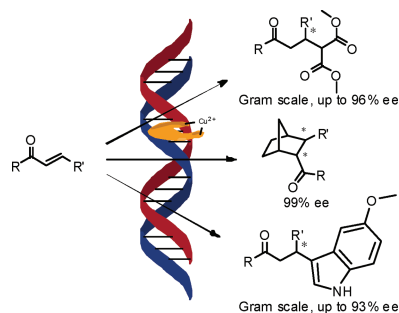


1387

### Organic co-solvents in aqueous DNA-based asymmetric catalysis

Rik P. Megens and Gerard Roelfes\*

It is possible to use water-miscible organic solvents in DNA-based asymmetric catalysis without affecting the enantioselectivity of the reactions. Additionally, it enables the use of higher substrate concentrations and lower temperatures, which gives rise to higher enantioselectivities with only 0.75 mol% of catalyst. This is an important step towards synthetic application of the DNA-based catalysis concept.

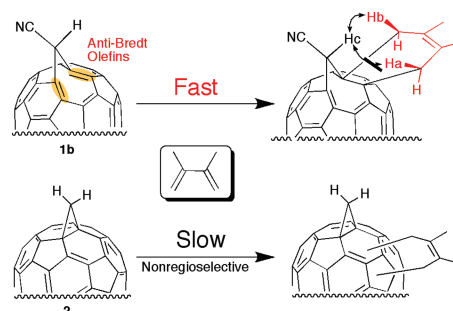


1394

### Kinetics and regioselectivity in the Diels–Alder reaction of fulleroids vs. methanofullerene and C<sub>60</sub>

Naohiko Ikuma, Yasunori Susami and Takumi Oshima\*

[5,6] Open fulleroids were found to display a more enhanced and regioselective Diels–Alder addition at the bridgehead anti-Bredt double bond as compared with [6,6] closed methanofullerene and C<sub>60</sub>.

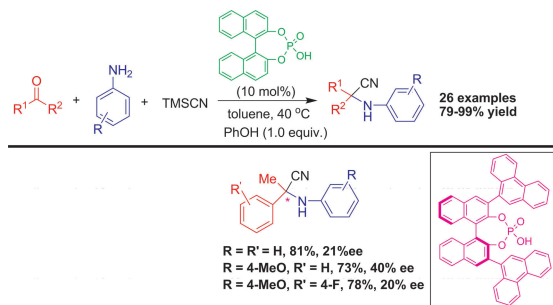


1399

### Brønsted acid-catalyzed efficient Strecker reaction of ketones, amines and trimethylsilyl cyanide

Guang-Wu Zhang, Dong-Hua Zheng, Jing Nie, Teng Wang and Jun-An Ma\*

A general method for the one-pot, three-component Strecker reaction of ketones, amines and trimethylsilyl cyanide was developed using Brønsted acids as organocatalysts to afford  $\alpha$ -aminonitriles in good to excellent yields.

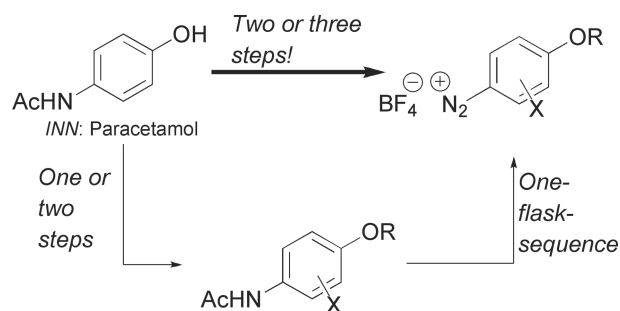


1406

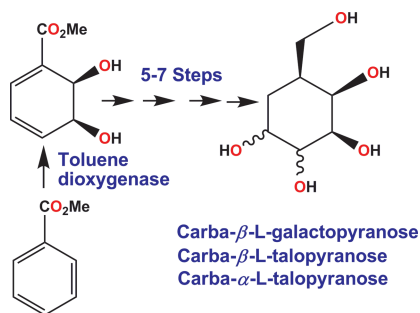
### Functionalized alkoxy arene diazonium salts from paracetamol

Bernd Schmidt,\* René Berger and Frank Hölder

Functionalized arene diazonium tetrafluoroborates are obtained from acetamides in a convenient one-flask procedure. A diazonium salt obtained *via* this method was used in the synthesis of the natural product de-*O*-methyl centrolobine.



1415

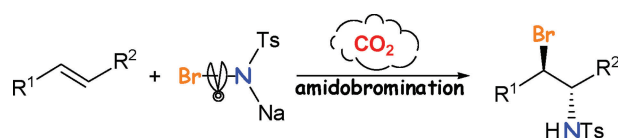


### Chemoenzymatic synthesis of the carbasugars carba-β-L-galactopyranose, carba-β-L-talopyranose and carba-α-L-talopyranose from methyl benzoate

Derek R. Boyd,\* Narain D. Sharma, Nigel I. Bowers, Gerard B. Coen, John F. Malone, Colin R. O'Dowd, Paul J. Stevenson and Christopher C. R. Allen

The *cis*-dihydrodiol metabolite from methyl benzoate has been used as a synthetic precursor of carba-β-L-galactopyranose, carba-β-L-talopyranose, carba-α-L-talopyranose and carba-β-L-galactopyranose.

1424



### CO<sub>2</sub>-induced amidobromination of olefins with bromamine-T

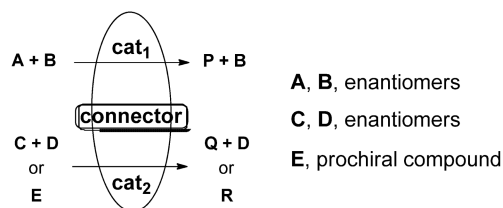
Junpei Hayakawa, Mitsuhiro Kuzuhara and Satoshi Minakata\*

The carbon dioxide (CO<sub>2</sub>)-induced amidobromination of olefins with bromamine-T is described. The method can be used in reactions with a wide range of olefins, leading to the regioselective formation of amidobrominated compounds.

1431



#### Parallel Interconnected Kinetic Asymmetric Transformations

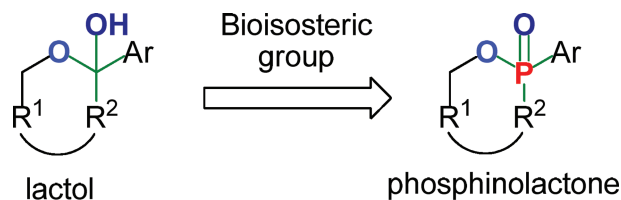


### Biocatalysed concurrent production of enantioenriched compounds through parallel interconnected kinetic asymmetric transformations

Ana Rioz-Martínez, Fabricio R. Bisogno, Cristina Rodríguez, Gonzalo de Gonzalo, Iván Lavandera, Daniel E. Torres Pazmiño, Marco W. Fraaije and Vicente Gotor\*

Examples of *parallel interconnected kinetic asymmetric transformations* are presented. In a *one-pot* reaction using two biocatalysts, optically active ketones, sulfoxides and *sec*-alcohols could *concurrently* be achieved in a strict *parallel* fashion.

1438



### Drug discovery: phosphinolactone, *in vivo* bioisostere of the lactol group

Jean-Noël Volle,\* Damien Filippini, Bartłomiej Krawczy, Nikolay Kaloyanov, Arie Van der Lee, Tangui Maurice, Jean-Luc Pirat and David Virieux\*

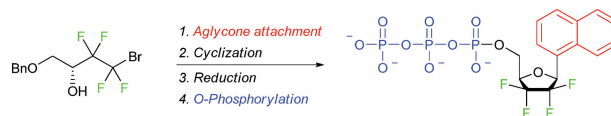
In drug discovery, structural modifications over the lead molecule are often crucial for the development of a drug. Herein, we reported the first *in vivo* bioisosteric effect of phosphinolactone function in relation to the lactol group constituting the bioactive molecule: Hydroxybupropion.

1445

### Synthesis and *O*-phosphorylation of 3,3,4,4-tetrafluoroaryl-*C*-nucleoside analogues

Laurent Bonnac, Sarah E. Lee, Guy T. Giuffredi, Lucy M. Elphick, Alexandra A. Anderson, Emma S. Child, David J. Mann and Véronique Gouverneur\*

Enantioenriched tetrafluorinated aryl-*C*-nucleosides were synthesised as single diastereomers from (2*R*)-1-benzyloxy-4-bromo-3,3,4,4-tetrafluorobutan-2-ol. The presence of the tetrafluorinated ethylene group proved compatible with *O*-phosphorylation, as demonstrated by the successful preparation of the tetrafluorinated naphthyl-*C*-nucleotide.

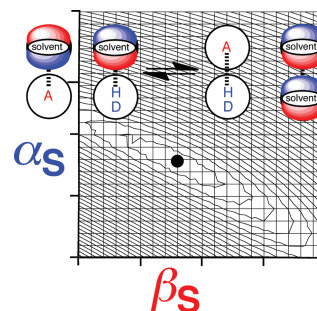


1455

### Hydrogen bonding properties of non-polar solvents

Rafel Cabot, Christopher A. Hunter\* and Lisa M. Varley

High-throughput NMR titrations on H-bonded complexes were used to characterise the H-bonding properties of non-polar organic solvents, like alkanes and perfluorocarbons.

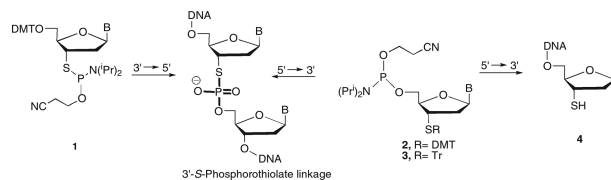


1463

### Reverse-direction (5' → 3') synthesis of oligonucleotides containing a 3'-*S*-phosphorothiolate linkage and 3'-terminal 3'-thionucleosides

James W. Gaynor, Michael M. Piperakis, Julie Fisher and Richard Cosstick\*

The synthesis of oligodeoxynucleotides containing 3'-thionucleosides has been explored using a reverse-direction (5' → 3') approach, based on nucleoside monomers which contain a trityl- or dimethoxytrityl-protected 3'-thiol and a 5'-*O*-phosphoramidite.

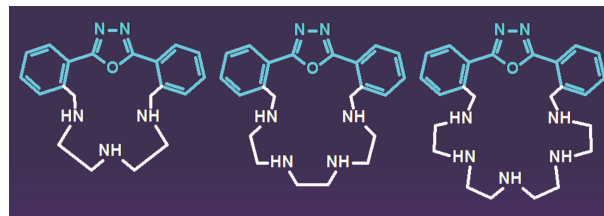


1471

### New family of polyamine macrocycles containing 2,5-diphenyl[1,3,4]oxadiazole as a signaling unit. Synthesis, acid–base and spectrophotometric properties

Gianluca Ambrosi, Mauro Formica, Vieri Fusi,\* Luca Giorgi, Eleonora Macedi, Mauro Micheloni,\* Giovanni Piersanti and Roberto Pontellini

Synthesis, acid–base and photochemical properties of a new family of polyamine macrocycles containing the 2,5-diphenyl[1,3,4]oxadiazole fluorescent probe.



# Organic & Biomolecular Chemistry

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## IN THIS ISSUE

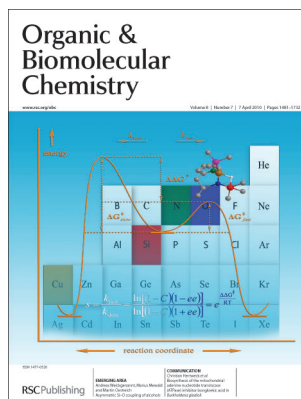
ISSN 1477-0520 CODEN OBCRAK 8(7) 1481–1732 (2010)



### Cover

See Werner Hummel *et al.*, pp. 1540–1550.  
Discovery of the bakers' yeast reductase responsible for the reduction of 2,5-hexanedione into enantiopure (2*S*,5*S*)-hexanediol. This diol serves as a building block for the production of various fine chemicals and pharmaceuticals.

Image reproduced by permission of Werner Hummel from *Org. Biomol. Chem.*, 2010, **8**, 1540.



### Inside cover

See Martin Oestreich *et al.*, pp. 1497–1504.  
Stereoselective protection of alcohols is achieved through asymmetric Si–O coupling of silicon reagents and either chiral racemic alcohols (kinetic resolution) or prochiral alcohols (desymmetrisation).

Image reproduced by permission of Martin Oestreich from *Org. Biomol. Chem.*, 2010, **8**, 1497.

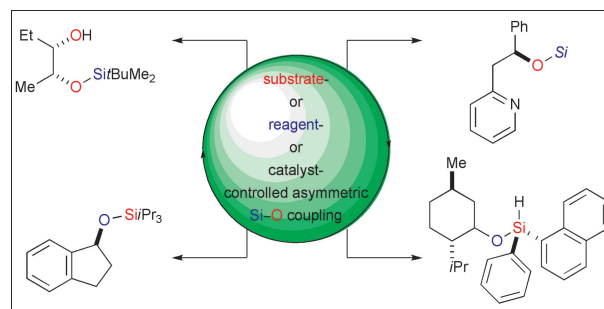
## EMERGING AREA

1497

### Asymmetric Si–O coupling of alcohols

Andreas Weickgenannt, Marius Mewald and Martin Oestreich\*

This Emerging Area summarises about 40 years of investigations directed towards asymmetric Si–O couplings, including substrate-, reagent- and catalyst-controlled approaches.



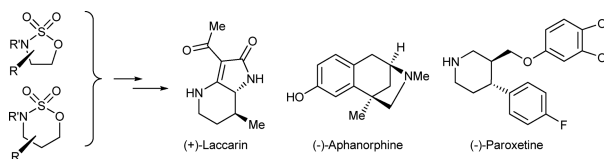
## PERSPECTIVE

1505

### *N*-Heterocycle construction *via* cyclic sulfamidates. Applications in synthesis

John F. Bower,\* Janjira Rujirawanich and Timothy Gallagher\*

1,2- And 1,3-cyclic sulfamidates offer a versatile and effective reactivity profile that is readily harnessed to provide a flexible entry to a wide range of substituted, functionalised and enantiomerically pure *N*-based heterocycles. The scope of this chemistry is illustrated with examples drawn from work within natural products and the pharmaceutical arena.

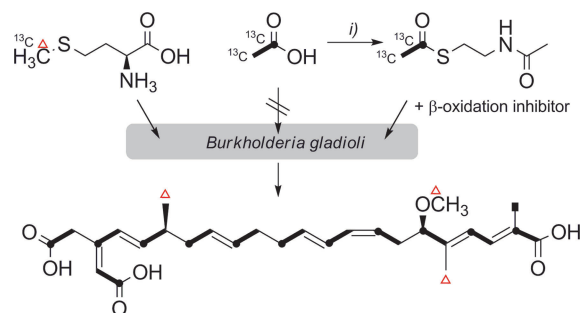


1520

**Biosynthesis of the mitochondrial adenine nucleotide translocase (ATPase) inhibitor bongkreic acid in *Burkholderia gladioli***

Barbara Rohm, Kirstin Scherlach and Christian Hertweck\*

Biosynthetic studies with  $^{13}\text{C}$ -labelled biosynthetic precursors revealed that the infamous, food-related toxin bongkreic acid is a polyketide with acetate-derived  $\beta$ -branches and a carboxylate terminus derived from the methyl group of acetate.

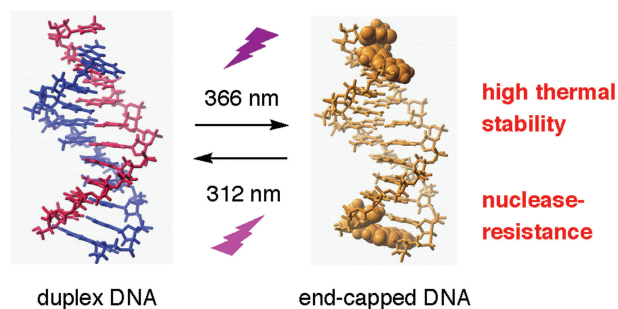


1523

**Photoreversible DNA end capping for the formation of hairpin structures**

Yoshinaga Yoshimura, Hajime Okada and Kenzo Fujimoto\*

We describe a photoreversible DNA end capping *via* 3-cyanovinylcarbazole nucleoside. Doubly end-capped oligodeoxynucleotide (ODN) exhibits increased stability against snake venom phosphodiesterase and shows high thermal stability.

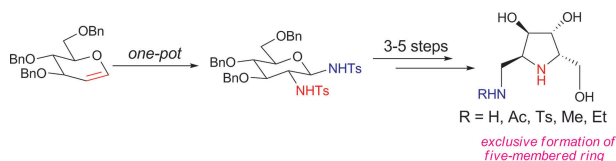


1527

**Design and synthesis of new amino-modified iminocyclitols: selective inhibitors of  $\alpha$ -galactosidase**

Muthupandian Ganesan, Rekhawar V. Madhukarrao and Namakkal G. Ramesh\*

A new and short synthesis of hitherto unreported stereo analogue of amino-modified five-membered iminocyclitols, that are selective inhibitors of  $\alpha$ -galactosidase, is described.

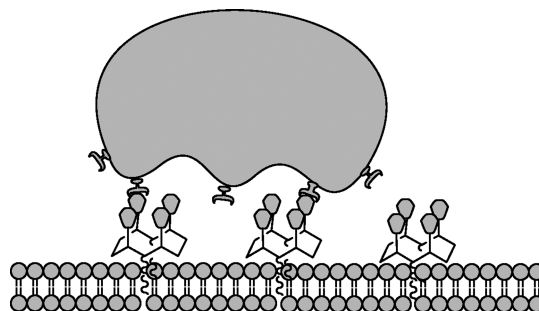


1531

**Cell adhesion through clustered ligand on fluid supported lipid bilayers**

Ludivine Sandrin, Liliane Coche-Guérente, Amandine Bernstein, Hajra Basit, Pierre Labbé, Pascal Dumy\* and Didier Boturyn\*

The complementary QCM-D and optical microscopy techniques were used for monitoring cell adhesion on a RGD-functionalized supported lipid bilayer. A critical interligand RGD spacing of nearly 80 nm was estimated for cell adhesion.

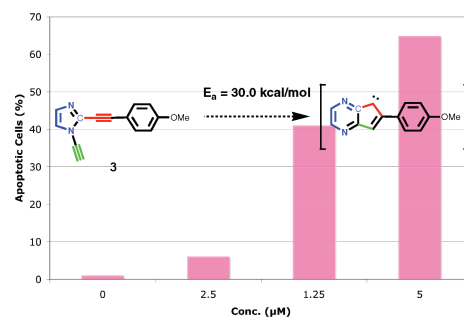


1535

### Cyclization kinetics and biological evaluation of an anticancer 1,2-dialkynylimidazole

Christophe Laroche, Jing Li, Cristina Gonzales, Wendi M. David and Sean M. Kerwin\*

An improved procedure for the synthesis of 1-alkynylimidazole derivatives has been employed to prepare sufficient quantities of **3** for biological evaluation. The 1,2-dialkynylimidazole **3** is cytotoxic against a wide range of cancer cells and induces apoptosis in A549 cells.



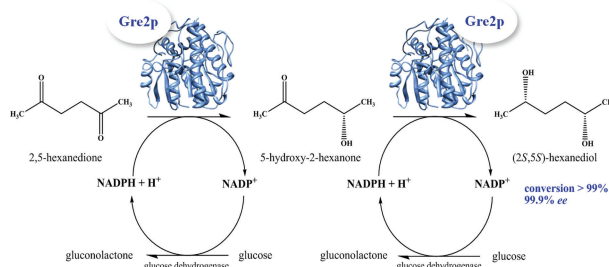
## PAPERS

1540

### Highly efficient and stereoselective biosynthesis of (2*S*,5*S*)-hexanediol with a dehydrogenase from *Saccharomyces cerevisiae*

Marion Müller, Michael Katzberg, Martin Bertau and Werner Hummel\*

The dehydrogenase which is responsible for the stereoselective reduction of 2,5-hexanedione in bakers' yeast was identified. Enzymatic synthesis now enables a highly efficient synthesis route to (2*S*,5*S*)-hexanediol. The high space-time yield make the process transferable to an industrial scale.

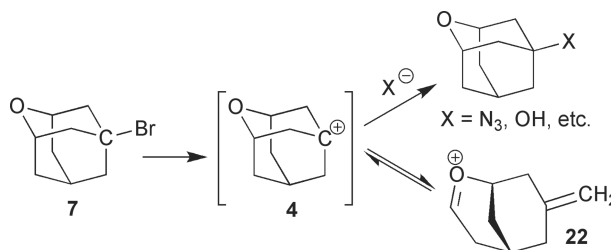


1551

### Searching for intermediates in Prins cyclisations: the 2-oxa-5-adamantyl carbocation

Roger W. Alder,\* Fabrizio Carta, Christopher A. Reed, Irina Stoyanova and Christine L. Willis

2-Oxa-5-adamantyl carbocation **4** is a viable intermediate in several  $S_N1$  reactions of 5-bromo-2-oxaadamantane but attempts to observe **4** by NMR methods failed, probably because **4** undergoes reversible ring opening to **22**, which is destroyed under superacid conditions.

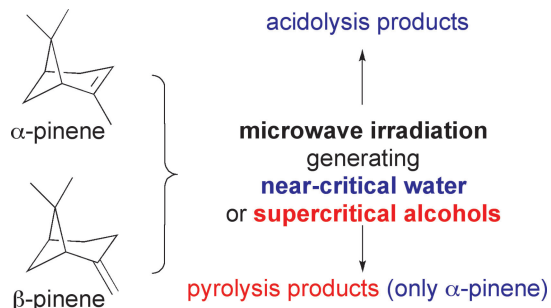


1560

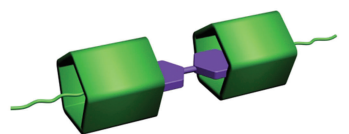
### Fate of monoterpenes in near-critical water and supercritical alcohols assisted by microwave irradiation

Tony Szuppa, Achim Stolle\* and Bernd Ondruschka

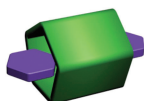
The behaviour of  $\alpha$ - and  $\beta$ -pinene in near-critical water and supercritical alcohols generated under closed-vessel conditions using a microwave was investigated, revealing significant differences in product distribution and reactivity.



1568



2:1 External Complex with Alkyl Substituted Paraquats



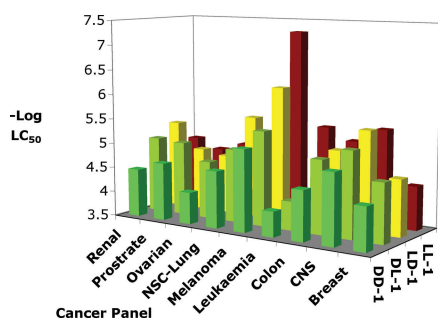
1:1 Pseudorotaxane Complex with 1,4-Bis(pyridinium)butane

### Complex interactions of pillar[5]arene with paraquats and bis(pyridinium) derivatives

Chunju Li,\* Qianqian Xu, Jian Li, Feina Yao and Xueshun Jia\*

The pillar[5]arene host forms 2 : 1 external complexes with alkyl-substituted paraquats, and it forms 1 : 1 pseudorotaxane-type inclusion complexes with methylene  $[-(\text{CH}_2)_n-]$  connected bis(pyridinium) derivatives.

1577

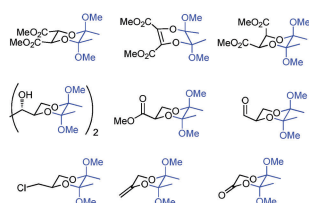


### Triple molecular target approach to selective melanoma cytotoxicity

Edward B. Skibo,\* Akmal Jamil, Brittany Austin, Douglas Hansen and Armand Ghodousi

Phenylalanine-linked pyrrolo[1,2-*a*]benzimidazole **LL1** was successfully designed to target melanoma cells *in vitro*; the design utilised three molecular targets: a phenylalanine pump, the reducing enzyme DT-diaphorase, and IMP dehydrogenase.

1588



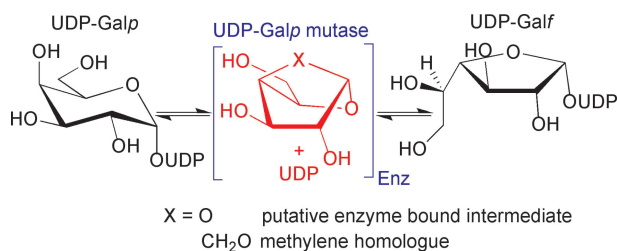
- continuous processing
- superior yields
- in-line purification

### The continuous flow synthesis of butane-2,3-diacetal protected building blocks using microreactors

Catherine F. Carter, Ian R. Baxendale, John B. J. Pavey and Steven V. Ley\*

The continuous flow syntheses of a family of butane-2,3-diacetal protected building blocks has been achieved using microreactors in concert with solid supported reagents and scavengers.

1596



### The UDP-Galp mutase catalyzed isomerization: synthesis and evaluation of 1,4-anhydro-β-D-galactopyranose and its [2.2.2] methylene homologue

Ali Sadeghi-Khomami, Tatiana J. Forcada, Claire Wilson, David A. R. Sanders and Neil R. Thomas\*

The synthesis of 1,4-anhydro-β-D-galactopyranose (1,5-anhydro-α-D-galactofuranose), a proposed intermediate in the ring contraction isomerisation catalyzed by UDP-galactopyranose mutase, together with its [2.2.2] bicyclic methylene homologue, synthesised as a possible competitive inhibitor or alternative substrate, are reported.

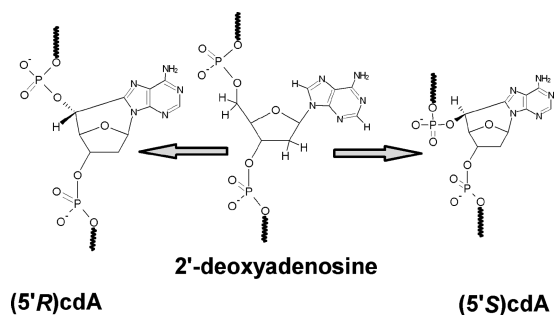


1603

### Formation of 5',8-cyclo-2'-deoxyadenosine in single strand DNA. Theoretical quantum mechanics study

Boleslaw T. Karwowski\*

In the present study, for the first time, emphasis was placed on the investigation of the possible reaction of 2'-deoxyadenosine-3',5'-diphosphate radicals, leading to the formation of the related 5',8-cyclo-2'-deoxynucleotide-3',5'-diphosphate.

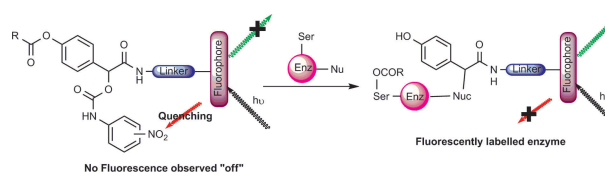


1610

### Fluorescence quenched quinone methide based activity probes – a cautionary tale

Jonathan D. Sellars, Marie Landrum, Aileen Congreve, David P. Dixon, Jackie A. Mosely, Andrew Beeby, Robert Edwards\* and Patrick G. Steel\*

A carbamate linked quenching group coupled with a pro-quinone methide reactive core provides an effective tool for studying enzyme function without problems associated with background fluorescence. However protein labelling observations should be treated with caution.

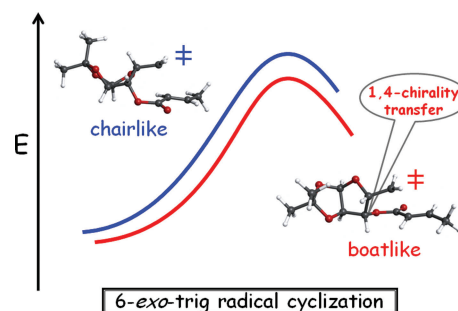


1619

### Unravelling the stereoselectivity in 6-*exo*-trig radical cyclization of $\alpha,\beta$ -unsaturated ester-tethered sugars. A tale of two stereocenters

Marcelo T. de Oliveira,\* Amary Cesar, Daniel H. S. Leal, Maria A. F. Prado, Thais H. Á. da Silva and Ricardo J. Alves

Based on insights gained from a DFT study on the 6-*exo*-trig radical cyclization of an  $\alpha,\beta$ -unsaturated ester-tethered sugar, we demonstrate that the stereoselective reaction proceeds according to a 1,4-chirality transfer mechanism.

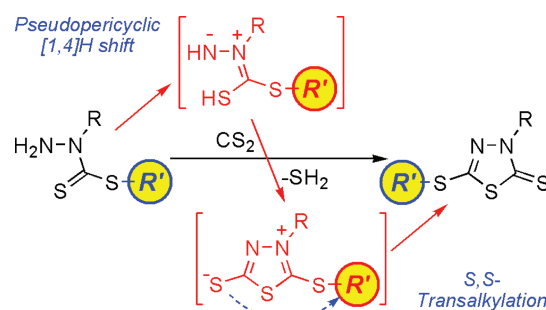


1623

### Unexpected transalkylation on 3-alkyl-2-alkylthio-1,3,4-thiadiazolium-5-thiolates: A computational and experimental mechanistic study

Arturo Espinosa,\* Rafaela García, Pedro Molina and Alberto Tárraga

The unprecedented pseudopericyclic [1,4]H *N*-to-*S* rearrangement of hydrazinecarbodithioate reagents, in the presence of carbon disulfide, affords thioxo-1,3,4-thiadiazolines involving a final intermolecular double *S,S*-transalkylation process.

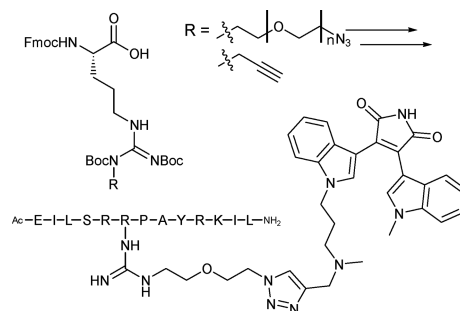


1629

**Preparation of novel alkylated arginine derivatives suitable for click-cycloaddition chemistry and their incorporation into pseudosubstrate- and bisubstrate-based kinase inhibitors**

Jeroen van Ameijde, Alex J. Poot, Loek T. M. van Wandelen, Angelique E. M. Wammes, Rob Ruijtenbeek, Dirk T. S. Rijkers and Rob M. J. Liskamp\*

Novel modified arginine residues suitable for 'click' chemistry and their use in a PKC inhibitor are described.

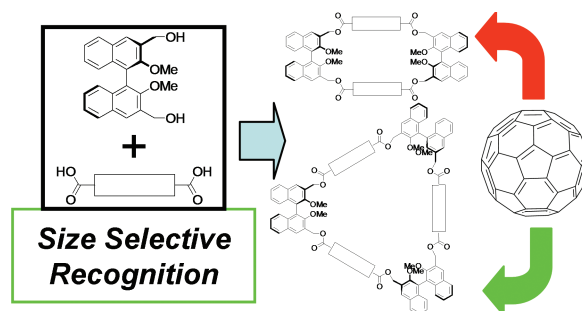


1640

**Structurally-variable, rigid and optically-active  $D_2$  and  $D_3$  macrocycles possessing recognition properties towards  $C_{60}$**

Carmine Coluccini, Daniele Dondi, Marco Caricato, Angelo Taglietti, Massimo Boiocchi and Dario Pasini\*

A straightforward route to chiral macrocycles is described. The larger [3 + 3] macrocycles possess the right cavity size for the complexation of  $C_{60}$ , with switchable stoichiometries in relation to the spacer shapes defining the cavities of the cyclic structures.

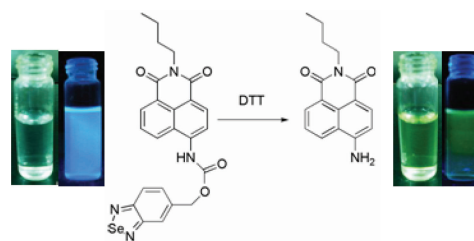


1650

**A highly selective ratiometric fluorescent probe for 1,4-dithiothreitol (DTT) detection**

Baocun Zhu, Xiaoling Zhang,\* Hongying Jia, Yamin Li, Haipeng Liu and Weihong Tan\*

A highly selective ratiometric fluorescent probe for 1,4-dithiothreitol (DTT) was designed and synthesized, which displays a 66 nm red-shift of fluorescence emission and the color changes from colorless to jade-green upon reaction with DTT.

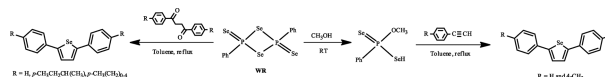


1655

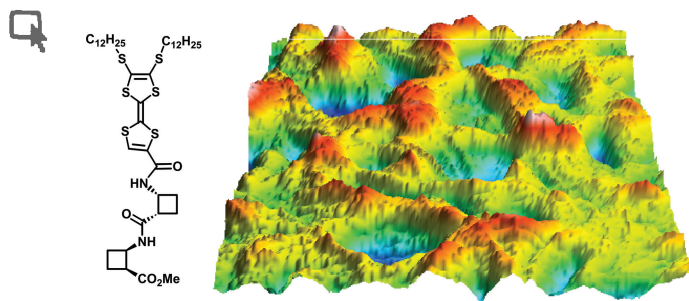
**Synthesis of novel 2,5-diarylselenophenes from selenation of 1,4-diarylbutane-1,4-diones or methanol/arylacetylenes**

Guoxiong Hua, John B. Henry, Yang Li, Andrew R. Mount, Alexandra M. Z. Slawin and J. Derek Woollins\*

2,5-Diarylselenophenes can be prepared by reaction of *O*-methyl *Se*-hydrogen phenylphosphonodiselenoate with arylacetylenes or by direct reaction of Woollins' reagent with 1,4-diarylbutane-1,4-diones.



1661

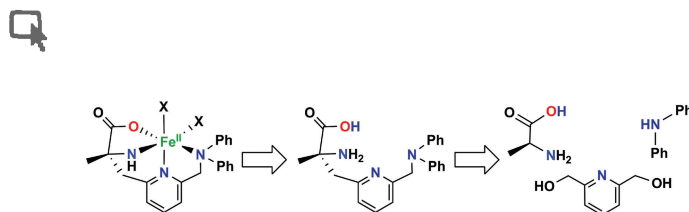


### Use of unnatural $\beta$ -peptides as a self-assembling component in functional organic fibres

Elisabeth Torres, Josep Puigmartí-Luis, Ángel Pérez del Pino, Rosa M. Ortuño\* and David B. Amabilino\*

Supramolecular fibres are formed by a homochiral synthetic dipeptide incorporating two cyclobutyl rings. Current-sensing AFM shows that once doped, films of the material are capable of conducting electricity.

1666

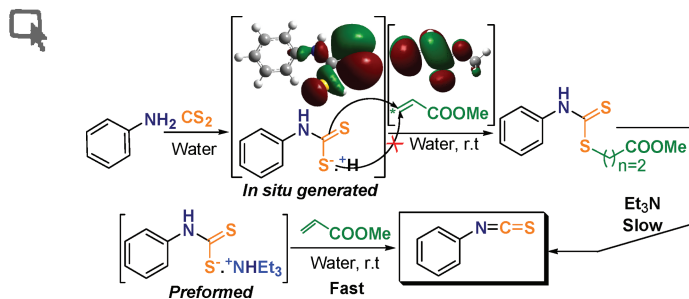


### Design and synthesis of a tetradentate '3-amine-1-carboxylate' ligand to mimic the metal binding environment at the non-heme iron(II) oxidase active site

Victoria J. Dungan, Yannick Ortin, Helge Mueller-Bunz and Peter J. Rutledge\*

Non-heme iron(II) oxidases (NHIOs) promote a raft of interesting oxidation reactions *in vivo*. Can we replicate the iron binding environment of the NHIO active site to create biomimetic small-molecule systems that promote hydrocarbon oxidation *in vitro*?

1674

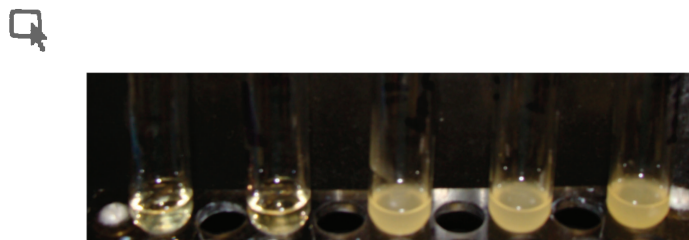


### The thiocarbonyl 'S' is softer than thiolate 'S': A catalyst-free one-pot synthesis of isothiocyanates in water

Latonglila Jamir, Abdur Rezzak Ali, Harisadhan Ghosh, Francis A. S. Chipem and Bhisma K. Patel\*

Treatment of the preformed or the *in situ* generated aryl/alkyl dithiocarbamates triethylammonium salt with methyl acrylate in an aqueous medium gave solely arylisothiocyanate, whereas the *in situ* generated aryl dithiocarbamic acid yielded exclusively the *thia*-Michael adduct.

1679



### The effects of tryptophan and hydrophobicity on the structure and bioactivity of novel indolicidin derivatives with promising pharmaceutical potential

Aaron P. Podorieszsch and Heidi E. K. Huttunen-Hennelly\*

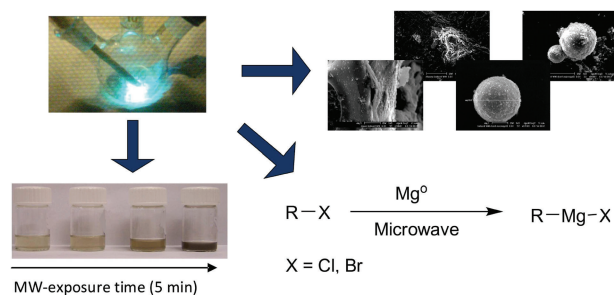
We have created novel indolicidin derivatives that exhibit promising pharmaceutical potential, strong antimicrobial and low hemolytic activity. Furthermore, we report the first activity observed against *Candida albicans*, a common pathogen causing yeast infections and oral thrush.

1688

### Microwave-induced electrostatic etching: generation of highly reactive magnesium for application in Grignard reagent formation

Bastiaan H. P. van de Kruijs, Mark H. C. L. Dressen, Jan Meuldijk, Jef A. J. M. Vekemans and Lumbertus A. Hulshof\*

Microwave-induced electrical discharges influence the surface and, therefore, the reactivity in Grignard reagent formation of magnesium turnings.

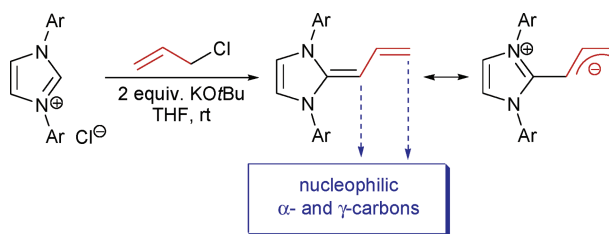


1695

### On new N-heterocyclic carbene derived alkylidene imidazolines

Christiane E. I. Knappke, Jörg M. Neudörfel and Axel Jacobi von Wangelin\*

Oxygen-free: Substitution of allyl halides with N-heterocyclic carbenes results in the formation of nucleophilic 1,1-diamino-1,3-dienes which are deoxy-analogues of the conceptually related Breslow-type homoenolates and exhibit significant zwitterionic character.

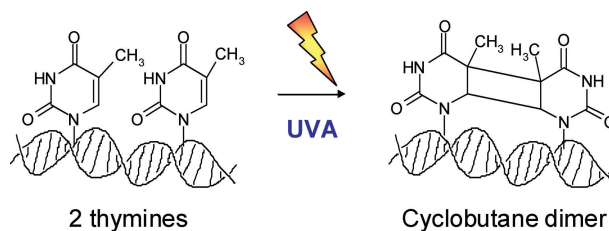


1706

### UVA-induced cyclobutane pyrimidine dimers in DNA: a direct photochemical mechanism?

Stéphane Mouret, Coralie Philippe, Jocelyne Gracia-Chantegrel, Akos Banyasz, Szilvia Karpati, Dimitra Markovitsi and Thierry Douki\*

Cyclobutane pyrimidine dimers produced in DNA upon UVA irradiation arise from a direct photochemical mechanism rather than a photosensitized process.

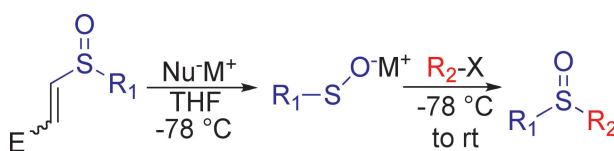


1712

### Nucleophilic attack of 2-sulfinyl acrylates: A mild and general approach to sulfenic acid anions

Suneel P. Singh, Jennifer S. O'Donnell and Adrian L. Schwan\*

A stereospecific addition/elimination of 2-sulfinyl acrylates using various nucleophiles is demonstrated as a general protocol for alkane- and arenesulfenate generation. A variety of sulfoxides are prepared through alkylation chemistry.

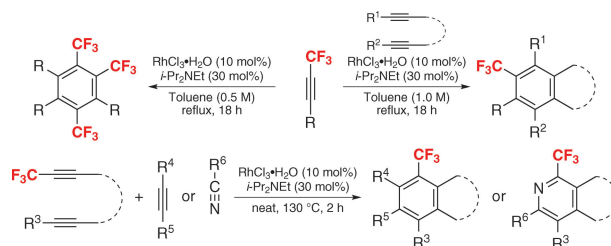


1718

### Rhodium-catalyzed [2+2+2] cycloaddition of various fluorine-containing alkynes—novel synthesis of multi-substituted fluoroalkylated aromatic compounds

Tsutomu Konno,\* Kazuki Moriyasu, Ryoko Kinugawa and Takashi Ishihara

Various fluorinated internal alkynes underwent a smooth rhodium-catalyzed [2+2+2] cycloaddition to afford multi-substituted fluoroalkylated aromatic compounds in good to high yields.

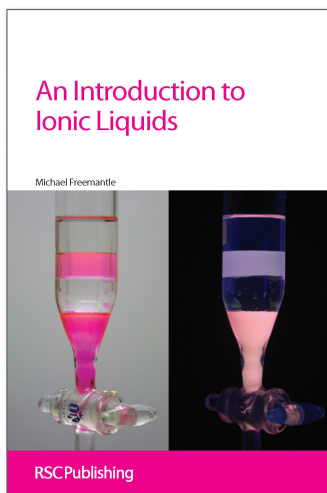
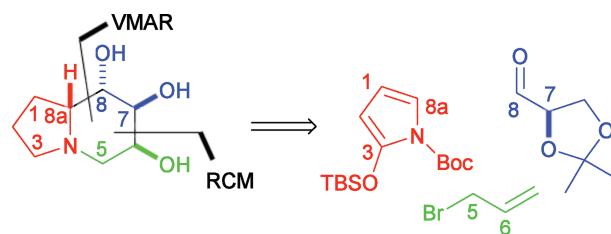


1725

### Asymmetric total synthesis of 1-deoxy-7,8-di-*epi*-castanospermine

Vincenzo Zambrano,\* Gloria Rassu, Annamaria Roggio, Luigi Pinna, Franca Zanardi, Claudio Curti, Giovanni Casiraghi\* and Lucia Battistini\*

An efficient, stereocontrolled synthesis of 1-deoxy-7,8-di-*epi*-castanospermine has been developed involving a vinylogous Mukaiyama aldol reaction (VMAR) and an ene-ene ring closing metathesis reaction (RCM) as key steps.



## An Introduction to Ionic Liquids

Michael Freemantle

This is the first single-author book on ionic liquids and the first introductory book on the topic. *An Introduction to Ionic Liquids* is written in a clear, concise and consistent way and provides a useful introduction to ionic liquids for those readers who are not familiar with the topic. It is also wide ranging, embracing every aspect of the chemistry and applications of ionic liquids. The book draws extensively on the primary scientific literature to provide numerous examples of research on ionic liquids. These examples will enable the reader to become familiar with the key developments in ionic liquids chemistry over recent years.

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BB Hardback | 281 pages | ISBN 9781847551610 | 2009 | £39.95

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# Organic & Biomolecular Chemistry

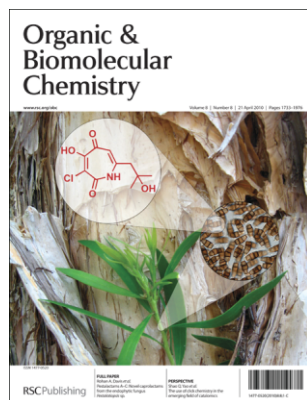
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## IN THIS ISSUE

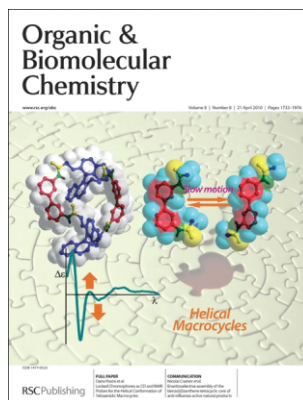
ISSN 1477-0520 CODEN OBCRAK 8(8) 1733–1976 (2010)



### Cover

See Rohan A. Davis *et al.*, pp. 1790–1796. Chemical investigations of a fermentation culture from the endophytic fungus *Pestalotiopsis* sp. yielded three novel natural products, pestalactams A–C. This fungus was isolated from the Australian plant *Melaleuca quinquenervia*.

Image reproduced by permission of Rohan A. Davis from *Org. Biomol. Chem.*, 2010, **8**, 1785.



### Inside cover

See Dario Pasini, pp. 1815–1819. Chiral macrocycles adopt an unusual helical shape when the internal rigidification induced by hydrogen bonding is counterbalanced by flexible spacers.

Image reproduced by permission of Dario Pasini from *Org. Biomol. Chem.*, 2010, **8**, 1807.

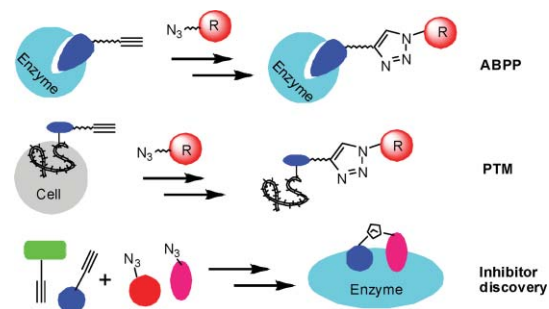
## PERSPECTIVE

1749

### The use of click chemistry in the emerging field of catalomics

Karunakaran A. Kalesh, Haibin Shi, Jingyan Ge and Shao Q. Yao\*

This perspective surveys the significant contributions of click chemistry in catalomics (a sub-area in chemical proteomics), with special emphasis on activity-based protein profiling (ABPP), posttranslational modifications (PTMs) and enzyme inhibitor developments.



## COMMUNICATIONS

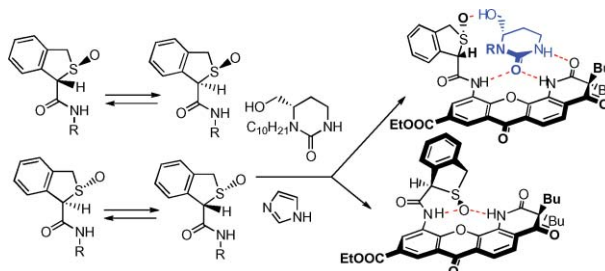
1763



### Synthesis of a chiral artificial receptor with catalytic activity in Michael additions and its chiral resolution by a new methodology

Luis Simón,\* Francisco M. Muñoz, Ángel Fuentes de Arriba, Victoria Alcázar, César Raposo and Joaquín R. Morán

We present the resolution of the racemic mixture of a catalytic receptor using a mimic of the reaction transition state by a novel method alternative to kinetic resolution.

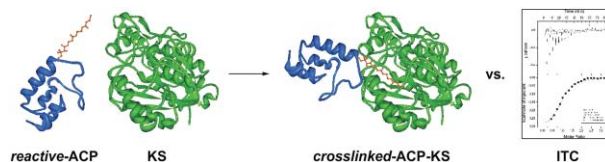


1769

### Mechanism-based crosslinking as a gauge for functional interaction of modular synthases

Andrew S. Worthington, Douglas F. Porter and Michael D. Burkart\*

Mechanism-based crosslinking of modular domains offers a potential diagnostic to highlight selective interactions between modular pairs. Here we compare kinetics and ITC to correlate crosslinking that occurs in ketosynthase chain elongation.

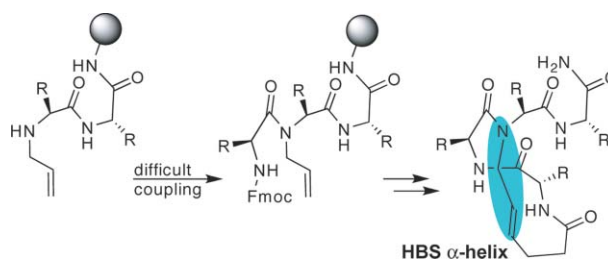


1773

### Solid phase synthesis of hydrogen bond surrogate derived $\alpha$ -helices: resolving the case of a difficult amide coupling

Anupam Patgiri, Michael R. Witten and Paramjit S. Arora\*

Solid-phase synthesis of hydrogen bond surrogate (HBS)  $\alpha$ -helices is described. The methodology describes herein addresses a low-yielding amide bond forming reaction to furnish the synthetic helices in high yields.

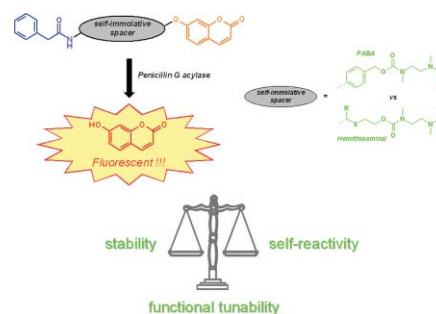


1777

### A comparative study of the self-immolation of *para*-aminobenzylalcohol and hemithioaminal-based linkers in the context of protease-sensitive fluorogenic probes

Yves Meyer, Jean-Alexandre Richard, Bruno Delest, Pauline Noack, Pierre-Yves Renard\* and Anthony Romieu\*

Model pro-fluorescent compounds were synthesised and subjected to PGA hydrolysis to study the release behavior of self-eliminating systems based on PABA or hemithioaminal traceless linkers. 1,6-Benzyl elimination occurs much faster than the fragmentation-cyclisation process involved in the disassembly of hemithioaminal derivatives.

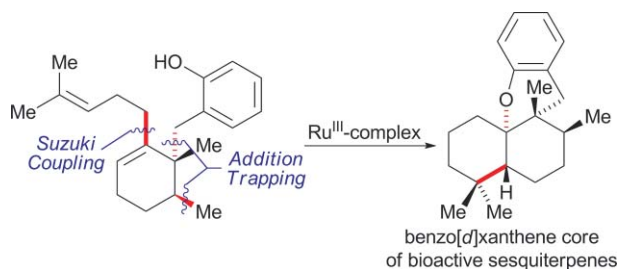


1781

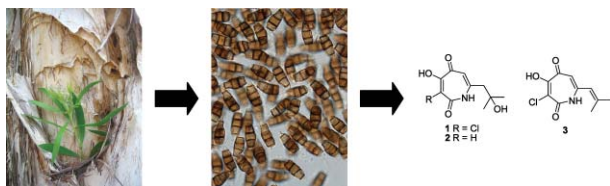
### Enantioselective assembly of the benzo[d]xanthene tetracyclic core of anti-influenza active natural products

Duc Tran Ngoc, Martin Albicker, Lorenz Schneider and Nicolai Cramer\*

A combination of an enantioselective conjugate addition/trapping sequence and a ruthenium(III)-catalyzed domino cyclization provides a concise access to benzo[d]xanthenes found in several anti-influenza active sesquiterpene natural products.



1785

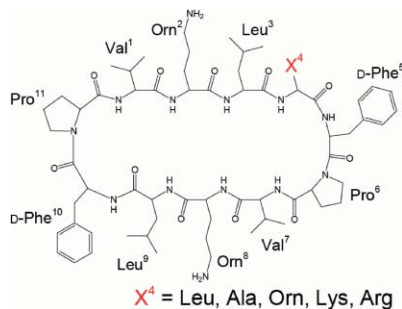


### Pestalactams A–C: novel caprolactams from the endophytic fungus *Pestalotiopsis* sp.

Rohan A. Davis,\* Anthony R. Carroll, Katherine T. Andrews, Glen M. Boyle, Truc Linh Tran, Peter C. Healy, John A. Kalaitzis and Roger G. Shivas

Chemical investigations of a fermentation culture from the endophytic fungus *Pestalotiopsis* sp. yielded three novel caprolactams, pestalactams A–C (1–3). These compounds are the first C-7 alkylated caprolactam natural products to be reported.

1791

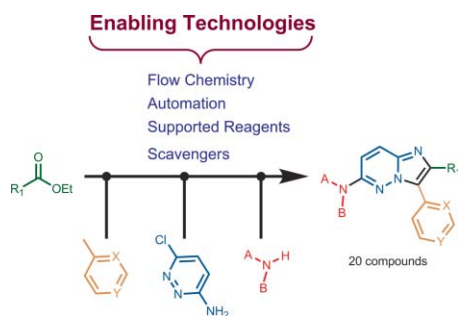


### Antimicrobially active cycloundecapeptides related to gramicidin S having a novel turn structure with *cis* D-Phe-Pro peptide bond

Makoto Tamaki,\* Ichiro Sasaki, Manabu Kokuno, Mitsuno Shindo, Masahiro Kimura and Yoshiki Uchida

We report the syntheses of antimicrobially active cycloundecapeptides related to gramicidin S, which possess antiparallel  $\beta$ -sheet conformation linked by a type II'  $\beta$ -turn around D-Phe<sup>10</sup>-Pro<sup>11</sup> and a novel turn structure around X<sup>4</sup>-D-Phe<sup>5</sup>-Pro<sup>6</sup> sequence with *cis* D-Phe-Pro peptide bond.

1798

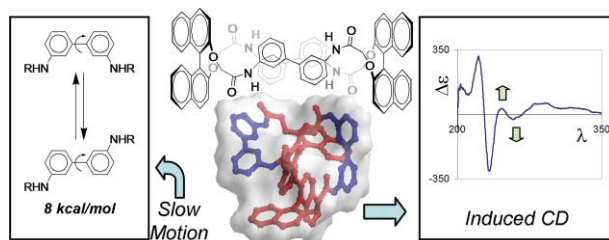


### The application of flow microreactors to the preparation of a family of casein kinase I inhibitors

Francesco Venturoni, Nikzad Nikbin, Steven V. Ley and Ian R. Baxendale

In this article we demonstrate how a combination of enabling technologies such as flow synthesis, solid-supported reagents and scavenging resins utilised under fully automated software control can assist in typical medicinal chemistry programmes.

1807



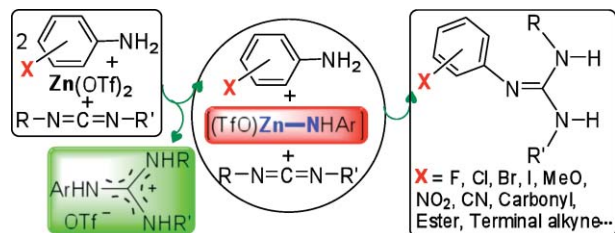
### Locked chromophores as CD and NMR probes for the helical conformation of tetraamidic macrocycles

Carmine Coluccini, Andrea Mazzanti and Dario Pasini\*

Binol-derived chiral macrocycles adopt an unusual helical shape, signalled by CD and NMR spectroscopies, when the internal rigidification induced by hydrogen bonding is counterbalanced by an element of flexibility introduced with the use of a 3,3'-biphenyl spacer.



1816

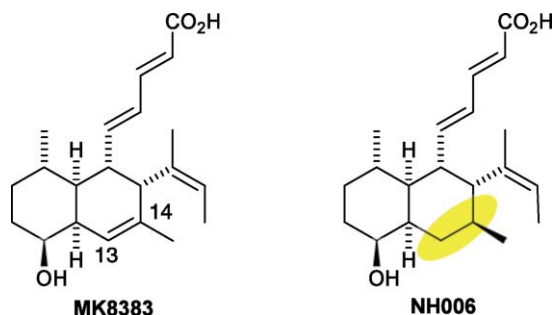


### Zn(OTf)<sub>2</sub>-catalyzed addition of amines to carbodiimides: efficient synthesis of guanidines and unpredicted formation of Zn–N amido species

Dongzhen Li, Jie Guang, Wen-Xiong Zhang,\* Yang Wang and Zhenfeng Xi\*

Zn(OTf)<sub>2</sub> acts as an excellent catalyst precursor for addition of various amines to carbodiimides under an atmosphere of air, offering a convenient synthesis of guanidines with high functional-group tolerance. A Zn–N amido species acts as the active species.

1821

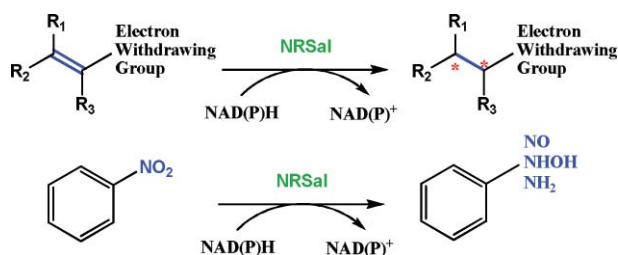


### Synthesis of NH006—a photostable fungicide effective against *Botrytis cinerea*—according to the asymmetric total synthesis of MK8383

Nobuyuki Hayashi, Kentaro Yamamoto, Nobuto Minowa, Masaaki Mitomi and Masahisa Nakada\*

We report the synthesis of NH006, an MK8383 derivative with a saturated C13-14 double bond and (S) configuration at C14, based on the asymmetric total synthesis of MK8383. NH006 exhibits good photostability and potent antifungal activity against *B. cinerea*.

1826

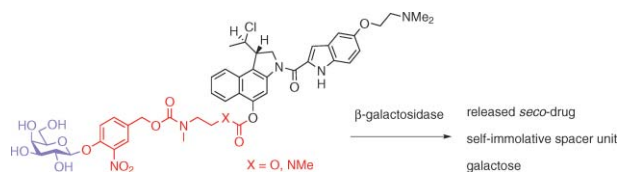


### Nitroreductase from *Salmonella typhimurium*: characterization and catalytic activity

Yanto Yanto, Mélanie Hall and Andreas S. Bommarius\*

Nitroreductase NRSal from *Salmonella typhimurium* displays both nitroreductase and enoate reductase activity in the asymmetric reduction of C=C bonds and aromatic nitro compounds. It also demonstrated the first single isolated enzyme-catalyzed reduction of nitrobenzene to aniline.

1833

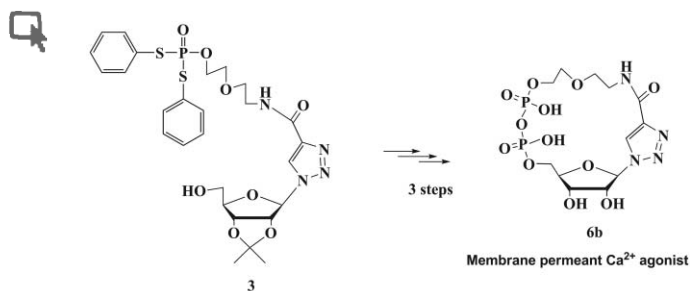


### Synthesis of the first spacer containing prodrug of a duocarmycin analogue and determination of its biological activity

Heiko J. Schuster, Birgit Krewer, J. Marian von Hof, Kianga Schmuck, Ingrid Schuberth, Frauke Alves and Lutz F. Tietze\*

The synthesis of a spacer prodrug is presented, which allows selective activation at the tumour site releasing the cytostatic after sufficient self-immolation of an introduced spacer unit with an IC<sub>50</sub> = 750 pM.

1843

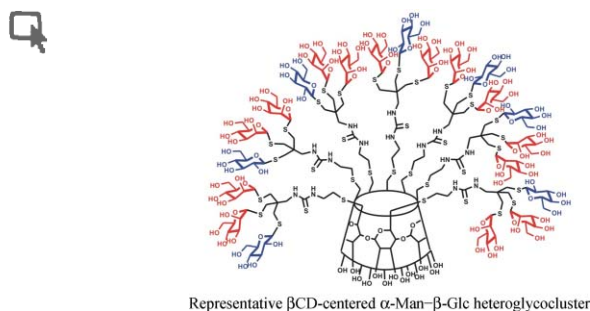


### Novel nucleobase-simplified cyclic ADP-ribose analogue: A concise synthesis and $\text{Ca}^{2+}$ -mobilizing activity in T-lymphocytes

Lingjun Li, Cornelia C. Siebrands, Zhenjun Yang, Liangren Zhang, Andreas H. Guse and Lihe Zhang\*

A purine nucleobase-simplified cyclic ADP ribose (cADPR) analogue was synthesized. It exhibits calcium release activity in intact T-lymphocytes, and indicates that it is a membrane-permeable cADPR mimic.

1849

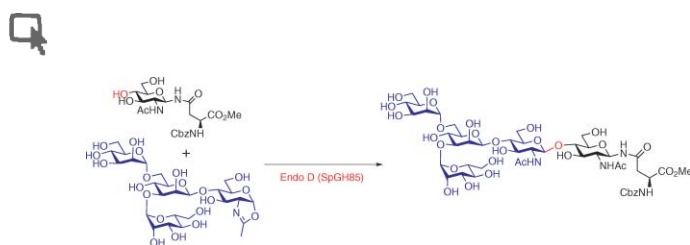


### Comparative studies on lectin-carbohydrate interactions in low and high density homo- and heteroglycoclusters

Marta Gómez-García, Juan M. Benito, Ricardo Gutiérrez-Gallego, Alfredo Maestre, Carmen Ortiz Mellet, José M. García Fernández and José L. Jiménez Blanco\*

A versatile synthetic procedure to construct a series of high- and low-density homo- and heteroglycoclusters is reported. The binding properties of these multivalent glycoconjugates to Con A, a model lectin, have been assessed by using a range of competitive and non-competitive binding assays including ELLA, ITC and SPR.

1861

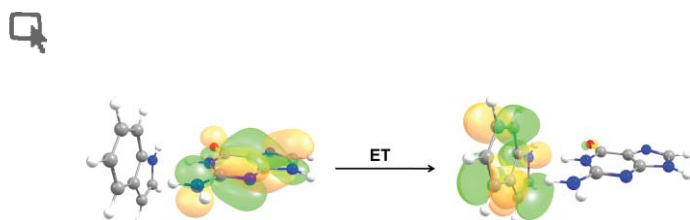


### *Streptococcus pneumoniae* endohexosaminidase D; feasibility of using *N*-glycan oxazoline donors for synthetic glycosylation of a GlcNAc-asparagine acceptor

Thomas B. Parsons, Mitul K. Patel, Alisdair B. Boraston, David J. Vocadlo and Antony J. Fairbanks\*

Endohexosaminidase D, a family 85 glycoside hydrolase from *S. pneumoniae*, catalyses the glycosylation of a GlcNAc-bearing glycosyl amino acceptor using *N*-glycan oxazoline oligosaccharides as donors, demonstrating the synthetic potential of this enzyme as a biocatalyst for the synthesis of defined glycoconjugates.

1870



### Electron transfer from aromatic amino acids to guanine and adenine radical cations in $\pi$ stacked and T-shaped complexes

Cristina Butchosa, Sílvia Simon\* and Alexander A. Voityuk\*

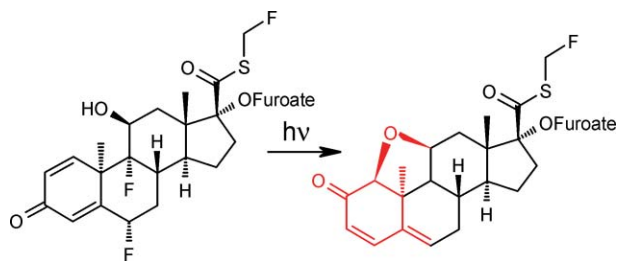
Efficient electron transfer (ET) from aromatic amino acid residues to guanine and adenine radical cations has been found in T-shaped complexes. Thus,  $\pi$  stacking of the donor and acceptor sites is not required for the repair of oxidized nucleobases.

1876

### Structure elucidation and spectroscopic analysis of photodegradants of the *anti*-rhinitis drug fluticasone furoate

Ben Bardsley,\* Marco S. Smith and Bob H. Gibbon

Light-induced degradation of the novel drug fluticasone furoate leads to a rearrangement of the steroid backbone with the resultant elucidated structures exhibiting a number of interesting spectroscopic features.

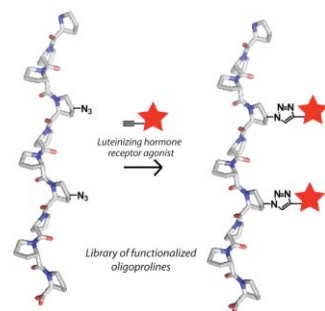


1881

### Oligoproline helices as structurally defined scaffolds for oligomeric G protein-coupled receptor ligands

Kimberly M. Bonger, Varsha V. Kapoor, Gijsbert M. Grotenbreg, Chris J. van Koppen, C. Marco Timmers, Gijsbert A. van der Marel and Herman S. Overkleeft\*

Oligoprolines are used as rigid backbone scaffolds for the design of oligomeric ligands that target specific G protein-coupled receptors.

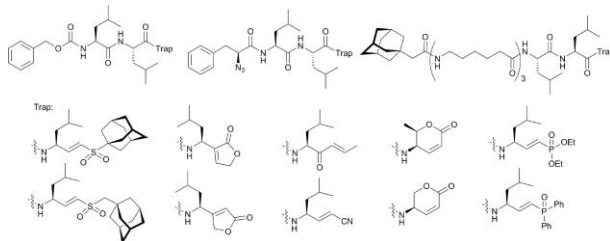


1885

### Proteasome selectivity towards Michael acceptor containing oligopeptide-based inhibitors

Wouter A. van der Linden, Paul P. Geurink, Chris Oskam, Gijsbert A. van der Marel, Bogdan I. Florea and Herman S. Overkleeft\*

Ten Michael acceptors combined with three peptide elements yields 30 potential proteasome inhibitors. These compounds were assessed for their proteasome inhibitory capacities. Cellular targets of two compounds were determined by a two step labeling, affinity purification and LC/MS<sup>2</sup> approach.

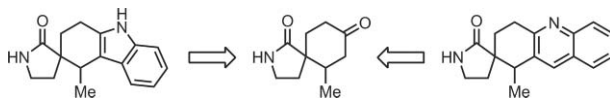


1894

### Synthesis of spirocyclic carbazole- and acridine-lactams

Martina Würdemann and Jens Christoffers\*

Spirocyclic keto-lactams were prepared in five steps from  $\gamma$ -butyrolactam and  $\delta$ -valerolactam. They were further converted by Fischer-indole or Friedländer-quinoline synthesis to give spirocyclic carbazole and acridine lactams.

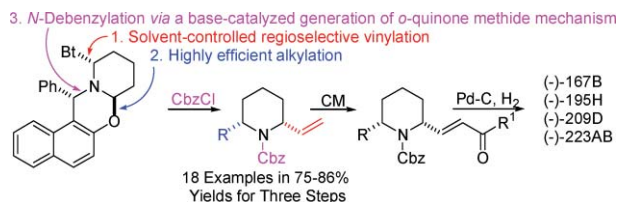


1899

### Enantiopure 2,6-disubstituted piperidines bearing one alkene- or alkyne-containing substituent: preparation and application to total syntheses of indolizidine-alkaloids

Hui Liu, Deyong Su, Guolin Cheng, Jimin Xu, Xinyan Wang\* and Yuefei Hu\*

A general and efficient preparation of enantiopure 2,6-disubstituted piperidines bearing one alkene- or alkyne-containing substituent was developed. By using this method, total syntheses of (–)-167B, (–)-195H, (–)-209D and (–)-223AB were accomplished efficiently.

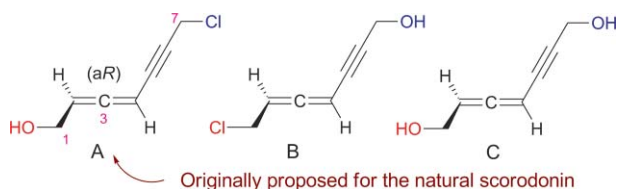


1905

### Synthesis of the structure proposed for the natural allenic antibiotic scorodonin

Ya-Jun Jian and Yikang Wu\*

The structure originally proposed for the natural scorodonin (A) is supported by enantioselective synthesis despite the *ca.* 2 ppm differences in <sup>13</sup>C NMR, while B and C are excluded.

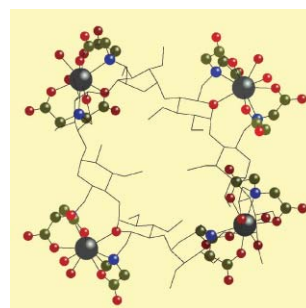


1910

### Novel polycarboxylated EDTA-type cyclodextrins as ligands for lanthanide binding: study of their luminescence, relaxivity properties of Gd(III) complexes, and PM3 theoretical calculations

D. Maffeo, M. Lampropoulou, M. Fardis, Y. G. Lazarou, I. M. Mavridis, D. A. I. Mavridou, E. Urso, H. Pratsinis, D. Kletsas and K. Yannakopoulou\*

Polycarboxylated EDTA-type CDs coordinate with lanthanide cations. The complexes with Gd(III) display exceptionally high relaxivity values and low toxicity, and thus are promising MRI contrast agents.

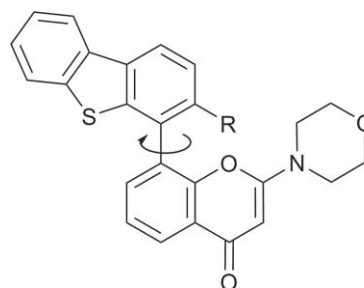


1922

### Atropisomeric 8-arylchromen-4-ones exhibit enantioselective inhibition of the DNA-dependent protein kinase (DNA-PK)

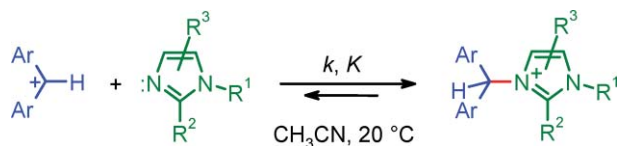
Céline Cano,\* Bernard T. Golding, Karen Haggerty, Ian R. Hardcastle, Marcus Peacock and Roger J. Griffin

We describe the development and resolution of the first atropisomeric DNA-PK inhibitors. Interestingly and as predicted, the biological evaluation of the pairs of atropisomers showed a marked difference in potency, with only one enantiomer being biologically active.



NU7441; R = H  
 1; R = *n*-propyl  
 2; R = allyl  
 3; R = methyl

1929

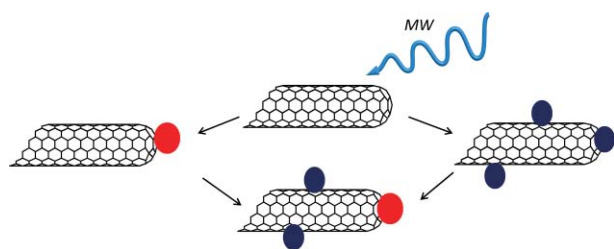


### Nucleophilicities and Lewis basicities of imidazoles, benzimidazoles, and benzotriazoles

Mahiuddin Baidya, Frank Brotzel and Herbert Mayr\*

Determination of rate and equilibrium constants: imidazoles and benzimidazoles are much weaker nucleophiles than expected from their Lewis and Brønsted basicities.

1936

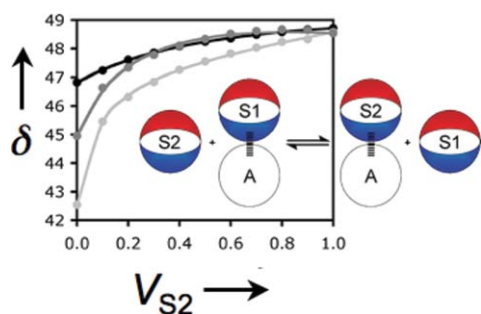


### Versatile microwave-induced reactions for the multiple functionalization of carbon nanotubes

Noelia Rubio, M. Antonia Herrero, Antonio de la Hoz, Moreno Meneghetti, Maurizio Prato\* and Ester Vázquez\*

Doubly functionalized CNTs, obtained *via* microwave activation, can serve as multipurpose, versatile synthons.

1943

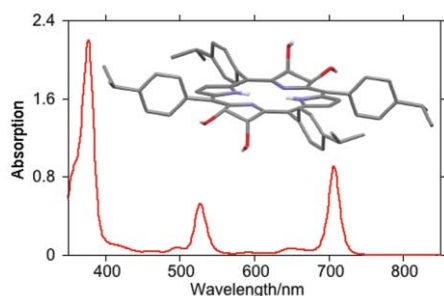


### A thermodynamic study of selective solvation in solvent mixtures

Rafel Cabot and Christopher A. Hunter\*

The  $^{31}\text{P}$  NMR chemical shift of *n*Bu<sub>3</sub>PO provides a probe of selective solvation in solvent mixtures, allowing characterisation of solvation equilibria and quantification of the H-bond properties of non-polar solvents.

1951



### Syntheses, structures, modification, and optical properties of *meso*-tetraaryl-2,3-dimethoxychlorin, and two isomeric *meso*-tetraaryl-2,3,12,13-tetrahydroxybacteriochlorins

Lalith P. Samankumara, Matthias Zeller, Jeanette A. Krause and Christian Brückner\*

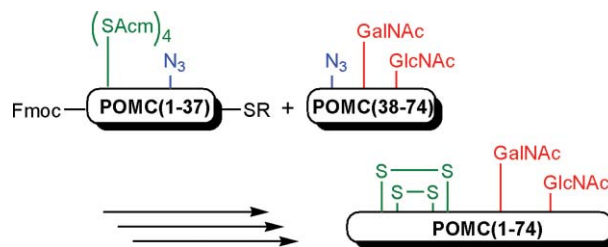
The refined syntheses, modification, and first X-ray structural characterization of *meso*-tetraarylporphyrin-derived  $\beta$ -tetraolbacteriochlorins are described.

1966

### Chemical synthesis of mouse pro-opiomelanocortin(1–74) by azido-protected glycopeptide ligation *via* the thioester method

Hidekazu Katayama,\* Hironobu Hojo,\* Ichiko Shimizu, Yuko Nakahara and Yoshiaki Nakahara

The use of azidopeptide as a building block facilitated the chemoselective peptide ligation by the thioester method. A glycoprotein was successfully synthesized by this method.



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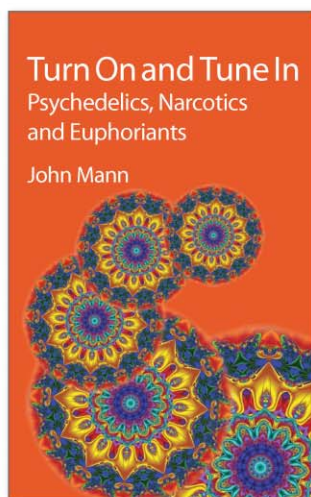
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\* Indicates the author for correspondence: see article for details.



Electronic supplementary information (ESI) is available *via* the online article (see <http://www.rsc.org/esi> for general information about ESI).



## Turn On and Tune In Psychedelics, Narcotics and Euphorants

John Mann

John Mann from Queen's University of Belfast has brought together details of the historical, anthropological and sociological importance of a range of psychoactive substances (both natural and synthetic) including LSD, opium, heroin, cocaine, cannabis, peyote, belladonna, mandrake, and absinthe. He has highlighted the colourful figures, both famous and infamous, involved in drug production, trafficking or use such as Albert Hofmann, Timothy Leary, Thomas de Quincey, Wilde, and many pop stars – John Lennon, Jerry Garcia of the Grateful Dead, Mick Jagger etc.

The basic chemistry and pharmacology are covered together with a brief account of useful drugs that have emerged from a study of the psychoactive ones. This book can be enjoyed by both the scientist and general reader and tells a fascinating story.

BB Hardback | 160 pages | ISBN 9781847559098 | 2009 | £24.95

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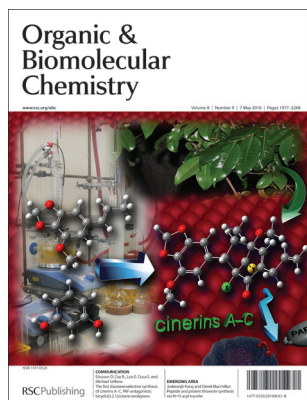
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## IN THIS ISSUE

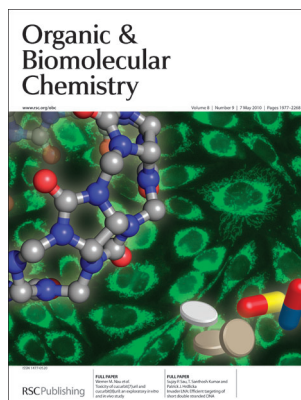
ISSN 1477-0520 CODEN OBCRAK 8(9) 1977–2268 (2010)



### Cover

See Michael Sefkow *et al.*, pp. 2003–2005.  
The first total synthesis of PAF-antagonistic cinerins A–C, isolated from the leaves of *Pleurothyrium cinereum*, is reported by Coy *et al.* on page 2003.

Image reproduced by permission of Michael Sefkow from *Org. Biomol. Chem.*, 2010, **8**, 2003.



### Inside cover

See Werner M. Nau *et al.*, pp. 2037–2042.  
Cucurbiturils are promising macrocycles for drug delivery, which have now been shown to display very low, if not negligible, toxicity in cell and animal studies.

Image reproduced by permission of Werner M. Nau from *Org. Biomol. Chem.*, 2010, **8**, 2037.

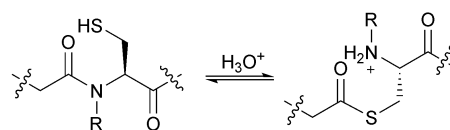
## EMERGING AREA

1993

### Peptide and protein thioester synthesis *via* N→S acyl transfer

Jaskiranjit Kang and Derek Macmillan\*

Peptide thioesters are playing an increasingly prominent role in the chemical toolbox for protein assembly and modification through Native Chemical Ligation (NCL). In this article we highlight recent developments in thioester production through selective disruption of amide bonds.



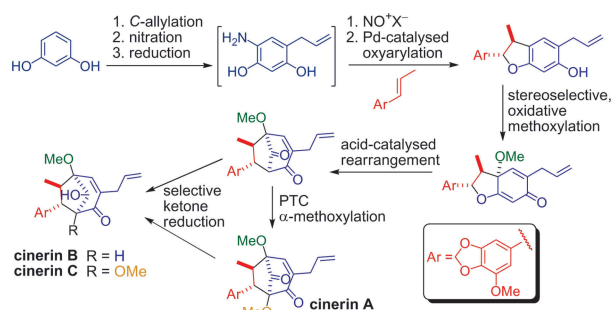
## COMMUNICATIONS

2003

### The first diastereoselective synthesis of cinerins A–C, PAF-antagonistic macrophyllin-type bicyclo[3.2.1]octane neolignans, using a novel Pd-catalysed oxyarylation

Ericsson D. Coy B.,\* Luis E. Cuca S. and Michael Sefkow\*

The first diastereoselective synthesis of PAF-antagonistic cinerins A–C, macrophyllin-type bicyclo[3.2.1]octane neolignans from *Pleurothyrium cinereum*, has been accomplished using a novel Pd-catalysed oxyarylation to afford a 2,3-dihydrobenzofuran as the key intermediate.

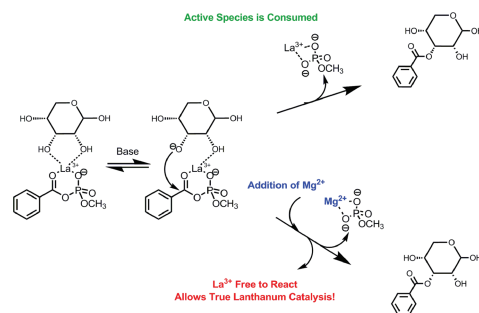


2006

### Magnesium ion enhances lanthanum-promoted monobenzylation of a monosaccharide in water

Raj S. Dhiman and Ronald Kluger\*

Monobenzylation of sugars is promoted by lanthanum triflate. Addition of magnesium ion produces a precipitate from the phosphate monoester by-product that allows lanthanum to function at low catalyst loading.

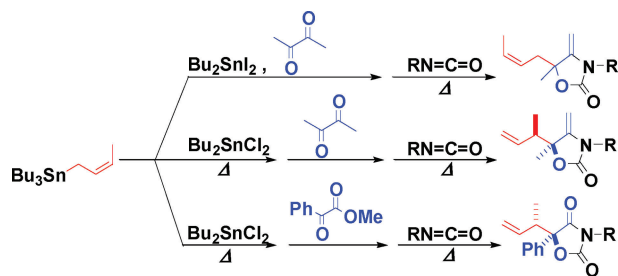


2009

### Synthesis of oxazolidinones initiated by regio- and diastereo-controlled crotylation of $\alpha$ -dicarbonyl compounds

Ikuya Shibata,\* Ryota Kojima, Shinji Tsunoi, Takashi Nozaki, Tomonari Watanabe, Atsushi Ninomiya, Makoto Yasuda and Akio Baba

One-pot synthesis of oxazolidinones was established initiated by allylation of  $\alpha$ -dicarbonyl compounds, accompanying regio- and diastereo-controlled carbon-carbon bond formation on the side chains of the oxazolidinones.

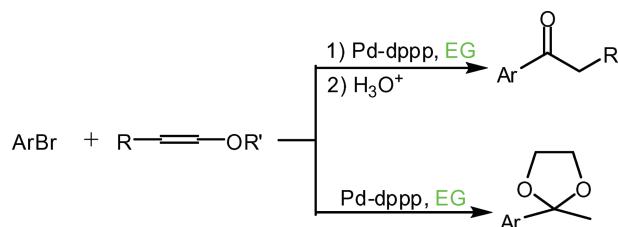


2012

### Efficient synthesis of alkyl aryl ketones & ketals *via* palladium-catalyzed regioselective arylation of vinyl ethers

Mingcui Liu, Zeynab Hyder, Yawei Sun, Weijun Tang, Lijin Xu\* and Jianliang Xiao

The combination of  $Pd(OAc)_2$  with 1,3-bis(diphenylphosphino)propane in ethylene glycol constitutes a high-performance catalytic system for highly regioselective arylation of a range of electron-rich vinyl ethers by aryl bromides to provide, upon hydrolysis, alkyl aryl ketones and cyclic ketals in good yields with up to  $3.75 \times 10^5$  TON and  $15625 \text{ h}^{-1}$  TOF.

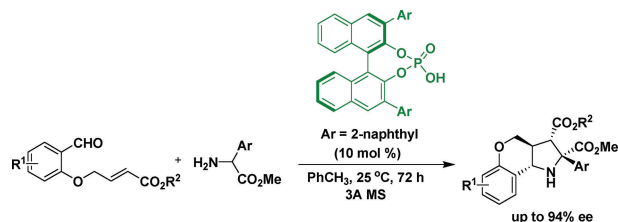


2016

### Organocatalytic asymmetric intramolecular [3+2] cycloaddition: A straightforward approach to access multiply substituted hexahydrochromeno[4,3-b]pyrrolidine derivatives in high optical purity

Nan Li, Jin Song, Xi-Feng Tu, Bin Liu, Xiao-Hua Chen and Liu-Zhu Gong\*

Asymmetric organocatalytic intramolecular 1,3-dipolar cycloaddition of 4-(2-formylphenoxy)butenoates with amino esters provides hexahydrochromeno[4,3-b]pyrrolidine derivatives in high ee (up to 94% ee).



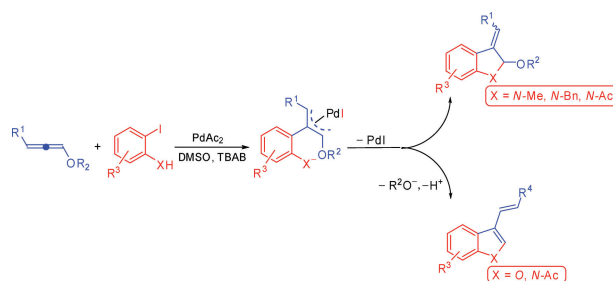


2020

### Heck reaction on protected 3-alkyl-1,2-dien-1-ols: an approach to substituted 3-alkenylindoles, 2-alkoxy-3-alkylidene-2,3-dihydrobenzofuranes and -indolidines

Tommaso Boi, Annamaria Deagostino,\* Cristina Prandi, Silvia Tabasso, Antonio Toppino and Paolo Venturello

Two different heterocyclic frameworks were obtained in the benzoannulation of 3-alkyl-1,2-dienols and *o*-iodophenols or protected *o*-iodoanilines, in dependence of the nucleophilic properties of the attaching heteroatom.

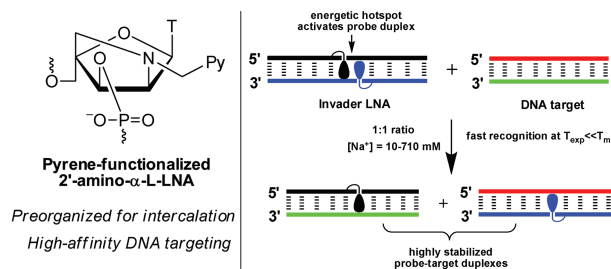


2028

### Invader LNA: Efficient targeting of short double stranded DNA

Sujay P. Sau, T. Santhosh Kumar and Patrick J. Hrdlicka\*

Energetically activated double stranded Invader LNA probes enable recognition of short isosequential dsDNA-targets at low experimental temperatures, at a variety of ionic strengths, and with good mismatch discrimination.

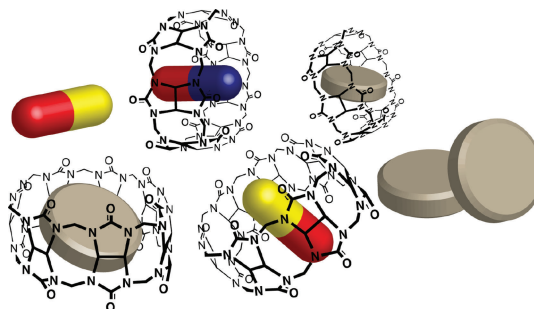


2037

### Toxicity of cucurbit[7]uril and cucurbit[8]uril: an exploratory *in vitro* and *in vivo* study

Vanya D. Uzunova, Carleen Cullinane, Klaudia Brix, Werner M. Nau\* and Anthony I. Day\*

The molecular container cucurbit[7]uril shows a low cytotoxicity ( $IC_{50} = 0.53$  mM) and high tolerated intravenous and oral dosage of at least 250 mg  $kg^{-1}$ , which makes it an ideal candidate for potential pharmaceutical applications.

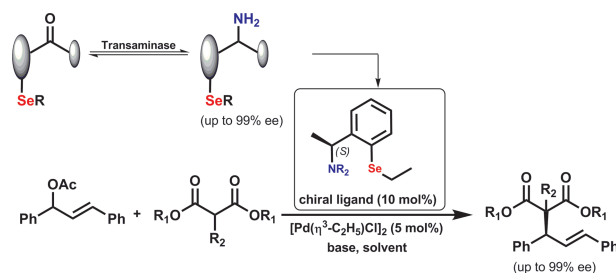


2043

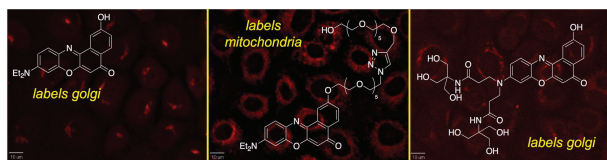
### $\omega$ -Transaminases as efficient biocatalysts to obtain novel chiral selenium-amine ligands for Pd-catalysis

Leandro H. Andrade,\* Alexandre V. Silva, Priscila Milani, Dominik Koszelewski and Wolfgang Kroutil

Modulated chiral selenium-amines were efficiently synthesized by using  $\omega$ -transaminases as tools for asymmetric induction. New chiral selenium compounds were evaluated as ligands in the palladium-catalyzed asymmetric alkylation.



2052

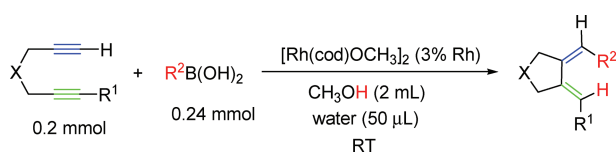


### Intracellular imaging of organelles with new water-soluble benzophenoxazine dyes

Jiney Jose, Aurore Loudet, Yuichiro Ueno, Rola Barhoumi, Robert C. Burghardt and Kevin Burgess\*

Five new water-soluble benzophenoxazine dyes were found to fluoresce with good quantum yields in EtOH (0.47–0.73) and physiological pH (0.17–0.33). The Stokes shifts of these dyes varies between 78–99 nm. Cellular imaging of Clone 9 cells with selected dyes showed selective staining of mitochondria and golgi.

2060

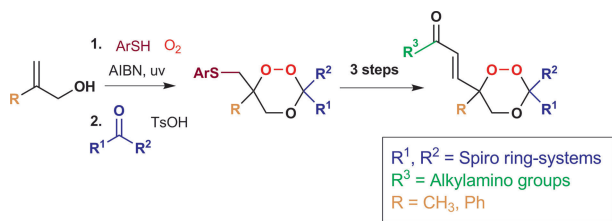


### Rhodium catalysed chemo- and stereoselective arylation and alkenylation reactions of unsymmetric diynes containing a terminal alkyne moiety with organoboronic acids

Levent Artok,\* Melih Kuş, Bağdagül N. Ürer, Gülşah Türkmen and Özge Aksın-Artok

Unsymmetric diynes possessing a terminal alkyne moiety reacted with organoboronic acids both chemo- and stereoselectively to afford arylated or alkenylated exocyclic dienes by catalysis from the  $[\text{Rh}(\text{cod})\text{OCH}_3]_2$  complex in  $\text{CH}_3\text{OH}$ .

2068

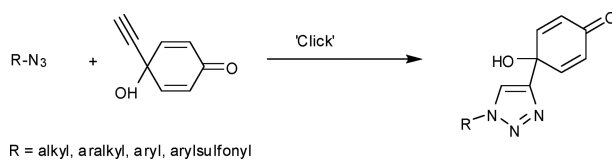


### Synthesis, *in vitro* and *in vivo* antimalarial assessment of sulfide, sulfone and vinyl amide-substituted 1,2,4-trioxanes prepared *via* thiol-olefin co-oxygenation (TOCO) of allylic alcohols

R. Amewu, P. Gibbons, A. Mukhtar, A. V. Stachulski, S. A. Ward, C. Hall, K. Rimmer, J. Davies, L. Vivas, J. Bacsa, A. E. Mercer, G. Nixon, P. A. Stocks and P. M. O'Neill\*

Selected analogues of polar 1,2,4-trioxanes express potent *in vitro* nM antimalarial activity, low cytotoxicity and oral activity.

2078



### Synthesis of antitumour (1H-1,2,3-triazol-4-yl)-4-hydroxycyclohexa-2,5-dien-1-ones by copper-catalysed Huisgen cycloadditions

Andrew J. McCarroll, Charles S. Matthews, Geoffrey Wells, Tracey D. Bradshaw and Malcolm F. G. Stevens\*

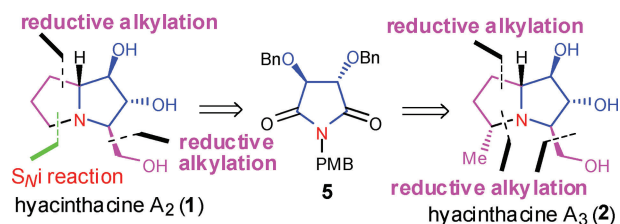
Triazoles bearing the 4-hydroxycyclohexa-2,5-dien-1-one (quinol) pharmacophore were prepared using copper-catalysed Huisgen cycloadditions, and screened for growth-inhibitory activity.

2085

### A flexible approach for the asymmetric syntheses of hyacinthacines A<sub>2</sub>, A<sub>3</sub> and structural confirmation of hyacinthacine A<sub>3</sub>

Wen-Jun Liu, Jian-Liang Ye\* and Pei-Qiang Huang\*

A concise approach for the asymmetric synthesis of polyhydroxylated pyrrolizidine alkaloids has been developed. Analysis of the <sup>1</sup>H and <sup>13</sup>C NMR spectra of a mixed synthetic product and natural hyacinthacine A<sub>3</sub> allowed the structural conformation.

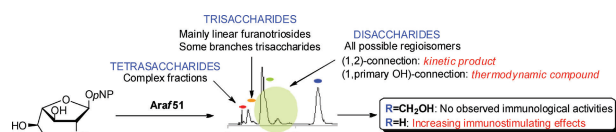


2092

### Enzymatic synthesis of oligo-D-galactofuranosides and L-arabinofuranosides: from molecular dynamics to immunological assays

Ilona Chlubnová, Dominik Filipp, Vojtech Spiwok, Hana Dvořáková, Richard Daniellou,\* Caroline Nugier-Chauvin,\* Blanka Králová and Vincent Ferrières

Immunostimulating furanosides were synthesized according to a chemo-enzymatic approach. Elicitation of the production of TNF- $\alpha$  was established, even for short chains like arabinotriosides.

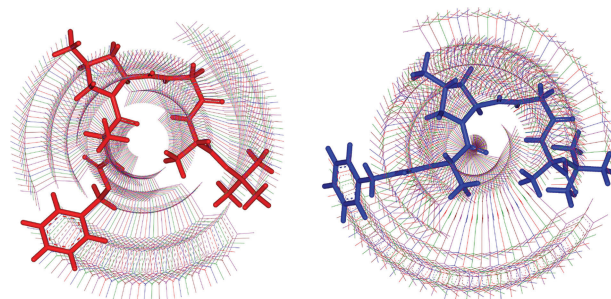


2103

### Conformational ensembles of flexible $\beta$ -turn mimetics in DMSO-*d*<sub>6</sub>

Jari J. Koivisto, Esa T. T. Kumpulainen and Ari M. P. Koskinen\*

Ensembles of conformations for three linear tetrapeptides CBz-L-Ala-L-Xaa-Gly-L-Ala-O*t*Bu (Xaa = proline, (4*R*)-methylproline, (4*S*)-methylproline) were determined using NAMFIS methodology. NBO calculations show that different backbone-backbone interactions contribute to  $\beta$ -turn stability.

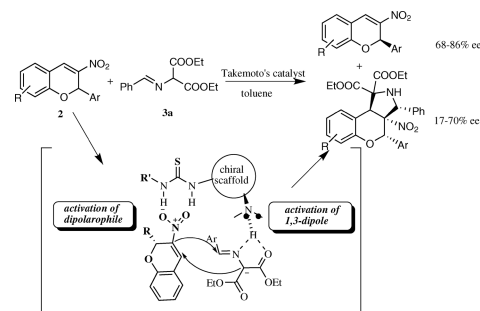


2117

### Efficient kinetic resolution of racemic 3-nitro-2*H*-chromene derivatives catalyzed by Takemoto's organocatalyst

Jian-Wu Xie,\* Li-Ping Fan, Hong Su, Xin-Sheng Li and Dong-Cheng Xu

Optically active 3-nitro-2*H*-chromene derivatives were obtained by kinetic resolution of racemic 3-nitro-2*H*-chromenes derivatives catalyzed by Takemoto's catalyst.

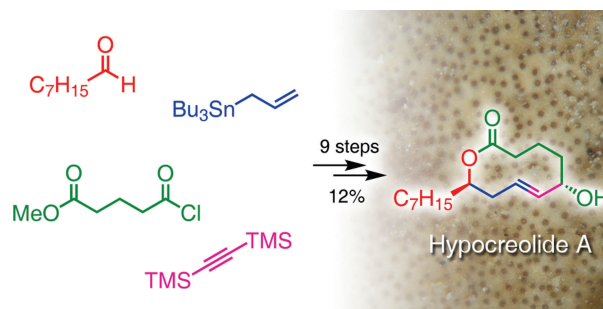


2123

### Structure elucidation of hypocreolide A by enantioselective total synthesis

Katharina Götz, Johannes C. Liermann, Eckhard Thines, Heidrun Anke and Till Opatz\*

The structure and absolute stereochemistry of the nonenolide hypocreolide A from the ascomycete *Hypocrea lactea* were elucidated by NMR spectroscopy and asymmetric total synthesis.

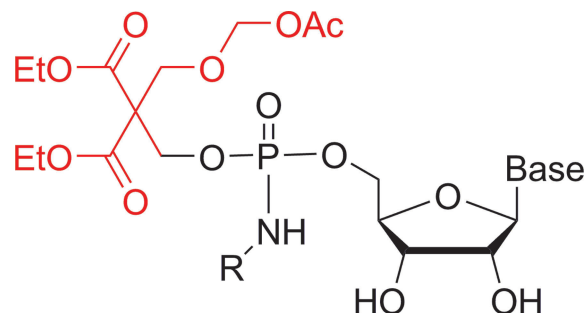


2131

### Chemical and enzymatic stability of amino acid derived phosphoramidates of antiviral nucleoside 5'-monophosphates bearing a biodegradable protecting group

Anna Leisvuori, Yuichiro Aiba, Tuomas Lönnberg, Päivi Poijärvi-Virta,\* Laurence Blatt, Leo Beigelman and Harri Lönnberg

The 3-acetyloxymethoxy-2,2-bis(ethoxycarbonyl)propyl group is introduced as a novel candidate for a biodegradable protecting group of nucleoside 5'-phosphoramidates.

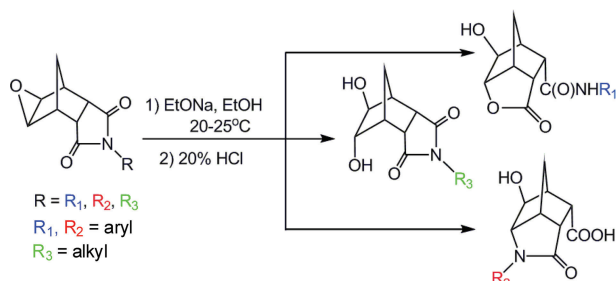


2142

### Ethanolysis of N-substituted norbornane epoxyimides: Discovery of diverse pathways depending on substituent's character

T. Petrova, I. Tarabara, V. Palchikov, L. Kasyan, D. Kosenkov, S. Okovytyy, L. Gorb, S. Shishkina, O. Shishkin and J. Leszczynski\*

This work represents investigation of the transformations of norbornane series epoxyimides in the course of ethanolysis reaction. Formation of different heterocyclic compounds depending on the substituent on the N atom has been shown experimentally and explained theoretically.

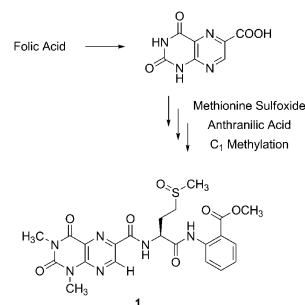


2158

### Penilumamide, a novel lumazine peptide isolated from the marine-derived fungus, *Penicillium* sp. CNL-338

Sven W. Meyer, Thorsten F. Mordhorst, Choonghwan Lee, Paul R. Jensen, William Fenical and Matthias Köck\*

Penilumamide was isolated from the fungal strain *Penicillium* sp. and its structure was determined by analysis of ESI-TOF MS data combined with 1D and 2D NMR experiments.

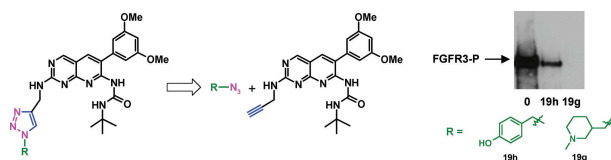


2164

### Synthesis and biological evaluation of a triazole-based library of pyrido[2,3-*d*]pyrimidines as FGFR3 tyrosine kinase inhibitors

Laurent Le Corre, Anne-Lise Girard, Johannes Aubertin, François Radvanyi, Catherine Benoist-Lasselin, Aurélie Jonquoy, Emilie Mugniery, Laurence Legeai-Mallet, Patricia Busca\* and Yves Le Merrer\*

Most of the 27 analogues synthesized were active against FGFR3 *in vitro* and one (**19g**) was able to inhibit mutant FGFR3-K650M in HEK cells.

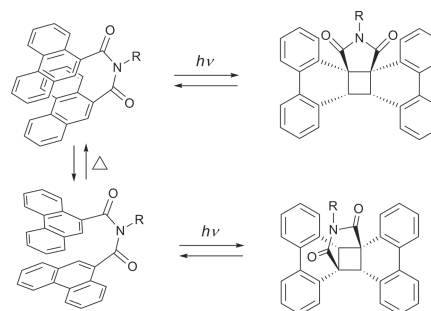


2174

### Reversal of regioselectivity (straight vs. cross ring closure) in the intramolecular [2+2] photocycloaddition of phenanthrene derivatives

Shigeo Kohmoto,\* Shugo Hisamatsu, Hakuei Mitsuhashi, Masahiro Takahashi, Hyuma Masu, Isao Azumaya, Kentaro Yamaguchi and Keiki Kishikawa

Depending on reaction temperature and irradiation time, a reversal of regioselectivity was attained in intramolecular [2+2] photocycloaddition of aromatic chain imides.

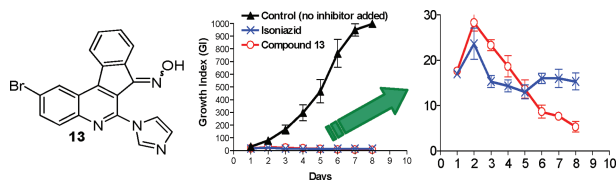


2180

### Conformationally-constrained indeno[2,1-*c*]quinolines – a new class of anti-mycobacterial agents

Ram Shankar Upadhayaya, Santosh V. Lahore, Aftab Y. Sayyed, Shailesh S. Dixit, Popat D. Shinde and Jyoti Chattopadhyaya\*

The design and synthesis of 23 new conformationally-constrained indeno[2,1-*c*]quinoline analogs and anti-mycobacterial activities against *Mycobacterium tuberculosis* H37Rv is reported.

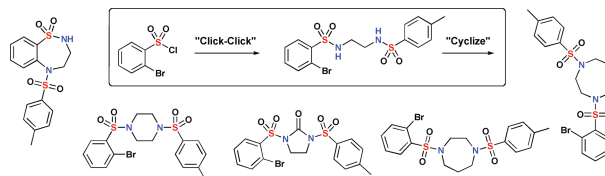


2198

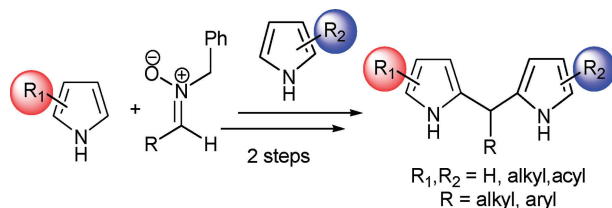
### Reagent based DOS: A “Click, Click, Cyclize” strategy to probe chemical space

Alan Rolfe, Gerald. H. Lushington and Paul. R. Hanson\*

We report a reagent-based, diversity-oriented synthetic strategy to probe chemical and biological space *via* a “Click, Click, Cyclize” protocol.



2204

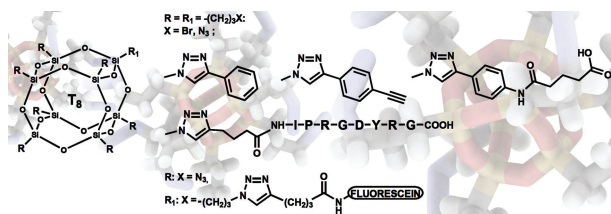


### An efficient method for the synthesis of unsymmetrical 2,2'-bis(pyrrolyl)alkanes

Marie Laure Murat-Onana, Christophe Berini, Frédéric Minassian,\* Nadia Pelloux-Léon\* and Jean-Noël Denis

A new strategy for the preparation of unsymmetrical 2,2'-bis(pyrrolyl)alkanes has been developed, and it has also been extended to the synthesis of tripyrromethanes and *N*-confused dipyrromethanes.

2212

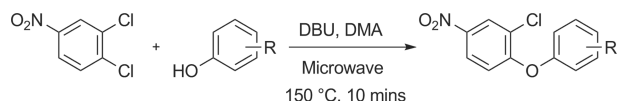


### Towards click bioconjugations on cube-octameric silsesquioxane scaffolds

Sebastian Fabritz, Dirk Heyl, Viktor Bagutski, Martin Empting, Eckhard Rikowski, Holm Frauendorf, Ildiko Balog, Wolf-Dieter Fessner, Jörg. J. Schneider, Olga Avrutina and Harald Kolmar\*

Synthesis and click conjugations on octaazido octasilsesquioxane scaffold without cage rearrangements are described, including effective transformation into an octaalkyne POSS framework and an octaconjugate of a fully unprotected functional peptide.

2219

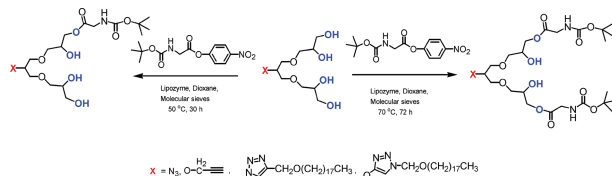


### The application of stop-flow microwave technology to scaling-out $S_NAr$ reactions using a soluble organic base

Jameel A. Marafie and Jonathan D. Moseley\*

Substituted diaryl ethers have been prepared by  $S_NAr$  reaction in combination with a soluble organic base, with productivities of  $>0.5$  kg per day using an automated stop-flow microwave reactor.

2228



### Novel chemoenzymatic methodology for the regioselective glycine loading on polyhydroxy compounds

Shashwat Malhotra, Marcelo Calderón, Ashok K. Prasad, Virinder S. Parmar\* and Rainer Haag\*

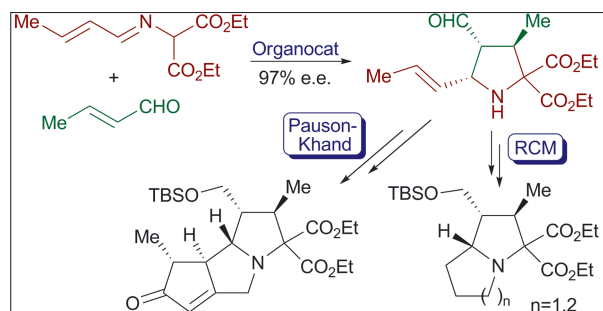
We present a temperature-dependent chemo-enzymatic methodology which offers efficient and controlled loading of amino acid (glycine) on polyhydroxy compounds and represents a platform for the selective amino acid attachment (decoration) to the dendritic polyglycerol (PG) scaffolds.

2238

**The organocatalytic [3+2] cycloaddition of azomethine ylides and  $\alpha,\beta$ -unsaturated aldehydes as a convenient tool for the enantioselective synthesis of pyrrolizidines and indolizidines**

Ainara Iza, Luisa Carrillo, Jose L. Vicario,\* Dolores Badía,\* Efraim Reyes and Jose I. Martínez

The organocatalytic [3+2] cycloaddition of  $\alpha,\beta$ -unsaturated aldehydes and azomethine ylides emerges as an efficient approach for the stereocontrolled preparation of pyrrolizidines, indolizidines or the more complex tricyclic hexahydrocyclopenta[*a*]pyrrolizine structure.

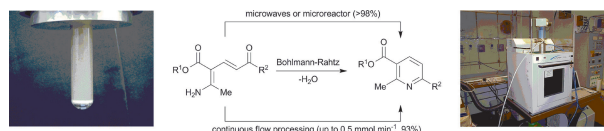


2245

**Continuous flow processing from microreactors to mesoscale: the Bohlmann–Rahtz cyclodehydration reaction**

Mark C. Bagley,\* Vincenzo Fusillo, Robert L. Jenkins, M. Caterina Lubinu and Christopher Mason

Combining microwave dielectric heating and flow processing provides a reliable and robust means to transfer operations from discovery to mesoscale production, exemplified by the Bohlmann–Rahtz cyclodehydration reaction.

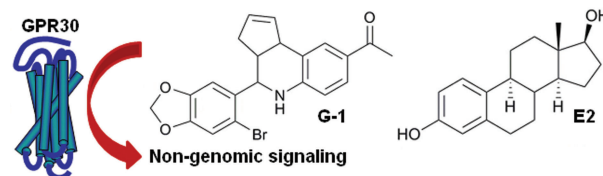


2252

**Highly efficient synthesis and characterization of the GPR30-selective agonist G-1 and related tetrahydroquinoline analogs**

Ritwik Burai, Chinnasamy Ramesh, Marvin Shorty, Ramona Curpan, Cristian Bologna, Larry A. Sklar, Tudor Oprea, Eric R. Prossnitz and Jeffrey B. Arterburn\*

The GPR30 agonist probe **G-1** and structural analogs were synthesized using multicomponent or stepwise Sc(III)-catalyzed aza-Diels–Alder cyclization with *endo*-diastereoselectivity.

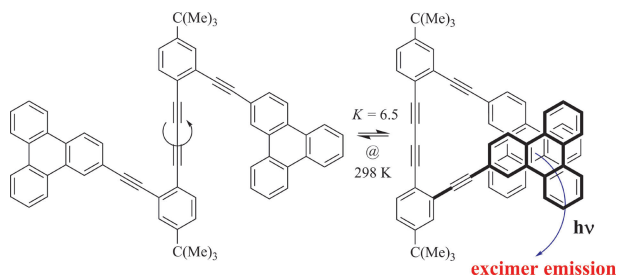


2260

**Unusual fluorescence emission from ethynyltriphenylene-substituted diacetylenic molecular hinge. Formation of intramolecular excimer**

Ritesh Nandy and Sethuraman Sankararaman\*

A diacetylenic molecular hinge bearing two ethynyltriphenylene units has been synthesized. Evidence from <sup>1</sup>H NMR and VT-NMR suggests that there is an equilibrium between the open conformer and the intramolecularly  $\pi$ – $\pi$  interacting closed conformer in solution arising from the rotation of the diacetylenic hinge.



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## IN THIS ISSUE

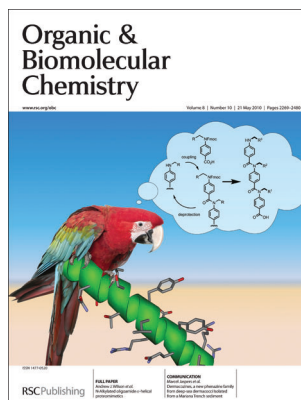
ISSN 1477-0520 CODEN OBCRAK 8(10) 2269–2480 (2010)



### Cover

See Kay Severin *et al.*, pp. 2327–2331.  
A dynamic mixture of iron complexes can be used as a colorimetric sensor for sulfated glycosaminoglycans such as heparin.

Image reproduced by permission of Kay Severin from *Org. Biomol. Chem.*, 2010, **10**, 2327.



### Inside cover

See Andrew J. Wilson *et al.*, pp. 2344–2351.  
'Who's a pretty helix?' On page 2344 of this issue, Wilson and co-workers describe the solid-phase synthesis of a novel series of oligobenzamide  $\alpha$ -helix mimetics shown to act as potent inhibitors of the p53-hDM2 interaction.

Image reproduced by permission of Andrew J. Wilson from *Org. Biomol. Chem.*, 2010, **10**, 2344.

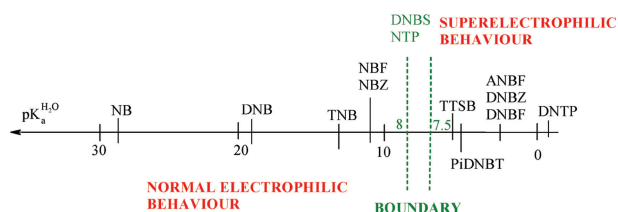
## PERSPECTIVE

2285

### Assessing the superelectrophilic dimension through $\sigma$ -complexation, $S_NAr$ and Diels–Alder reactivity

Erwin Bunzel and François Terrier

Investigation of highly electron-deficient heteroaromatic structures allows extension of the classical domain of reactivity in  $S_NAr$  and  $\sigma$ -complexation processes by 13 orders of magnitude, as illustrated by the  $pK_a^{H_2O}$  scale for covalent hydration. This provides access to a superelectrophilic dimension of major importance in terms of synthetic applications and recognition of new structure–reactivity relationships.



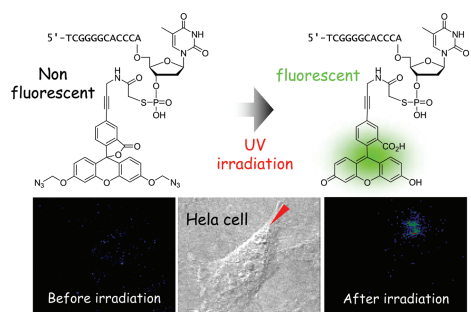
## COMMUNICATIONS

2309

### Photoactivatable fluorescein derivatives with azidomethyl caging groups for tracing oligonucleotides in living human cells

Kazuhiro Furukawa, Hiroshi Abe,\* Satoshi Tsuneda and Yoshihiro Ito\*

A new photocaged fluorescent compound, azidomethyl fluorescein, was successfully utilized to monitor the dynamics of oligonucleotides in living human cells.



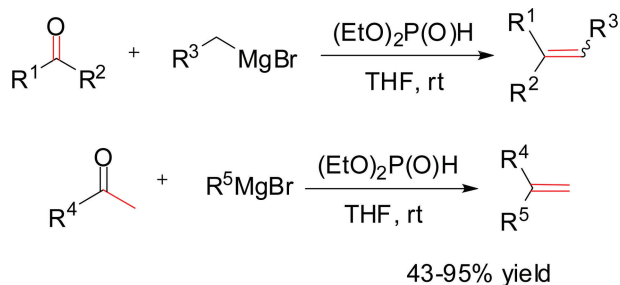


2312

**A novel and efficient method for the olefination of carbonyl compounds with Grignard reagents in the presence of diethyl phosphite**

Tongqiang Wang, Yuanyuan Hu and Songlin Zhang\*

A one-pot manner of carbonyl olefination: a range of conjugated dienes, terminal olefins, multisubstituted-alkenes and conjugated enynes could be readily obtained in good to excellent yields in mild conditions.

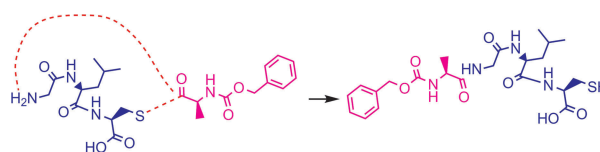


2316

**The chemical ligation of selectively *S*-acylated cysteine peptides to form native peptides via 5-, 11- and 14-membered cyclic transition states**

Alan R. Katritzky,\* Nader E. Abo-Dya, Srinivasa R. Tala and Zakaria K. Abdel-Samii

*N*-Pg-Cysteine peptides are *S*-acylated by *N*-(Pg- $\alpha$ -aminoacyl)benzotriazoles and *N*-Fmoc protected *S*-acyl-isopeptides were deprotected to *S*-acyl-isopeptides. The *S*-acyl-isodi-, isotetra-, and isopenta-peptides undergo ligation via 5-, 11-, and 14-membered transition states to give native peptides.

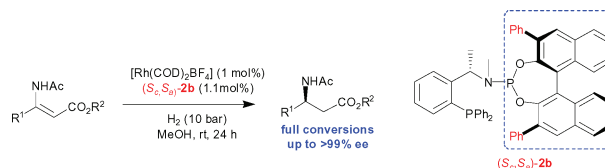


2320

**Chiral 1-phenylethylamine-derived phosphine-phosphoramidite ligands for highly enantioselective Rh-catalyzed hydrogenation of  $\beta$ -(acylamino)acrylates: significant effect of substituents on 3,3'-positions of binaphthyl moiety**

Xiao-Mao Zhou, Jia-Di Huang, Li-Bin Luo, Chen-Lu Zhang, Xiang-Ping Hu\* and Zhuo Zheng

New phosphine-phosphoramidite ligands were successfully applied in the Rh-catalyzed asymmetric hydrogenation of  $\beta$ -(acylamino)acrylates.

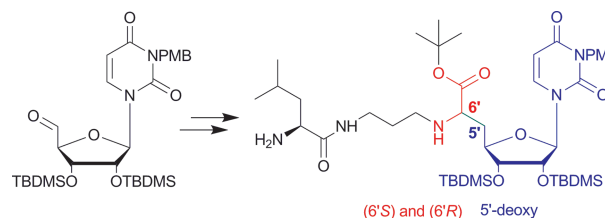


2323

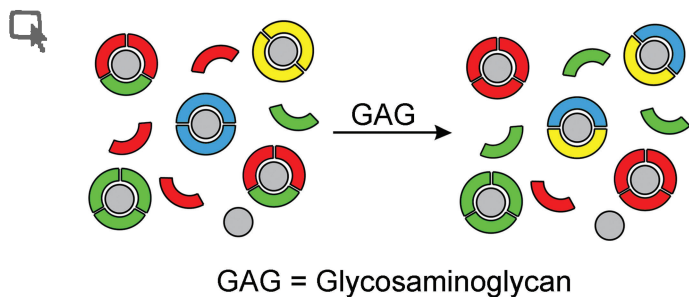
**Novel 5'-deoxy nucleosyl amino acid scaffolds for the synthesis of muraymycin analogues**

Anatol P. Spork and Christian Ducho\*

Naturally occurring nucleoside antibiotics such as muraymycins represent promising lead structures for the development of novel antibacterial agents. A concise synthesis of 5'-deoxy muraymycin derivatives has been developed. The key step was the highly stereoselective asymmetric hydrogenation of suitable dihydro amino acid precursors, providing unique nucleosyl amino acid structures.



2327

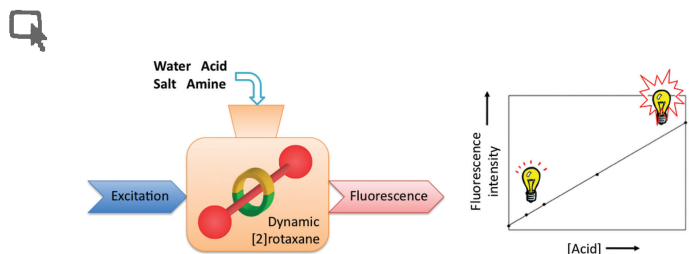


### Pattern-based sensing of sulfated glycosaminoglycans with a dynamic mixture of iron complexes

Peter-Korbinian Müller-Graff, Helga Szelke, Kay Severin\* and Roland Krämer\*

A dynamic mixture of Fe(II) complexes was used as a colorimetric sensor for sulfated glycosaminoglycans such as heparin, dextran sulfate, chondroitin sulfate, and heparan sulfate.

2332

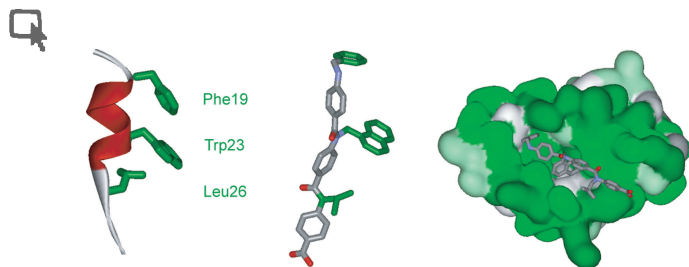


### Self-assembly, stability quantification, controlled molecular switching, and sensing properties of an anthracene-containing dynamic [2]rotaxane

Wing-Yan Wong, Ken Cham-Fai Leung\* and J. Fraser Stoddart\*

A novel anthracene-containing dynamic [2]rotaxane has been synthesised and characterised. The stability of the [2]rotaxane, which has been investigated after the addition of water, acids, salts, and an amine, is monitored by observing the anthracene fluorescence and  $^1\text{H}$  NMR chemical shifts. The [2]rotaxane has been shown to be a good acid sensor.

2344

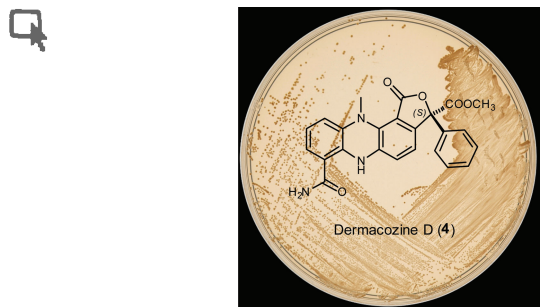


### N-alkylated oligoamide $\alpha$ -helical proteomimetics

Frederick Campbell, Jeffrey P. Plante, Thomas A. Edwards,\* Stuart L. Warriner\* and Andrew J. Wilson\*

In this paper, the design, synthesis and testing of a novel class of proteomimetic is described. Potent  $\mu\text{M}$  inhibitors of the p53-*h*DM2 protein-protein interaction are identified.

2352

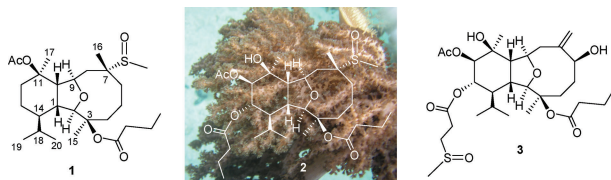


### Dermacozines, a new phenazine family from deep-sea dermacocci isolated from a Mariana Trench sediment

Wael M. Abdel-Mageed, Bruce F. Milne, Marcell Wagner, Marc Schumacher, Peter Sandor, Wasu Pathom-aree, Michael Goodfellow, Alan T. Bull, Koki Horikoshi, Rainer Ebel, Marc Diederich, Hans-Peter Fiedler and Marcel Jaspars\*

Seven phenazines with unique modifications were produced by the piezotolerant actinobacterium *Dermacoccus abyssi* which was isolated from a sediment sample collected from the deepest place on earth, Challenger Deep in the Mariana Trench.

2363

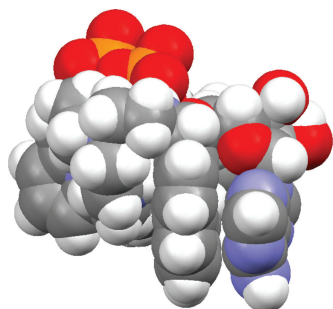


### Anti-inflammatory eunicellin-based diterpenoids from the cultured soft coral *Klyxum simplex*

Bo-Wei Chen, Chih-Hua Chao, Jui-Hsin Su, Zhi-Hong Wen, Ping-Jyun Sung and Jyh-Horng Sheu\*

Three novel eunicellin-based diterpenoids, namely klysimplexin sulfoxides A–C, were isolated from the cultured soft coral *Klyxum simplex*.

2367

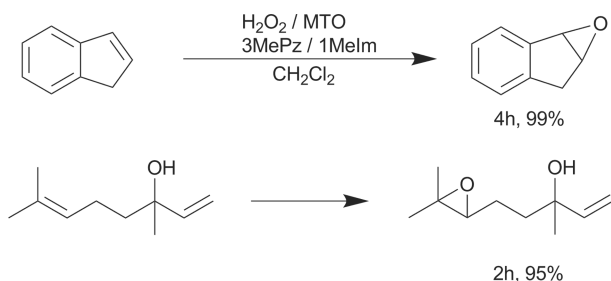


### Tritopic phenanthroline and pyridine tail-tied aza-scorpian

Jorge González, José M. Llinares, Raquel Belda, Javier Pitarch, Concepción Soriano, Roberto Tejero, Begoña Verdejo and Enrique García-España\*

Two new tail-tied aza-macrocycles in which two pyridinophane scorpian equivalent units have been covalently connected through 2,6-dimethylpyridine or 2,9-dimethylphenanthroline linkages show interesting capacity as  $Zn^{2+}$  and polyphosphate anion binders.

2377

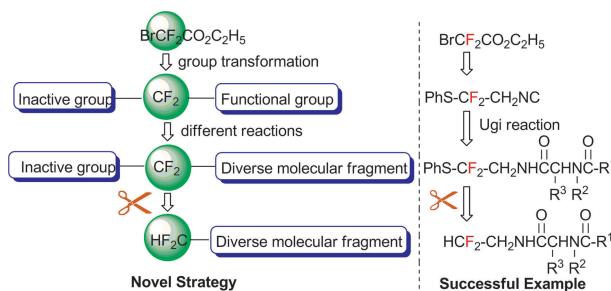


### An effective procedure for the synthesis of acid-sensitive epoxides: Use of 1-methylimidazole as the additive on methyltrioxorhenium-catalyzed epoxidation of alkenes with hydrogen peroxide

Shigekazu Yamazaki\*

The combined use of 3-methylpyrazole and 1-methylimidazole as the additives for methyltrioxorhenium(MTO)-catalyzed epoxidation has been found to be an effective procedure for the synthesis of acid-sensitive epoxides in excellent yields.

2386

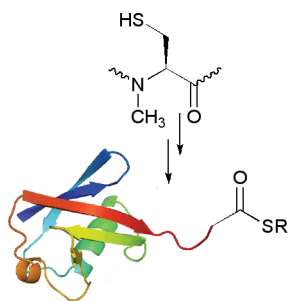


### A general strategy for construction of a difluoromethyl compound library and its application in synthesis of pseudopeptides bearing a terminal difluoromethyl group

Jingjing Wu, Song Cao,\* Nianjin Liu, Li Shen, Jinlong Yu, Jian Zhang, Hui Li and Xuhong Qian

A novel synthesis strategy that uses common reaction conditions to transform a collection of simple building blocks into complex molecules bearing a terminal difluoromethyl group was described. The strategy is illustrated by application to the synthesis of  $CF_2H$ -bearing pseudopeptides via Ugi reaction.

2392

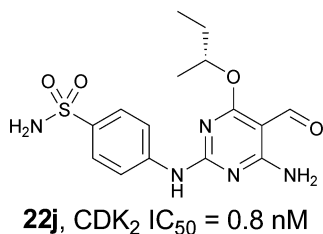


### *N*-Methylcysteine-mediated total chemical synthesis of ubiquitin thioester

Lesly A. Erlich, K. S. Ajish Kumar, Mahmood Haj-Yahya, Philip E. Dawson and Ashraf Brik\*

A new method for the synthesis of ubiquitin thioester was developed. The strategy was applied to the preparation of ubiquitylated  $\alpha$ -synuclein(1–17), which was shown to be a substrate for the ubiquitin C-terminal hydrolase.

2397

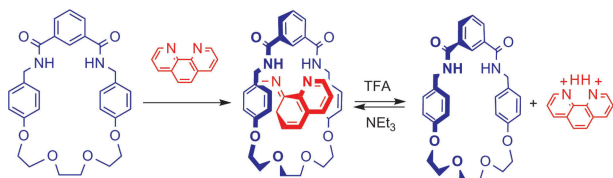


### Synthesis and biological evaluation of 5-substituted *O*<sup>4</sup>-alkylpyrimidines as CDK2 inhibitors

Francesco Marchetti, Céline Cano, Nicola J. Curtin, Bernard T. Golding, Roger J. Griffin, Karen Haggerty, David R. Newell, Rachel J. Parsons, Sara L. Payne, Lan Z. Wang and Ian R. Hardcastle\*

CDK2 inhibitory structure–activity relationships have been explored for a range of 5-substituted *O*<sup>4</sup>-alkylpyrimidines. The 5-formyl derivatives show selectivity for CDK-2 over other CDK family members.

2408

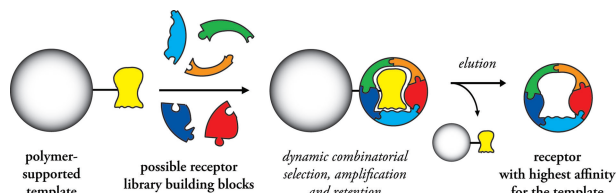


### Acid/base controllable molecular switch based on a neutral phenanthroline guest penetrated pseudorotaxane

Masahiro Muraoka,\* Hiromitsu Irie and Yohji Nakatsuji\*

New pseudorotaxanes incorporating a bisamide macrocycle and neutral phenanthroline derivatives can be formed by hydrogen bonding and  $\pi$ -electron interaction, which gives a pH controllable reversible molecular switching system.

2414



### Affinity chromatography in dynamic combinatorial libraries: one-pot amplification and isolation of a strongly binding receptor

Pol Besenius,\* Peter A. G. Cormack,\* R. Frederick Ludlow, Sijbren Otto and David C. Sherrington

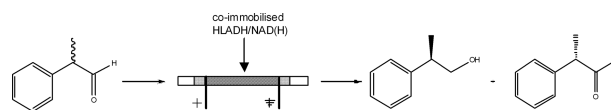
We report the one-pot amplification and isolation of a nanomolar receptor in a multibuilding block aqueous dynamic combinatorial library consisting of well over 140 theoretical members using a polymer-bound template.

2419

### The development and evaluation of a conducting matrix for the electrochemical regeneration of the immobilised co-factor NAD(H) under continuous flow

B. Ngamsom, A. M. Hickey, G. M. Greenway,\*  
J. A. Littlechild, T. McCreedy, P. Watts and C. Wiles

Employing a novel conducting controlled pore glass-poly(pyrrole) material for the co-immobilisation of HLADH and NAD(H), we were able to fabricate a reagent-less flow reactor capable of the continuous biosynthesis of chiral compounds under an applied voltage.

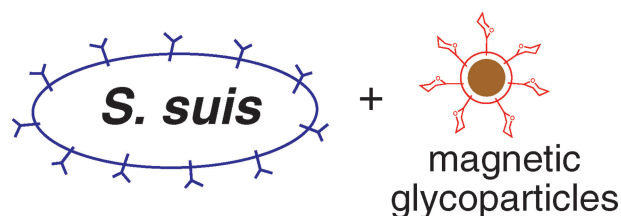


2425

### Detection of pathogenic *Streptococcus suis* bacteria using magnetic glycoparticles

Núria Parera Pera, Annika Kouki, Sauli Haataja,  
Hilbert M. Branderhorst, Rob M. J. Liskamp,  
Gerben M. Visser, Jukka Finne and Roland J. Pieters\*

Magnetic glycoparticles can be used to bind, concentrate, and detect the pathogenic bacterium *Streptococcus suis*

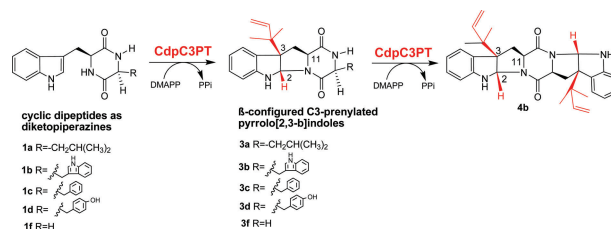


2430

### Preparation of pyrrolo[2,3-b]indoles carrying a $\beta$ -configured reverse C3-dimethylallyl moiety by using a recombinant prenyltransferase CdpC3PT

Wen-Bing Yin, Xia Yu, Xiu-Lan Xie and Shu-Ming Li\*

Six  $\beta$ -configured reversely C3-prenylated pyrrolo[2,3-b]indoles were successfully prepared from cyclic tryptophan-containing dipeptides by using a recombinant prenyltransferase from *Neosartorya fischeri*.

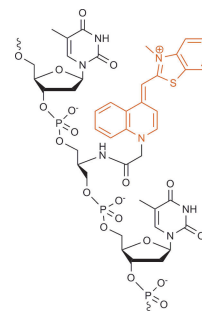


2439

### Designed thiazole orange nucleotides for the synthesis of single labelled oligonucleotides that fluoresce upon matched hybridization

Lucas Bethge, Ishwar Singh and Oliver Seitz\*

DNA conjugates that contain thiazole orange as an artificial base were synthesized and studied by fluorescence spectroscopy, revealing that fluorescence-on-hybridization can only be obtained through careful design of the backbone structure.

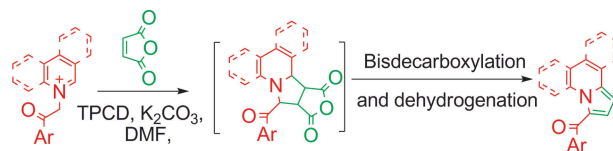


2449

### Regioselective synthesis of 3-acylindolizines and benzo-analogues *via* 1,3-dipolar cycloadditions of *N*-ylides with maleic anhydride

Yun Liu, Yan Zhang, Yong-Miao Shen, Hong-Wen Hu and Jian-Hua Xu\*

3-Acylindolizines and their benzo- analogues are regioselectively synthesized by one pot reactions of the *N*-ylide with maleic anhydride, taking advantage of the oxidative bisdecarboxylation and dehydrogenation of the primary cycloadducts by the mild oxidant tetrakispyridinecobalt(II) dichromate (TPCD).

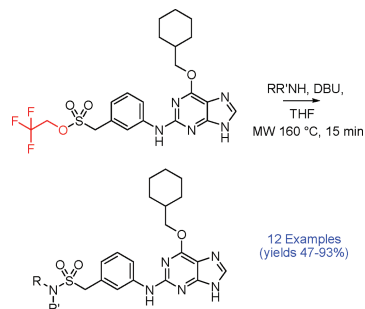


2457

### Synthesis of sulfonamide-based kinase inhibitors from sulfonates by exploiting the abrogated $S_N2$ reactivity of 2,2,2-trifluoroethoxysulfonates

Christopher Wong, Roger J. Griffin, Ian R. Hardcastle, Julian S. Northen, Lan-Zhen Wang and Bernard T. Golding\*

The reduced  $S_N2$  reactivity of the 2,2,2-trifluoroethyl group has been used for the synthesis of 6-cyclohexylmethoxy-2-aryl-aminopurines with a sulfonamide moiety attached to the aryl ring *via*  $CH_2$ ; such compounds are inhibitors of kinases relevant to cancer treatment.

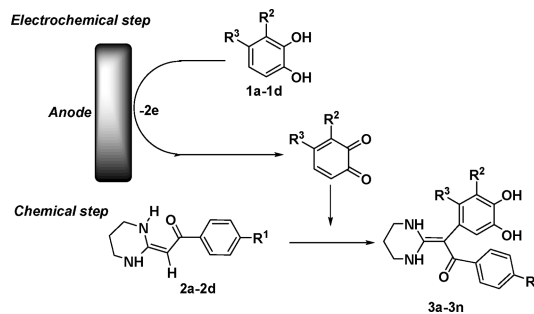


2465

### Anodic oxidation of catechols in the presence of $\alpha$ -oxoketene *N,N*-acetals with a tetrahydropyrimidine ring: selective $\alpha$ -arylation reaction

Cheng-Chu Zeng,\* Da-Wei Ping, Li-Ming Hu, Xiu-Qing Song and Ru-Gang Zhong

This paper provides an efficient way to obtain  $\alpha$ -aryl  $\alpha$ -oxoketene *N,N*-acetals with a tetrahydropyrimidine ring.

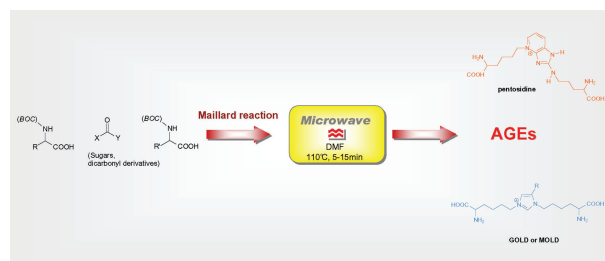


2473

### Microwave-assisted Maillard reactions for the preparation of advanced glycation end products (AGEs)

Sonja Visentin, Claudio Medana, Alessandro Barge, Valeria Giancotti and Giancarlo Cravotto\*

A MW-assisted Maillard reaction in DMF showed to be a straightforward method for the preparation of pentosidine and other AGE derivatives paving the road to a plethora of challenging scientific applications.



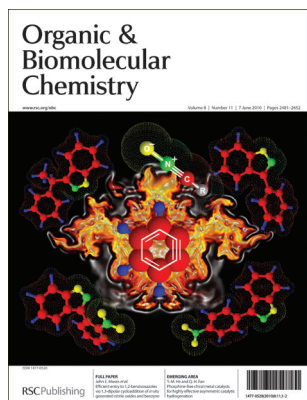
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## IN THIS ISSUE

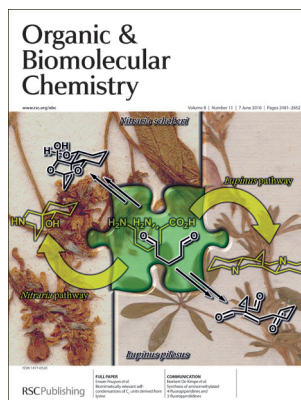
ISSN 1477-0520 CODEN OBCRAK 8(11) 2481–2652 (2010)



### Cover

See John E. Moses *et al.*, pp. 2537–2542.  
An improved synthesis of a range of 1,2-benzisoxazoles via 1,3-dipolar cycloaddition of *in situ* generated reactive intermediates: nitrile oxides and benzyne is described.

Image reproduced by permission of John E. Moses from *Org. Biomol. Chem.*, 2010, **8**, 2537.



### Inside cover

See Erwan Poupon *et al.*, pp. 2522–2528.  
Self-condensations of C<sub>3</sub> reactive units enabled the synthesis of skeletons reminiscent to that of alkaloids known to be biosynthesized via the lysine pathway (images of the Linnaeus' herbarium courtesy of the Museum of Natural History, Stockholm, Sweden).

Image reproduced by permission of Erwan Poupon from *Org. Biomol. Chem.*, 2010, **8**, 2522.

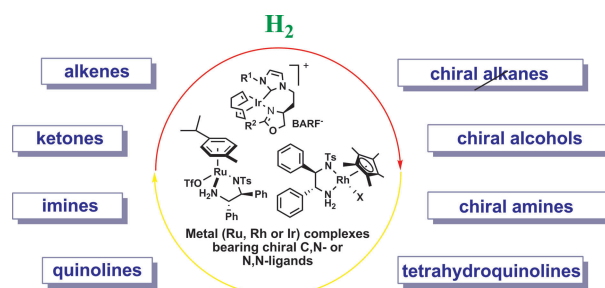
## EMERGING AREA

2497

### Phosphine-free chiral metal catalysts for highly effective asymmetric catalytic hydrogenation

Yan-Mei He and Qing-Hua Fan\*

In this account, two types of chiral phosphine-free ligand, N-heterocyclic carbene-based C,N-ligands and diamine-based N,N-ligands, in the homogeneous asymmetric hydrogenation of prochiral ketones, imines and quinolines are reviewed.



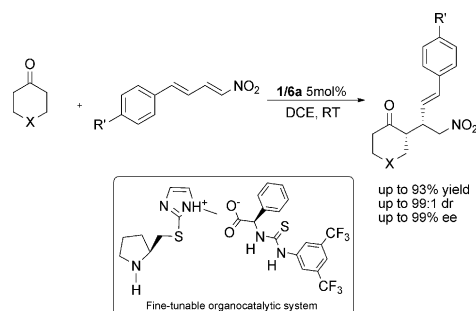
## COMMUNICATIONS

2505

### The highly enantioselective Michael addition of ketones to nitrodiene catalyzed by the efficient organocatalyst system of pyrrolidinyl-thioimidazole and chiral thioureido acid

Zhao-Bo Li, Shu-Ping Luo, Yi Guo, Ai-Bao Xia and Dan-Qian Xu\*

The highly enantioselective asymmetric Michael addition reactions of ketones to nitrodiene was promoted efficiently by fine-tunable organocatalytic system of pyrrolidinyl-thioimidazole and chiral thioureido acid to afford the adducts with high yields (up to 93%), high diastereoselectivities (up to 99 : 1) and excellent enantioselectivities (up to 99% ee).

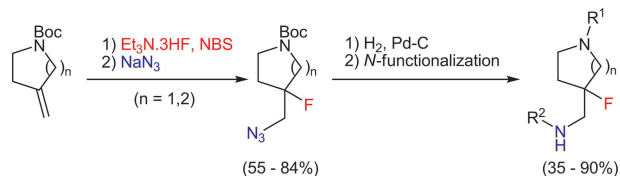


2509

### Synthesis of aminomethylated 4-fluoropiperidines and 3-fluoropyrrolidines

Guido Verniest, Karel Piron, Eva Van Hende, Jan Willem Thuring, Gregor Macdonald, Frederik Deroose and Norbert De Kimpe\*

A short and efficient synthesis of 4-aminomethyl-4-fluoropiperidines and 3-aminomethyl-3-fluoropyrrolidines is described. These fluorinated azaheterocycles are of specific interest as bifunctional building blocks for fluorinated pharmaceutical compounds.

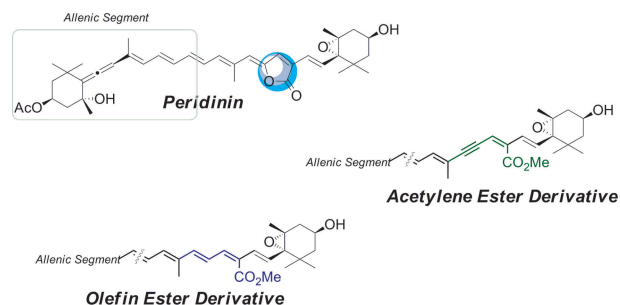


2513

### Syntheses of ylidenebutenolide-modified derivatives of peridinin and their stereochemical and spectral characteristics

Takayuki Kajikawa, Kazuyoshi Aoki, Takashi Iwashita, Dariusz M. Niedzwiedzki, Harry A. Frank and Shigeo Katsumura\*

We describe the syntheses of two ylidenebutenolide-modified derivatives of peridinin and the results of their stereochemical and spectral characteristics toward elucidation of the exact role of the ylidenebutenolide function.

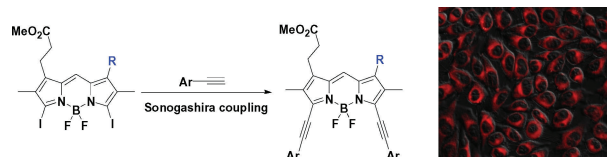


2517

### Long wavelength red fluorescent dyes from 3,5-diiodo-BODIPYs

Lijuan Jiao,\* Changjiang Yu, Timsy Uppal, Mingming Liu, Yan Li, Yunyou Zhou, Erhong Hao, Xiaoke Hu and M. Graça H. Vicente\*

Amphiphilic and long wavelength red fluorescent dyes have been efficiently synthesized from the Sonogashira coupling reactions of 3,5-diiodo-BODIPYs. One of these compounds showed low dark cytotoxicity and accumulated preferentially within the ER of HEp2 cells.

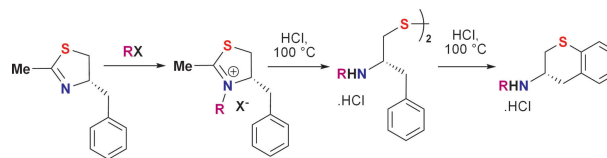


2520

### Synthesis of 3-amino-thiochromanes from 4-benzyl 2-thiazolines, via an unprecedented intramolecular electrophilic aromatic substitution

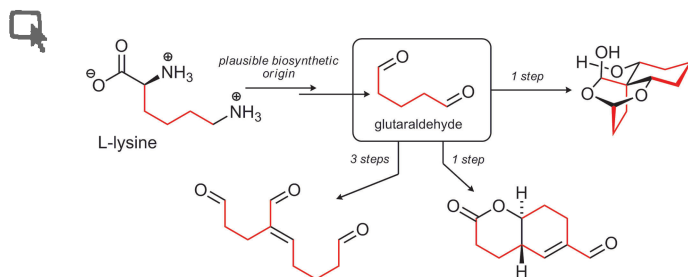
Guillaume Mercey, Remi Legay, Jean-François Lohier, Jana Sopkova-de Oliveira Santos, Jocelyne Levillain, Annie-Claude Gaumont and Mihaela Gulea\*

A one-pot synthesis of various *N*-substituted 3-amino-thiochromanes from 4-benzyl-2-methyl thiazoline is described. The reaction involves the formation of a disulfide, which subsequently takes part in an unprecedented intramolecular electrophilic aromatic substitution.





2522

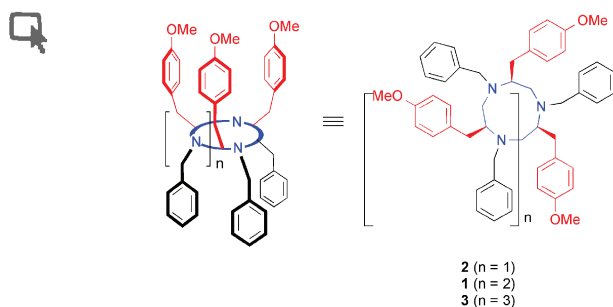


### Biomimetically relevant self-condensations of C<sub>5</sub> units derived from lysine

Rim Salame, Edmond Gravel, Pascal Retailleau and Erwan Poupon\*

In various and simple conditions, dimerization of pentanedial-derived units gives rise to interesting skeletons, which are reminiscent of alkaloids known to be biosynthesized in Nature *via* lysine metabolism.

2529

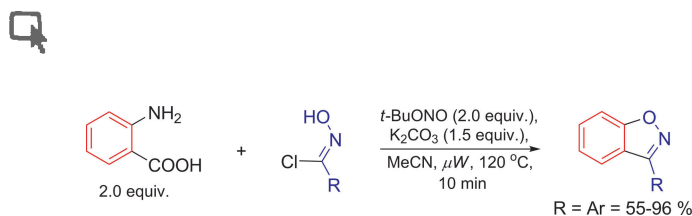


### Synthesis of chiral polyazamacrocycles of variable ring size

Seiji Kamioka, Sakae Sugiyama, Takashi Takahashi and Takayuki Doi\*

Optically active tri-, tetra-, and penta-azamacrocycles having 4-methoxyphenyl pendants were synthesized. Tri-azamacrocycle **2** does not mainly have a vase-type conformation as tetra-azamacrocycle **1** does but penta-azamacrocycle **3** has a vase-type conformation in CDCl<sub>3</sub> and in CD<sub>2</sub>Cl<sub>2</sub>.

2537

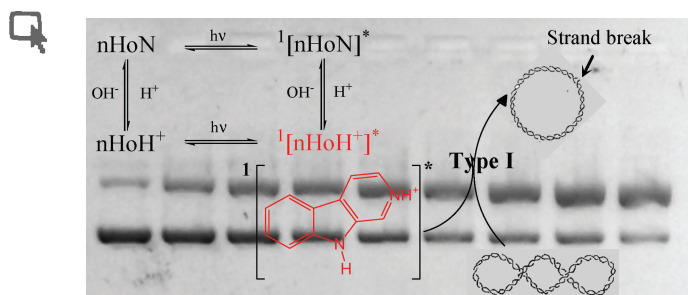


### An efficient entry to 1,2-benzisoxazoles *via* 1,3-dipolar cycloaddition of *in situ* generated nitrile oxides and benzyne

Christian Spiteri, Christopher Mason, Fengzhi Zhang, Dougal J. Ritson, Pallavi Sharma, Steve Keeling and John E. Moses\*

An efficient protocol for the synthesis of a range of 1,2-benzisoxazoles using an improved 1,3-dipolar cycloaddition of nitrile oxides and benzyne is described. Key to the procedure is the *in situ* generation of the reactive nitrile oxide and benzyne reactants simultaneously.

2543



### Photosensitized cleavage of plasmidic DNA by norharmane, a naturally occurring $\beta$ -carboline

M. Micaela Gonzalez, Magali Pellon-Maison, Matias A. Ales-Gandolfo, Maria R. Gonzalez-Baró, Rosa Erra-Balsells\* and Franco M. Cabrerizo\*

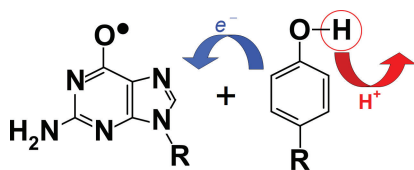
In air-equilibrated aqueous solution, under both pH conditions, the photosensitized cleavage of plasmidic DNA occurs mainly *via* Type I mechanism (electron transfer) from the single excited state (S<sub>1</sub>) of the protonated form of norharmane (<sup>1</sup>[nHoH<sup>+</sup>]\*).

2553

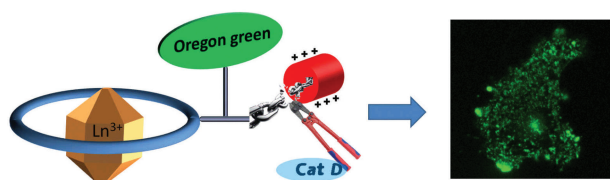
### Reduction of electron deficient guanine radical species in plasmid DNA by tyrosine derivatives

Mandi Tsoi, Trinh T. Do, Vicky J. Tang, Joseph A. Aguilera and Jamie R. Milligan\*

Reduction of guanyl radicals in plasmid DNA by tyrosine residues in an electrostatically bound peptide ligand involves a proton coupled electron transfer.



2560

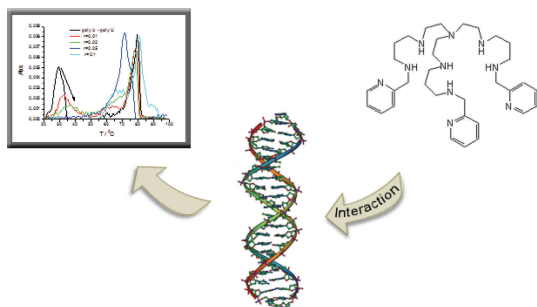


### A paramagnetic chemical exchange-based MRI probe metabolized by cathepsin D: design, synthesis and cellular uptake studies

Mojmír Suchý, Robert Ta, Alex X. Li, Filip Wojciechowski, Stephen H. Pasternak, Robert Bartha and Robert H. E. Hudson\*

A dual fluorescence/MRI probe for the potential detection of localized cathepsin D activity has been synthesized which includes MRI and optical reporter groups connected to a cell penetrating peptide by a cathepsin D cleavable sequence.

2567

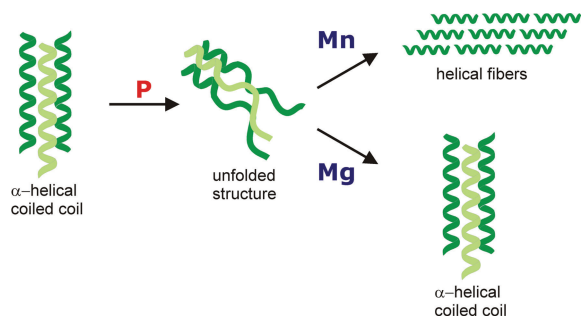


### Acid–base properties of functionalised tripodal polyamines and their interaction with nucleotides and nucleic acids

Alejandra Sornosa-Ten, M. Teresa Albelda,\* Juan C. Frías, Enrique García-España,\* José M. Llinares, Ana Budimir and Ivo Piantanida\*

Tripodal polyamines functionalised with heterocyclic moieties revealed the formation of stable complexes with monophosphate nucleotides in aqueous media. Strong binding of all the studied compounds to both ds-DNA and ds-RNA is to some extent selective toward the latter, showing rather rare RNA over DNA preference.

2575



### Towards understanding secondary structure transitions: phosphorylation and metal coordination in model peptides

Malgorzata Broncel, Sara C. Wagner, Kerstin Paul, Christian P. R. Hackenberger\* and Beate Kokschi\*

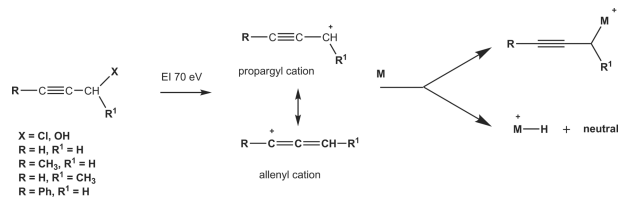
Structural consequences of phosphorylation and subsequent magnesium and manganese ion coordination were investigated in a coiled coil-based peptide model. It was demonstrated that these biologically relevant factors have significant molecular switching abilities, with phosphorylation being highly destabilizing and metals possessing structure-inducing properties.

2580

### Intrinsic acidity and electrophilicity of gaseous propargyl/allenyl carbocations

Priscila M. Lalli, Yuri E. Corilo, Patricia V. Abdelnur, Marcos N. Eberlin\* and Kenneth K. Laali\*

The ion/molecule chemistry of propargyl/allenyl cations with different substituents was studied. Their intrinsic acidity, as measured *via* proton transfer reactions, and electrophilicity (adduct formation) were evaluated in reactions with model reactants.

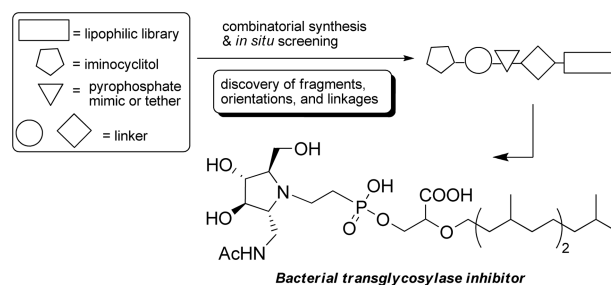


2586

### Combinatorial approach toward synthesis of small molecule libraries as bacterial transglycosylase inhibitors

Hao-Wei Shih, Kuo-Ting Chen, Shao-Kang Chen, Chia-Ying Huang, Ting-Jen R Cheng, Che Ma, Chi-Huey Wong\* and Wei-Chieh Cheng\*

With assistance of microtiter plate-based combinatorial chemistry and *in situ* screening, a potential inhibitor, the first potent iminocyclitol-based inhibitor against bacterial TGases was efficiently developed.

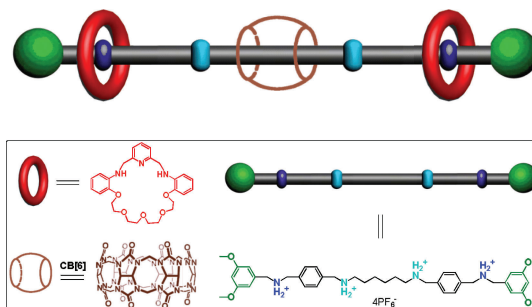


2594

### Efficient synthesis of a hetero[4]rotaxane by a “threading-stoppering-followed-by-clipping” approach

Jun Yin, Chunyan Chi and Jishan Wu\*

A “threading-stoppering-followed-by-clipping” approach was used for the synthesis of a hetero[4]rotaxane, in which one cucurbit[6]uril (CB[6]) and two hetero crown ether macrocycles are threaded onto one dumbbell-shaped molecule.

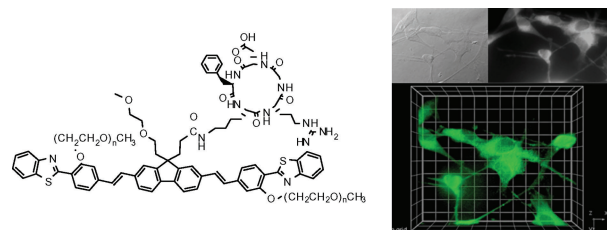


2600

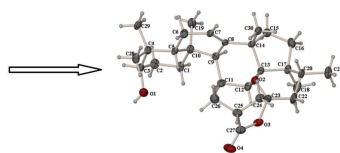
### Linear and nonlinear photophysics and bioimaging of an integrin-targeting water-soluble fluorenyl probe

Alma R. Morales, Gheorghe Luchita, Ciceron O. Yanez, Mykhailo V. Bondar, Olga V. Przhonska and Kevin D. Belfield\*

A water-soluble fluorenyl probe has been synthesized and its linear photophysical and two-photon absorption properties characterized. Conventional and two-photon fluorescence microscopy imaging of U87MG cells incubated with the fluorenyl-RGD peptide conjugate demonstrated high integrin selectivity.



2609



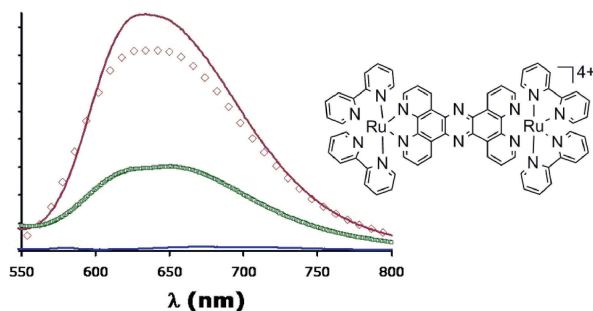
Abiesatrine A (1)

### Abiesatrines A–J: anti-inflammatory and antitumor triterpenoids from *Abies georgei* Orr

Xian-Wen Yang, Su-Mei Li, Liang Wu, Yong-Li Li, Lin Feng, Yun-Heng Shen, Jun-Mian Tian, Jian Tang, Ning Wang, Yonghong Liu and Wei-Dong Zhang\*

A novel *spiro*-lanostane (abiesatrine A, **1**) was isolated from *Abies georgei* together with 9 new and 10 known triterpenes. The configuration of **1**, featuring a unique spiro-lactone formed by C-13 and C-23 via oxygen-bridge, was confirmed by X-ray crystallography.

2617

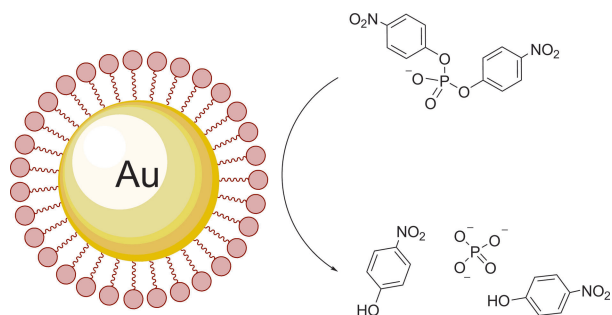


### Differentiating quadruplexes: binding preferences of a luminescent dinuclear ruthenium(II) complex with four-stranded DNA structures

Tom Wilson, Mike P. Williamson\* and Jim A Thomas\*

A DNA dimmer switch: the interaction of dinuclear ruthenium complexes with biologically relevant DNA quadruplexes results in emission that is dependent—in both intensity and wavelength—on specific quadruplex structural features.

2622

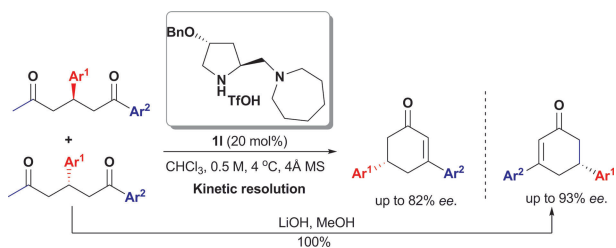


### Phosphate diesters cleavage mediated by Ce(IV) complexes self-assembled on gold nanoparticles

Renato Bonomi, Paolo Scrimin and Fabrizio Mancin\*

Gold nanoparticles bearing Ce(IV) complexes on the coating monolayer show high activity in the hydrolytic cleavage of phosphate diesters due to the cooperative action of several metal ions.

2627



### Organocatalytic kinetic resolution *via* intramolecular aldol reactions: Enantioselective synthesis of both enantiomers of chiral cyclohexenones

Liujuan Chen, Sanzhong Luo,\* Jiuyuan Li, Xin Li and Jin-Pei Cheng\*

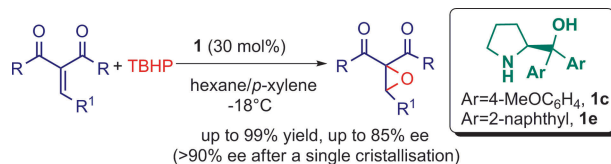
Kinetic resolution of 6-aryl-2,6-hexadiones was achieved with chiral secondary amine catalyzed intramolecular aldolization. The current kinetic resolution protocol enables the synthesis of both enantiomers of cyclohexenones with moderate to good enantioselectivity.

2633

### Asymmetric epoxidation of 2-arylidene-1,3-diketones: facile access to synthetically useful epoxides

Alessio Russo and Alessandra Lattanzi\*

The first enantioselective epoxidation reaction of acyclic and cyclic 2-arylidene-1,3-diketones, by means of simple  $\alpha,\alpha$ -diaryl prolinols/TBHP system, provides the corresponding synthetically and pharmaceutically useful epoxides in up to 85% ee.

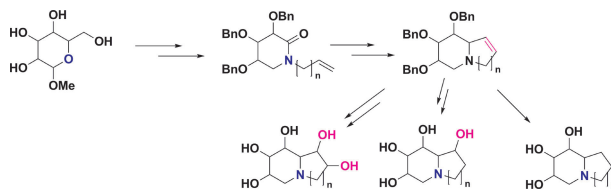


2639

### A new synthetic access to bicyclic polyhydroxylated alkaloid analogues from pyranosides


Ning Wang, Li-He Zhang and Xin-Shan Ye\*

An efficient route to bicyclic polyhydroxylated alkaloid analogues from pyranosides was developed by using a seven- or eight-step sequence in good overall yields.



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# Organic & Biomolecular Chemistry

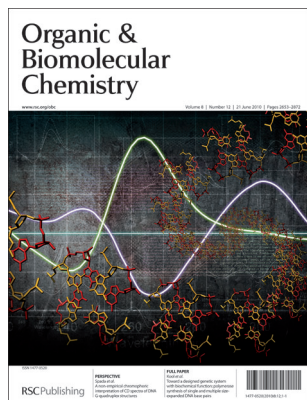
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## IN THIS ISSUE

ISSN 1477-0520 CODEN OBCRAK 8(12) 2653–2872 (2010)

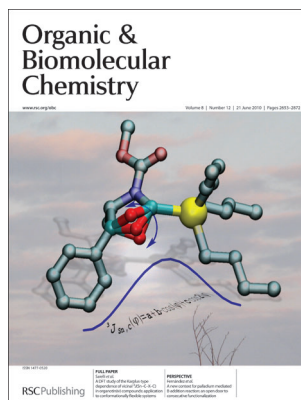


### Cover

See Gian Piero Spada *et al.*, pp. 2683–2692.

Why does the different strand folding in G4-DNAs give rise to different circular dichroism spectra? In this perspective article, the most relevant CD features are rationalised in terms of different stacking orientation between adjacent G-quartets.

Image reproduced by permission of Gian Piero Spada from *Org. Biomol. Chem.*, 2010, **8**, 2683.



### Inside cover

See Giacomo Saielli *et al.*, pp. 2711–2718.

Relativistic DFT calculations, including population analysis, highlight several unexpected features of the Karplus-type dependence of vicinal (Sn–C–X–C) spin-spin couplings in organotin(IV) synthetic intermediates.

Image reproduced by permission of Giacomo Saielli from *Org. Biomol. Chem.*, 2010, **8**, 2711.

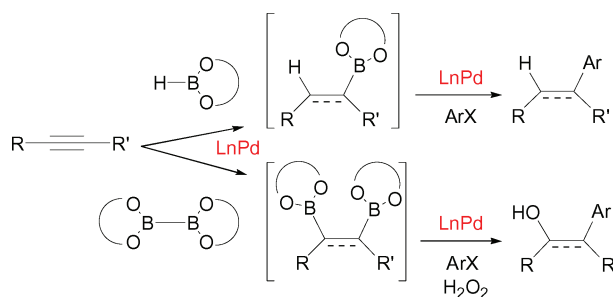
## PERSPECTIVES

2667

### A new context for palladium mediated B-addition reaction: an open door to consecutive functionalization

Cristina Pubill-Ulldemolins, Amadeu Bonet, Carles Bo, Henrik Gulyás\* and Elena Fernández\*

Highlighting the great interest in the application of organoboranes in C–C bond formation, this perspective provides the reader with the criteria to design consecutive tandem organoboron formation/C–C coupling reactions by means of multifaceted palladium catalytic systems.

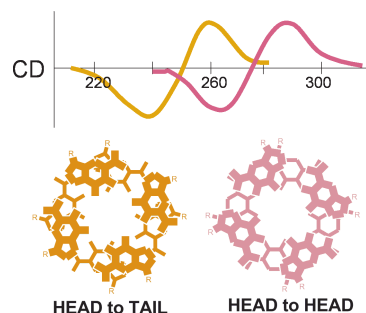


2683

### A non-empirical chromophoric interpretation of CD spectra of DNA G-quadruplex structures

Stefano Masiero, Roberta Trotta, Silvia Pieraccini, Stefano De Tito, Rosaria Perone, Antonio Randazzo\* and Gian Piero Spada\*

While the main difference in CD spectra of G4-DNAs is usually empirically associated to the relative orientation of the strands, in this perspective article, it is rationalised in terms of different stacking orientation (head-to-tail, head-to-head, tail-to-tail) between adjacent G-quartets.

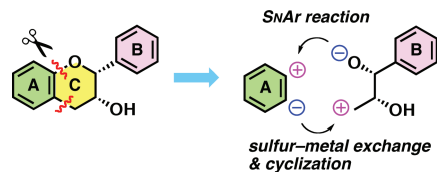


2693

### General synthesis of epi-series catechins and their 3-gallates: reverse polarity strategy

Ken Ohmori, Takahisa Yano and Keisuke Suzuki\*

A general synthetic route to the epi-series catechins was developed based on the reverse polarity strategy. Aromatic nucleophilic substitution reaction followed by the sulfinyl–metal exchange and cyclization enabled stereo-controlled access to various members of epi-series catechins and their 3-gallates.

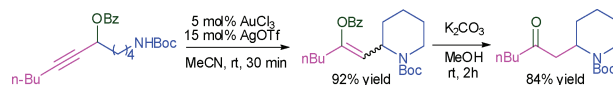


2697

### Gold-catalyzed synthesis of nitrogen-containing heterocycles from $\epsilon$ -*N*-protected propargylic esters

Jianfeng Huang, Xuan Huang and Bo Liu\*

A mild and efficient gold-catalyzed tandem cyclization to piperidiny enol esters has been developed with facily available  $\epsilon$ -*N*-Boc-protected propargylic esters.

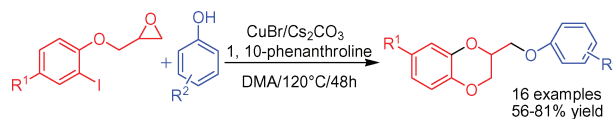


2700

### Copper-catalyzed tandem process: an efficient approach to 2-substituted-1,4-benzodioxanes

Yunyun Liu and Weiliang Bao\*

An efficient method for the preparation of various 2-substituted-1,4-benzodioxanes by CuBr-catalyzed tandem reactions of 2-((*o*-iodophenoxy)methyl)oxiranes with phenols has been developed. The reaction involves the ring-opening process of 2-((*o*-iodophenoxy)methyl)oxirane followed by an intramolecular C–O cross coupling cyclization.



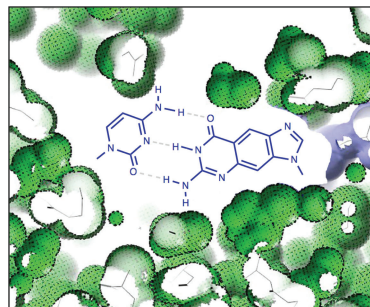
## PAPERS

2704

### Toward a designed genetic system with biochemical function: polymerase synthesis of single and multiple size-expanded DNA base pairs

Haige Lu, Andrew T. Krueger, Jianmin Gao, Haibo Liu and Eric T. Kool\*

Size-expanded DNA (xDNA) represents a new, larger-than-native architecture for a genetic set. The first full study of polymerase-mediated synthesis, editing, and extension of up to four xDNA base pairs is described here. Results show that a repair polymerase (Dpo4) is able to extend xDNA pairs more efficiently than the Klenow polymerase.

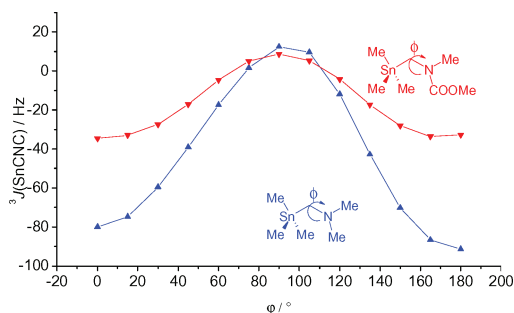


2711

**A DFT study of the Karplus-type dependence of vicinal  $^3J(\text{Sn}-\text{C}-\text{X}-\text{C})$ ,  $\text{X}=\text{N},\text{O},\text{S}$ , in organotin(IV) compounds: application to conformationally flexible systems**

Girolamo Casella, Francesco Ferrante and Giacomo Saielli\*

Karplus-type curves for Sn–C–X–C couplings have been investigated by relativistic and non-relativistic DFT protocols. The results obtained for simple model systems reveal interesting features which help to rationalize experimental data for cyclic and conformationally flexible  $\alpha$ -aminoorganostannanes.

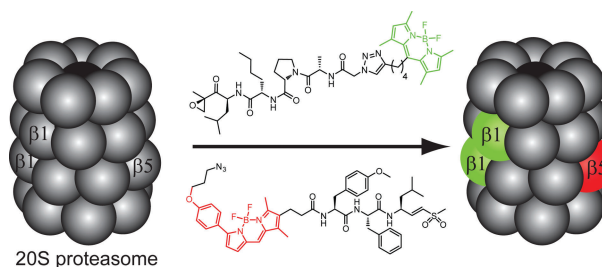


2719

**A panel of subunit-selective activity-based proteasome probes**

Martijn Verdoes, Lianne I. Willems, Wouter A. van der Linden, Boudewijn A. Duivenvoorden, Gijsbert A. van der Marel, Bogdan I. Florea, Alexei F. Kisselev\* and Herman S. Overkleeft\*

The development of fluorescent activity-based probes that selectively target the  $\beta 1$  and  $\beta 5$  active sites of the constitutive proteasome is presented.

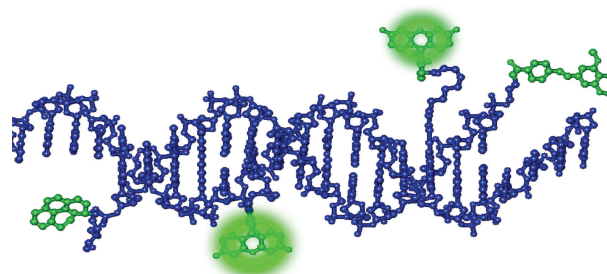


2728

**End-capped HyBeacon probes for the analysis of human genetic polymorphisms related to warfarin metabolism**

Nouha Ben Gaied, James A. Richardson, Daniel G. Singleton, Zhengyun Zhao, David French and Tom Brown\*

End-capped HyBeacon probes have been used to characterize SNPs in genes associated with variations in the efficiency of warfarin metabolism. 5'-Trimethoxystilbene and 3'-pyrene caps increase the differences between hybridised and dissociated states and provide a robust method for interrogation of polymorphic DNA sequences.

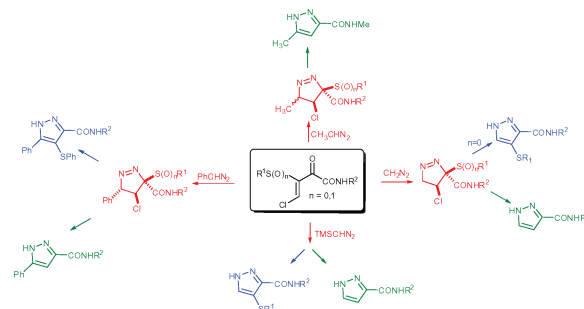


2735

**1,3-Dipolar cycloadditions of 2-thio-3-chloroacrylamides with diazoalkanes**

Marie Kissane, Simon E. Lawrence and Anita R. Maguire\*

2-Thio-3-chloroacrylamides undergo 1,3-dipolar cycloadditions with diazoalkanes leading to a series of novel pyrazolines and pyrazoles. The mechanistic and synthetic features of the cycloadditions to the 2-thio-3-chloroacrylamides at both the sulfide and sulfoxide levels of oxidation are rationalised on the basis of the nature of the substituents.



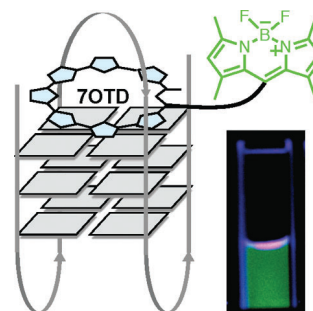


2749

### Visualization of G-quadruplexes by using a BODIPY-labeled macrocyclic heptaoxazole

Masayuki Tera, Keisuke Iida, Kazunori Ikebukuro, Hiroyuki Seimiya, Kazuo Shin-ya and Kazuo Nagasawa\*

Visualization of G-quadruplex structures could be achieved by fluorescent labeled macrocyclic heptaoxazole namely LIBOD-7OTD in the cell-free and cell-based assay.

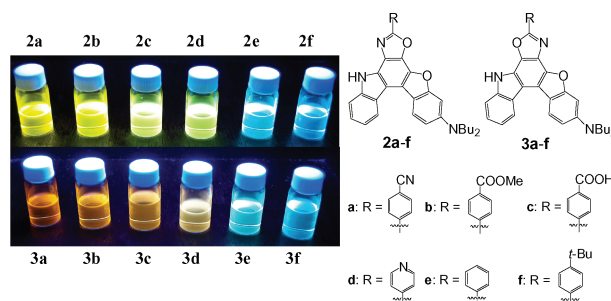


2756

### Synthesis and fluorescence and electrochemical properties of D- $\pi$ -A structural isomers of benzofuro[2,3-*c*]-oxazolo[4,5-*a*]carbazole-type and benzofuro[2,3-*c*]-oxazolo[5,4-*a*]carbazole-type fluorescent dyes

Yosuke Ooyama, Genta Ito, Kohei Kushimoto, Kenji Komaguchi, Ichiro Imae and Yutaka Harima\*

Two heteropolycyclic D- $\pi$ -A structural isomers, which differ in the position of oxygen and nitrogen atoms of the oxazole ring, have been synthesized, and their photophysical and electrochemical properties have been investigated.

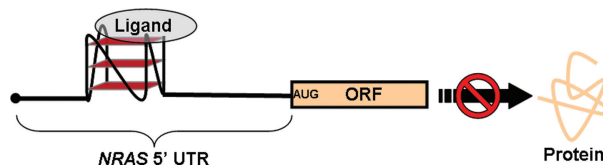


2771

### Small molecule-mediated inhibition of translation by targeting a native RNA G-quadruplex

Anthony Bugaut, Raphaël Rodriguez, Sunita Kumari, Shang-Te Danny Hsu and Shankar Balasubramanian\*

We report on the first example of translation inhibition by a small molecule that targets an RNA G-quadruplex within the 5' UTR of the human *NRAS* proto-oncogene.

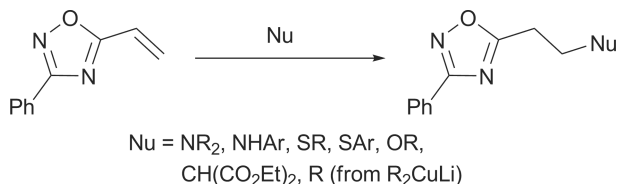


2777

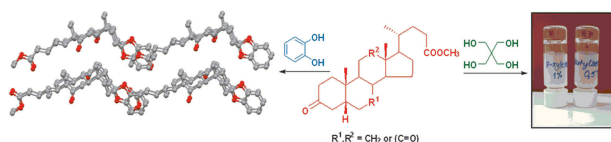
### Tuned methods for conjugate addition to a vinyl oxadiazole; synthesis of pharmaceutically important motifs

Alan R. Burns, Jennifer H. Kerr, William J. Kerr,\* Joanna Passmore, Laura C. Paterson and Allan J. B. Watson

The addition of various nucleophiles to a vinyl 1,2,4-oxadiazole is described. Following optimisation, individual protocols tuned for the use of each specific class of reagent have been developed to allow the installation of nitrogen, sulfur, oxygen, and carbon nucleophiles, and leading to the preparation of a series of compounds containing the pharmaceutically important oxadiazole motif.



2784

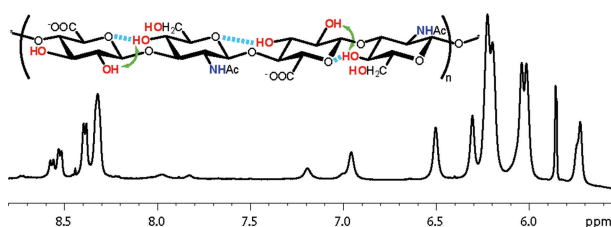


### Bile acid-derived mono- and diketals—synthesis, structural characterization and self-assembling properties

Satu Ikonen,\* Satu Nonappa, Arto Valkonen,  
Raija Juvonen, Hannu Salo and Erkki Kolehmainen

Novel bile acid-derived monoketals of catechol and 2,3-naphthalenediol, as well as mono- and diketals with pentaerythritol have been prepared and characterized. Their self-assembling properties in solution and in the solid state are discussed.

2795

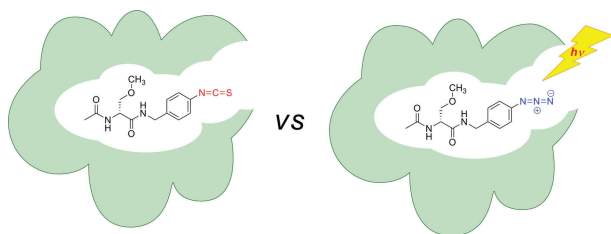


### Experimental evidence of chemical exchange over the $\beta(1\rightarrow3)$ glycosidic linkage and hydrogen bonding involving hydroxy protons in hyaluronan oligosaccharides by NMR spectroscopy

Gustav Nestor, Lennart Kenne and Corine Sandström\*

NMR analysis of hydroxy protons of hyaluronan oligosaccharides gives experimental evidence of weak inter-residual hydrogen bond interactions and reveals a chemical exchange interaction between two hydroxy protons over the  $\beta(1\rightarrow3)$  glycosidic linkage.

2803

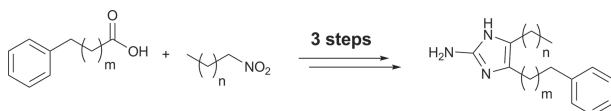


### Proteomic searches comparing two (*R*)-lacosamide affinity baits: An electrophilic arylisothiocyanate and a photoactivated arylazide group

Ki Duk Park, James P. Stables, Rihe Liu\* and Harold Kohn\*

Lacosamide affinity baits were evaluated for their preferential adduction of binding proteins, for the stereospecificity of protein modification, and their use in competition experiments.

2814



### A nitroenolate approach to the synthesis of 4,5-disubstituted-2-aminoimidazoles. Pilot library assembly and screening for antibiotic and antibiofilm activity

Zhaoming Su, Steven A. Rogers, W. Steve McCall,  
Alicia C. Smith, Sindhu Ravishankar, Trey Mullikin and  
Christian Melander\*

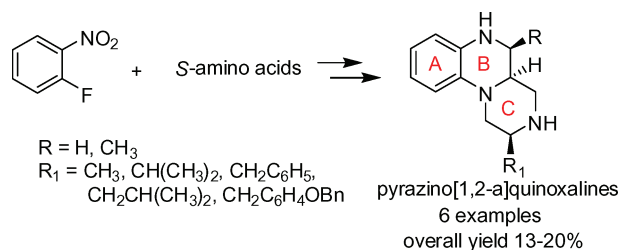
4,5-Disubstituted 2-aminoimidazoles with potent antibiotic and antibiofilm activity against terrestrial and marine bacteria.

2823

**A new synthesis of amino acid-based enantiomerically pure substituted 2,3,4,4a,5,6-hexahydro-1*H*-pyrazino[1,2-*a*]quinoxalines**

Krishnananda Samanta and Gautam Panda\*

A new series of enantiomerically pure pyrazino[1,2-*a*]quinoxalines were synthesized for the first time in twelve steps with 13–20% overall yields. Inter and intramolecular Mitsunobu cyclization followed by  $\text{PPh}_3/\text{I}_2$ /imidazole mediated 6-*exo-tet* cyclization were the key steps.

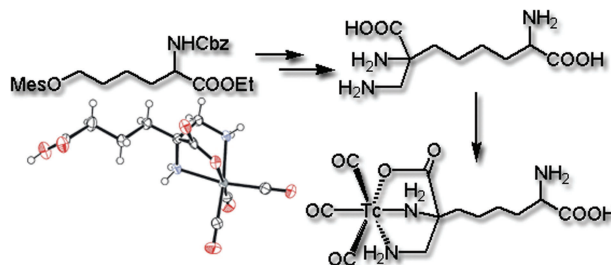


2829

**Syntheses of bifunctional 2,3-diamino propionic acid-based chelators as small and strong tripod ligands for the labelling of biomolecules with <sup>99m</sup>Tc**

Yu Liu, Bruno L. Oliveira, João D. G. Correia, Isabel C. Santos, Isabel Santos, Bernhard Spingler and Roger Alberto\*

2,3-Diamino propionic acid is a strong, albeit scarcely used, tripod ligand. The coupling of different functionalities at  $\alpha$ -carbon leads to bifunctional chelators which can be conjugated to biological vectors for application in molecular imaging.



2840

**Tributyltin hydride-mediated radical cyclisation reactions: efficient construction of multiply substituted cyclopentanes**

Jie Lei, Hai-Lei Cui, Rui Li,\* Li Wu, Zheng-Yu Ding and Ying-Chun Chen\*

The  $n\text{Bu}_3\text{SnH}$ -mediated cyclisation reactions of allylic-allylic alkylation products of  $\alpha,\alpha$ -dicyanoalkenes and Morita–Baylis–Hillman (MBH) carbonates of methyl vinyl ketone have been investigated. Cyclopentane derivatives bearing multiple substituents were efficiently prepared with moderate to excellent diastereoselectivity.

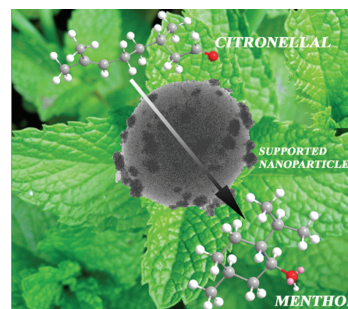


2845

**One-step microwave-assisted asymmetric cyclisation/hydrogenation of citronellal to menthols using supported nanoparticles on mesoporous materials**

Alina Mariana Balu, Juan Manuel Campelo, Rafael Luque\* and Antonio Angel Romero

A microwave-assisted one step cyclisation/hydrogenation methodology was able to provide high yields of menthols from citronellal using a simple and environmentally friendly heterogeneous catalyst based on supported nanoparticles on porous supports.

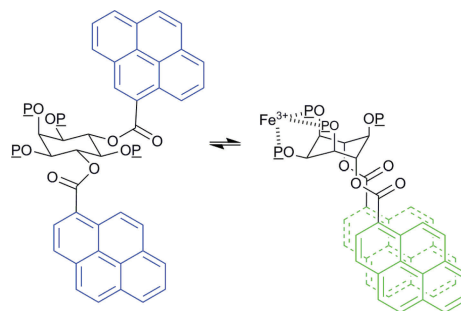


2850

**Conformational analysis of the natural iron chelator *myo*-inositol 1,2,3-trisphosphate using a pyrene-based fluorescent mimic**

D. Mansell, N. Rattray, L. L. Etchells, C. H. Schwalbe, A. J. Blake, J. Torres, C. Kremer, E. V. Bichenkova, C. J. Barker and S. Freeman\*

The selective interaction of  $\text{Fe}^{3+}$  with a *myo*-inositol phosphate containing the natural antioxidant 1,2,3-trisphosphate motif has been monitored using a pyrene-based fluorescent probe: the penta-equatorial chair (blue fluorescence) ring flips to the unstable penta-axial conformation (green excimer fluorescence) upon binding  $\text{Fe}^{3+}$ .

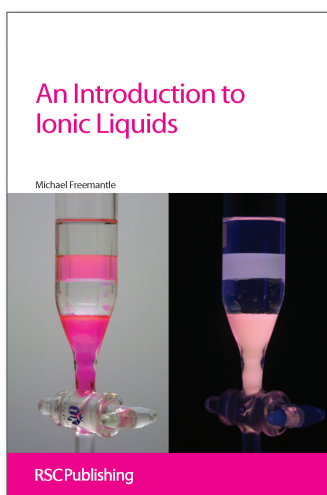
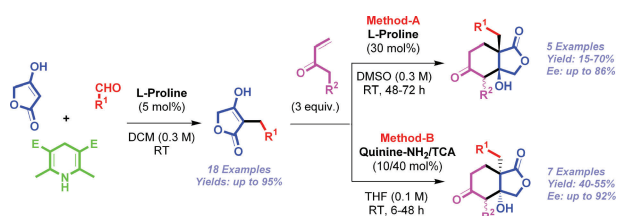


2859

**Direct catalytic asymmetric synthesis of highly functionalized tetronic acids/tetrahydro-isobenzofuran-1,5-diones via combination of cascade three-component reductive alkylations and Michael-aldol reactions**

Dhevalapally B. Ramachary\* and Mamillapalli Kishor

A general process for the synthesis of tetrahydro-isobenzofuran-1,5-diones was achieved for the first time through asymmetric cascade Michael-aldol reaction of 4-hydroxy-3-alkyl-5*H*-furan-2-ones with alkyl vinyl ketones in the presence of a catalytic amount of L-proline or Q-NH<sub>2</sub>/TCA



## An Introduction to Ionic Liquids

Michael Freemantle

This is the first single-author book on ionic liquids and the first introductory book on the topic. *An Introduction to Ionic Liquids* is written in a clear, concise and consistent way and provides a useful introduction to ionic liquids for those readers who are not familiar with the topic. It is also wide ranging, embracing every aspect of the chemistry and applications of ionic liquids. The book draws extensively on the primary scientific literature to provide numerous examples of research on ionic liquids. These examples will enable the reader to become familiar with the key developments in ionic liquids chemistry over recent years.

Science students, researchers, teachers in academic institutions and chemists and other scientists in industry and government laboratories will find the book an invaluable introduction to one of the most rapidly advancing and exciting fields of science and technology today.

BB Hardback | 281 pages | ISBN 9781847551610 | 2009 | £39.95

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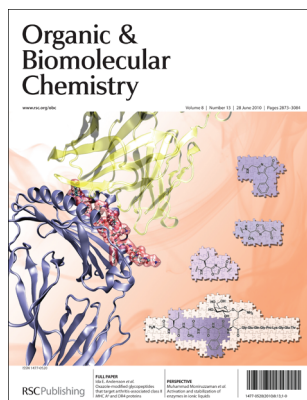
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## IN THIS ISSUE

ISSN 1477-0520 CODEN OBCRAK 8(13) 2873–3084 (2010)



### Cover

See Andersson *et al.*, pp. 2931–2940.  
Oxazole-modified glycopeptides that probe interactions with class II MHC proteins and T-cell receptors associated with autoimmune arthritis.

Image reproduced by permission of Mattias Hedenström and Ida Andersson from *Org. Biomol. Chem.*, 2010, **8**, 2931.



### Inside cover

See Wang *et al.*, pp. 2923–2925.  
New aminonaphthalimide imidazolium podands as luminescence chemosensors were prepared for selectively sensing nucleoside polyphosphates ADP and ATP in living cells.

Image reproduced by permission of Chunying Duan from *Org. Biomol. Chem.*, 2010, **8**, 2923.

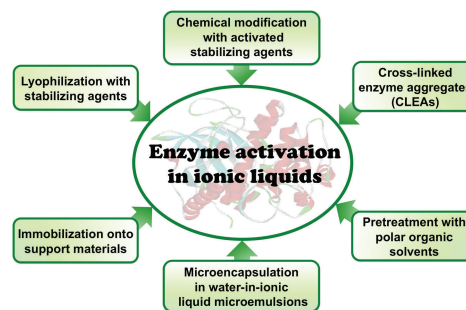
## PERSPECTIVES

2887

### Activation and stabilization of enzymes in ionic liquids

Muhammad Moniruzzaman, Noriho Kamiya and Masahiro Goto\*

Ionic liquids are being increasingly exploited as potential “green” solvents for biocatalytic processes. This perspective summarizes a number of diverse strategies being used successfully for activation and stabilization of enzymes in ionic liquids.

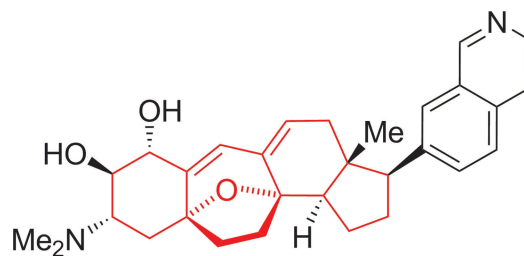


2900

### Chemistry of the cortistatins—a novel class of anti-angiogenic agents

David Yu-Kai Chen\* and Chih-Chung Tseng

This article provides a comprehensive overview of the synthetic studies of the cortistatin family of anti-angiogenic agents. In particular, the synthetic strategies employed in the construction of the oxo-bridged pentacyclic core of the cortistatins are illustrated.



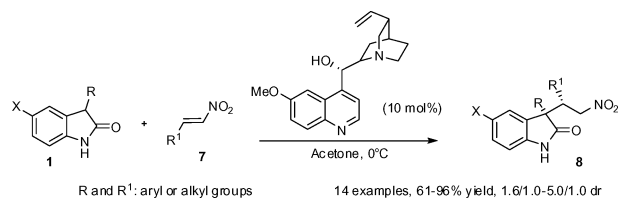
Cortistatin A

2912

### Organocatalytic Michael addition of unprotected 3-substituted oxindoles to nitroolefins

Miao Ding, Feng Zhou, Zi-Qing Qian and Jian Zhou\*

Quinidine was found to catalyze the Michael addition of unprotected 3-substituted oxindoles to nitroolefins in excellent yield and moderate to good diastereoselectivity. Bifunctional quinidine derived thiourea catalyst could catalyze this reaction to afford the major diastereomer in 85% ee.

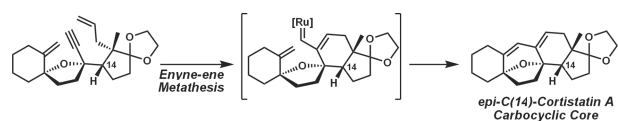


2915

### Efforts toward rapid construction of the cortistatin A carbocyclic core *via* enyne-ene metathesis

Corinne Baumgartner, Sandy Ma, Qi Liu and Brian M. Stoltz\*

Our efforts toward the construction of the cortistatin A carbocyclic core *via* an enyne-ene metathesis are disclosed. Interestingly, an attempted S<sub>N</sub>2 inversion of a secondary mesylate in our five-membered D-ring piece gave a product with retention of stereochemistry.

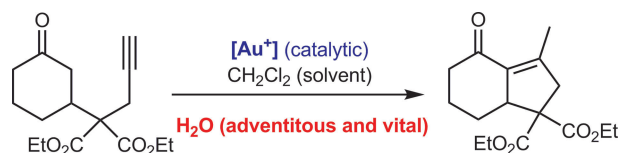


2918

### Gold-catalysed room-temperature cycloisomerisation of alkynes and unactivated enolisable ketones

Paul W. Davies\* and Christelle Detty-Mambo

The cycloisomerisation of simple keto-alkynes proceeds at room temperature under the mild conditions of gold catalysis. Bicyclic fused and spiro compounds can be obtained by overall 5-*exo* and 6-*exo* carbon-carbon bond-forming cyclisations.

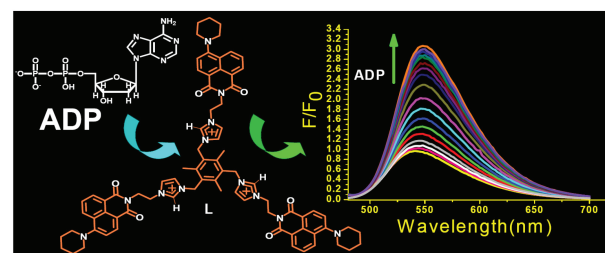


2923

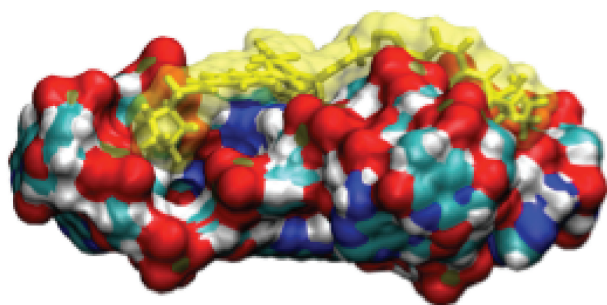
### Aminonaphthalimide-based imidazolium podands for turn-on fluorescence sensing of nucleoside polyphosphates

Dehui Wang, Xiaolin Zhang, Cheng He and Chunying Duan\*

New aminonaphthalimide imidazolium podands as luminescence chemosensors were prepared for selectively sensing nucleoside polyphosphates ADP and ATP in living cells.



2926



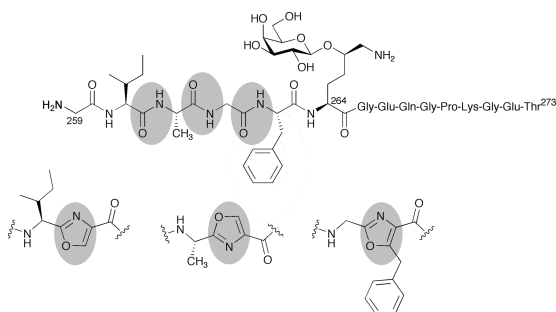
### A click chemistry approach to $C_3$ symmetric, G-quadruplex stabilising ligands

John E. Moses,\* Dougal J. Ritson, Fengzhi Zhang, Caterina Maria Lombardo, Shozeb Haider, Neil Oldham and Stephen Neidle\*

A structure-based design and syntheses of a series of tris-triazole G-quadruplex binding ligands was achieved. These novel compounds display excellent selectivity for quadruplex DNA over duplex DNA.

PAPERS

2931

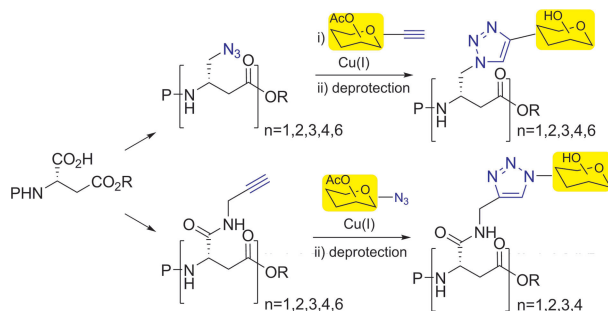


### Oxazole-modified glycopeptides that target arthritis-associated class II MHC A<sup>q</sup> and DR4 proteins

Ida E. Andersson, Tsvetelina Batsalova, Balik Dzhambazov, Lotta Edvinsson, Rikard Holmdahl, Jan Kihlberg\* and Anna Linusson\*

Oxazole-modified glycopeptides have been synthesized and evaluated for binding to arthritis-associated class II MHC A<sup>q</sup> and DR4 proteins, as well as for their ability to stimulate autoimmune T-cell hybridomas.

2941

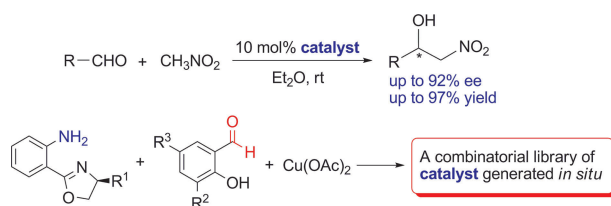


### Click glycoconjugation of per-azido- and alkyne-functionalized $\beta$ -peptides built from aspartic acid

Marielle Barra, Olivier Roy, Mounir Traïkia and Claude Taillefumier\*

Azide- and alkyne-containing homo- $\beta^3$ -peptides were synthesised from aspartic acid. Their subsequent conjugation with monosaccharides was efficiently achieved by copper-mediated cycloadditions leading to two novel families of glycoclusters. These compounds represent ideal tools to explore carbohydrate-mediated multivalent interactions.

2956



### Efficient *in situ* three-component formation of chiral oxazoline-Schiff base copper(II) complexes: towards combinatorial library of chiral catalysts for asymmetric Henry reaction

Wen Yang, Han Liu and Da-Ming Du\*

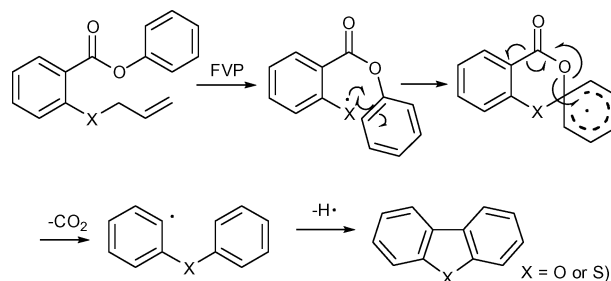
A combinatorial *in situ* three-component chiral oxazoline-Schiff base copper(II) complex catalyst formation method was developed. This modular library of complex catalysts was evaluated in an asymmetric Henry reaction. Good yields and up to 92% ee were obtained.

2961

### Formation of dibenzofurans by flash vacuum pyrolysis of aryl 2-(allyloxy)benzoates and related reactions

Michael Black, J. I. G. Cadogan\* and Hamish McNab\*

Flash vacuum pyrolysis of aryl 2-(allyloxy)benzoates and of the corresponding aryl 2-(allylthio)benzoates at 650 °C, gives dibenzofurans and dibenzothiophenes, respectively. The scope and mechanism of this reaction are studied in detail.

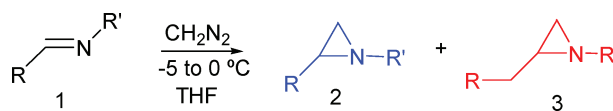


2968

### Catalyst-free aziridination and unexpected homologation of aziridines from imines

Paula Sérgio Branco,\* Vivek Prabhakar Raje,\*  
Jorge Dourado and Joana Gordo

A mild, very simple and rapid procedure for the preparation of *N*-sulfonyl-2-substituted aziridines, involving an aziridination or unexpected homologation–aziridination reaction of *N*-sulfonylimines using diazomethane as the carbene source.

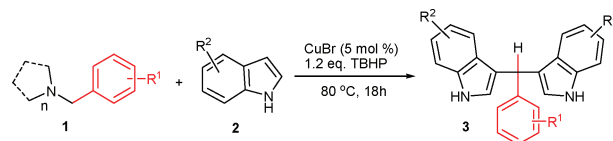


2975

### CuBr-catalyzed selective oxidation of *N*-azomethine: highly efficient synthesis of methine-bridged bis-indole compounds

Jianguo Yang,\* Zhijing Wang, Fuyou Pan, Yongmin Li and Weiliang Bao\*

An efficient CuBr catalyzed cleavage of C–N bonds in the oxidative cross-dehydrogenative-coupling of *N*-benzyl amines with indoles mediated by *tert*-butyl hydroperoxide was reported. A series of methine-bridged bis-indole derivatives were successfully synthesized.

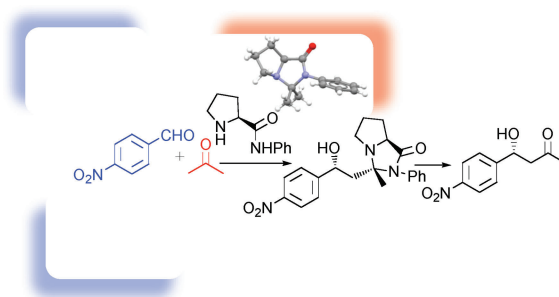


2979

### Imidazolidinone intermediates in prolinamide-catalyzed aldol reactions

Ángel L. Fuentes de Arriba, Luis Simón, César Raposo,  
Victoria Alcázar, Francisca Sanz, Francisco M. Muñoz and  
Joaquín R. Morán\*

The aldol reaction catalyzed by aromatic prolinamides has been studied in depth and several imidazolidinone intermediates detected and fully characterized. Their evolution and influence on the course of the reaction is also investigated.



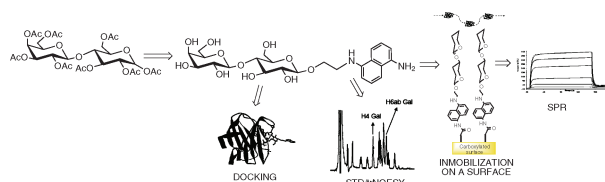


2986

### Binding studies of adhesion/growth-regulatory galectins with glycoconjugates monitored by surface plasmon resonance and NMR spectroscopy

F. Javier Muñoz, J. Ignacio Santos, Ana Ardá, Sabine André, Hans-Joachim Gabius, José V. Sinisterra, Jesús Jiménez-Barbero and María J. Hernáiz\*

A fluorescent glycan, which can be easily immobilized on a surface, has been prepared. By using SPR, STD/trNOESY and docking measurements, it was possible to analyze galectin–glycan interactions in a sensitive, systematic, reliable and quantitative manner.

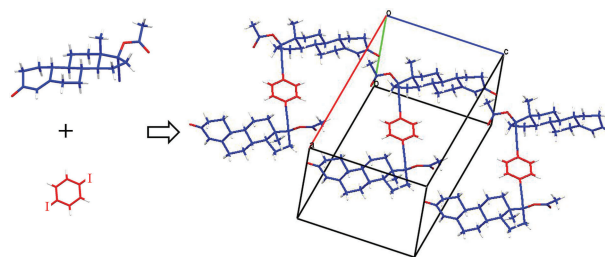


2993

### Synthesis and solid state characterization of molecular rotors with steroidal staters: ethisterone and norethisterone

Braulio Rodríguez-Molina, Arturo Pozos, Ricardo Cruz, Margarita Romero, Blas Flores, Noberto Farfán, Rosa Santillan\* and Miguel A. Garcia-Garibay\*

Illustrated here with ethisterone and norethisterone, 19-ethynyl-substituted steroids provide a promising and readily available platform for the one-step synthesis of molecular rotors with 1,4-phenylene groups acting as rotating units.

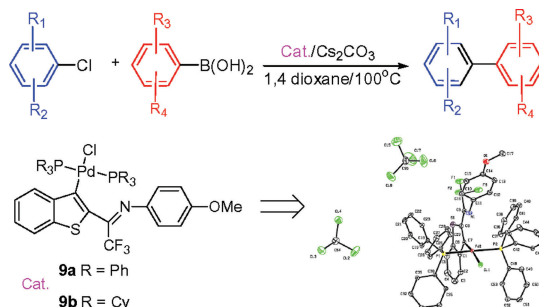


3001

### New cyclopalladated benzothiophenes: a catalyst precursor for the Suzuki coupling of deactivated aryl chlorides

Madavu Salian Subhas, Shailesh S. Racharlawar, B. Sridhar, P. Kavin Kennady, Pravin R. Likhar,\* Mannepalli Lakshmi Kantam and Suresh K. Bhargava

Treating benzothiophene-based palladacycles with excess phosphine ligand selectively afforded trans-bis(phosphine) palladium complexes in good yields. An acyclic palladium complex was tested as catalyst in the Suzuki coupling of sterically hindered aryl chlorides and boronic acids. The palladacycles were also tested for anticancer activity.

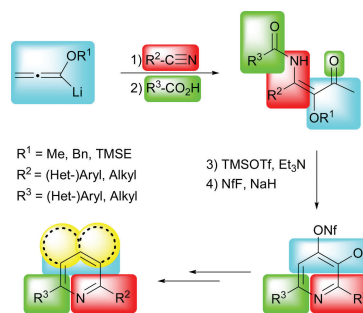


3007

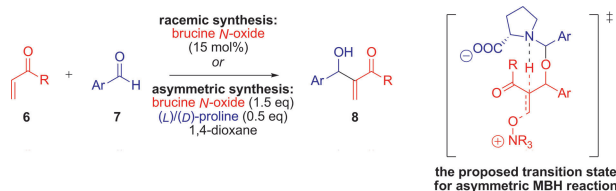
### A three-component synthesis of $\beta$ -alkoxy- $\beta$ -keto-enamides—flexible precursors for 4-hydroxypyridine derivatives and their palladium-catalysed reactions

Tilman Lechel, Jyotirmayee Dash, Christian Eidamshaus, Irene Brüdgam, Dieter Lentz and Hans-Ulrich Reissig\*

Starting from lithiated alkoxyallenes a flexible three-component synthesis led to  $\beta$ -alkoxy- $\beta$ -ketoenamide derivatives in good yields. Cyclisation and conversion into 4-pyridyl nonaflates allowed various palladium-catalysed reactions. Subsequent cyclisations led to furopyridine and benzoisoquinoline derivatives.



3015

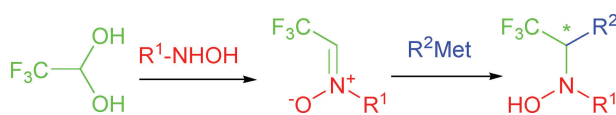


### Brucine *N*-oxide-catalyzed Morita–Baylis–Hillman reaction of vinyl ketones: a mechanistic implication of dual catalyst system with proline

Kyungsoo Oh,\* Jian-Yuan Li and Jinhyang Ryu

The asymmetric Morita–Baylis–Hillman reaction of vinyl ketones with electron-deficient aromatic aldehydes was catalyzed by proline in the presence of co-catalyst, brucine *N*-oxide.

3025

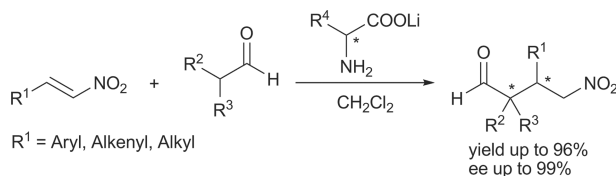


### Trifluoromethyl nitrones: from fluoral to optically active hydroxylamines

Thierry Milcent, Nathan Hinks, Danièle Bonnet-Delpon and Benoit Crousse\*

We present the nucleophilic diastereoselective additions of organometallic reagents to trifluoromethyl nitrones, affording the corresponding optically active trifluoroethyl hydroxylamines in good yields.

3031

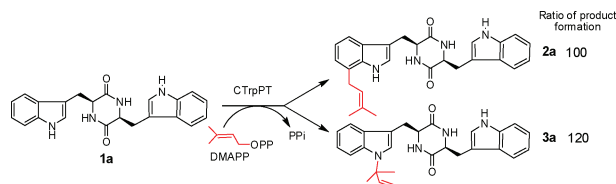


### Asymmetric Michael addition of aldehydes to nitroalkenes using a primary amino acid lithium salt

Masanori Yoshida,\* Atsushi Sato and Shoji Hara

Enantioselective Michael addition of aldehydes to nitroalkenes catalysed by *L*-phenylalanine lithium salt gave  $\gamma$ -nitroaldehydes in good yields with high enantioselectivity.

3037

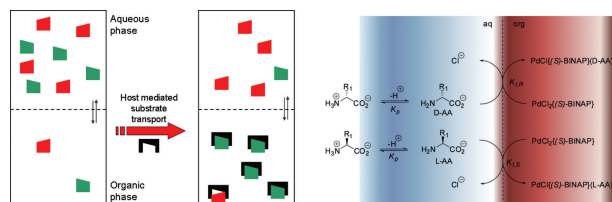


### Simultaneous C7- and N1-prenylation of cyclo-*L*-Trp-*L*-Trp catalyzed by a prenyltransferase from *Aspergillus oryzae*

Hui-Xi Zou, Xiu-Lan Xie, Uwe Linne, Xiao-Dong Zheng and Shu-Ming Li\*

A recombinant prenyltransferase His<sub>6</sub>-CTrpPT from *Aspergillus oryzae* catalyzes simultaneously the regular C7- and reverse N1-prenylation of tryptophan-containing cyclic dipeptides, as demonstrated by using cyclo-*L*-Trp-*L*-Trp.

3045

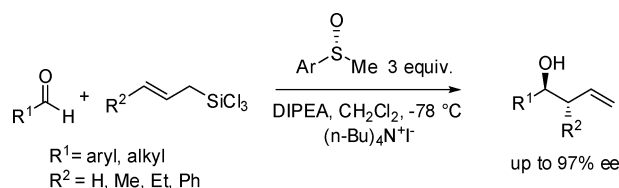


### Chiral separation of substituted phenylalanine analogues using chiral palladium phosphine complexes with enantioselective liquid-liquid extraction

Bastiaan J. V. Verkuijl, Boelo Schuur, Adriaan J. Minnaard,\* Johannes G. de Vries\* and Ben L. Feringa\*

Chiral palladium phosphine complexes have been employed in the chiral separation of amino acids and phenylalanine analogues in particular.

3055

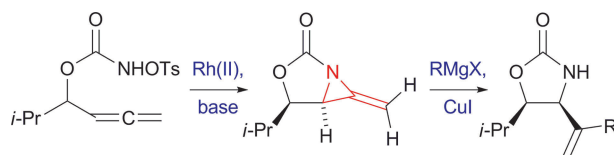


### Chiral sulfoxides as activators of allyl trichlorosilanes in the stereoselective allylation of aldehydes

Vincenzo De Sio, Antonio Massa\* and Arrigo Scettri\*

Chiral aryl methyl sulfoxides proved to be efficient activators in the asymmetric allylation of aldehydes with allyl trichlorosilanes. High enantioselectivity was found in the case of electron-poor aldehydes. The high levels of diastereoselectivity and the detection of nonlinear effects have allowed the elucidation of some mechanistic aspects of the reaction.

3060

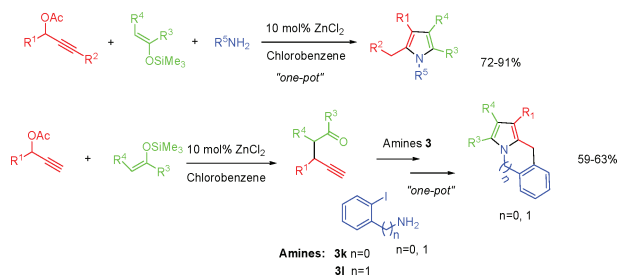


### Structure and reactivity of bicyclic methylene aziridines prepared by intramolecular aziridination of allenes

Jeremy Robertson,\* George C. Feast, Louise V. White, Victoria A. Steadman (née Doughty) and Timothy D. W. Claridge

The Rh(II)-catalyzed intramolecular aziridination of allenyl-substituted *N*-tosyl oxycarbamates leads to bicyclic methylene aziridines that undergo formal  $S_NV$  ring-opening with organocuprates.

3064



### One-pot highly efficient synthesis of substituted pyrroles and *N*-bridgehead pyrroles by zinc-catalyzed multicomponent reaction

Xiao-tao Liu, Lu Hao, Min Lin, Li Chen and Zhuang-ping Zhan\*

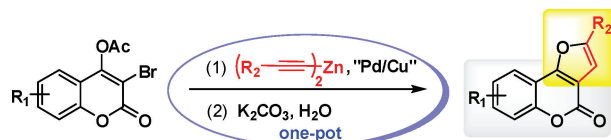
A convenient zinc-catalyzed multicomponent process has been developed for the synthesis of substituted pyrroles. The protocol developed has been extended to the synthesis of *N*-bridgehead pyrroles containing polycyclic fragments.

3073

### One-pot synthesis of furocoumarins *via* sequential Pd/Cu-catalyzed alkylation and intramolecular hydroalkoxylation

Lei Chen, Yi Li and Ming-Hua Xu\*

A novel and rapid assembly of an interesting class of furocoumarins-4*H*-furo[3,2-*c*]chromen-4-ones has been successfully achieved using one-pot sequential coupling/cyclization strategy with easily available starting materials 3-bromo-4-acetoxycoumarins and terminal alkynes.

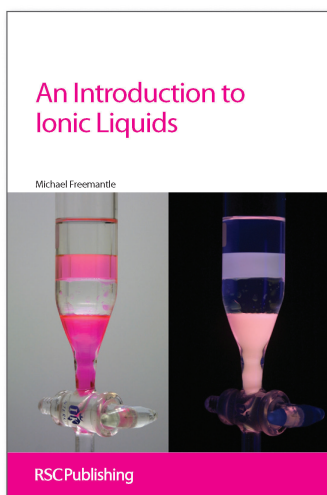
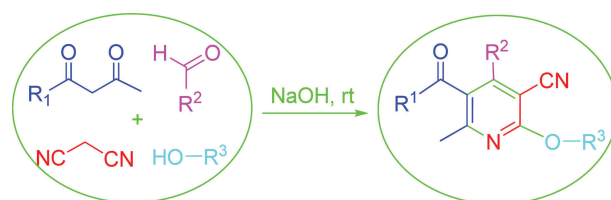


3078

### Efficient one-pot synthesis of substituted pyridines through multicomponent reaction

Xin Xin, Yan Wang, Santosh Kumar, Xu Liu, Yingjie Lin and Dewen Dong\*

A facile and convenient synthesis of substituted pyridines has been developed *via* a one-pot multicomponent reaction of commercially available 1,3-dicarbonyl compounds, malononitrile, aromatic aldehydes and alcohol in the presence of NaOH under mild conditions.



## An Introduction to Ionic Liquids

Michael Freemantle

This is the first single-author book on ionic liquids and the first introductory book on the topic. *An Introduction to Ionic Liquids* is written in a clear, concise and consistent way and provides a useful introduction to ionic liquids for those readers who are not familiar with the topic. It is also wide ranging, embracing every aspect of the chemistry and applications of ionic liquids. The book draws extensively on the primary scientific literature to provide numerous examples of research on ionic liquids. These examples will enable the reader to become familiar with the key developments in ionic liquids chemistry over recent years.

Science students, researchers, teachers in academic institutions and chemists and other scientists in industry and government laboratories will find the book an invaluable introduction to one of the most rapidly advancing and exciting fields of science and technology today.

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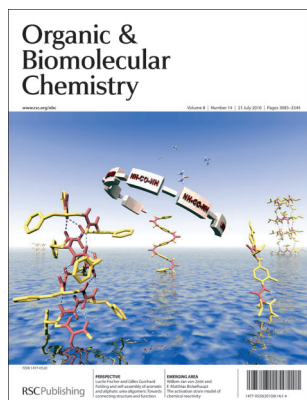
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## IN THIS ISSUE

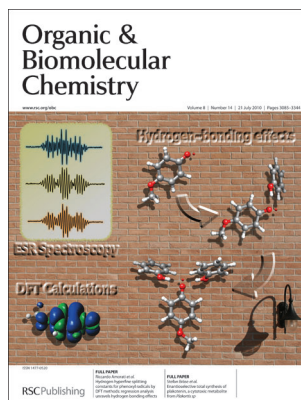
ISSN 1477-0520 CODEN OBCRAK 8(14) 3085–3344 (2010)



### Cover

See Lucile Fischer and Gilles Guichard, pp. 3101–3117. Just like their oligoamide congeners, aromatic and aliphatic urea-based oligomers show high propensity to fold and to self-assemble. Ultimately, structural knowledge is providing a basis for *function*

Image reproduced by permission of Gilles Guichard from *Org. Biomol. Chem.*, 2010, **8**, 3101.



### Inside cover

See Riccardo Amorati *et al.*, pp. 3136–3141. Joint ESR spectroscopic measures and DFT theoretical calculations shed new light on hydrogen bonds formation between phenols and biologically relevant phenoxyl radicals

Image reproduced by permission of Riccardo Amorati from *Org. Biomol. Chem.*, 2010, **8**, 3136.

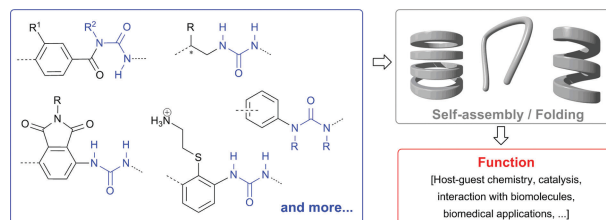
## PERSPECTIVE

3101

### Folding and self-assembly of aromatic and aliphatic urea oligomers: Towards connecting structure and function

Lucile Fischer and Gilles Guichard\*

Aromatic and aliphatic urea-based oligomers have been designed to fold and/or self-assemble. Structural insight provides a basis for the elaboration of molecules with function.



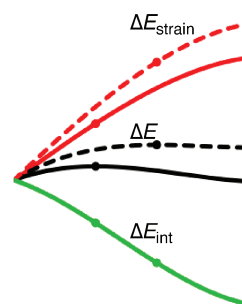
## EMERGING AREA

3118

### The activation strain model of chemical reactivity

Willem-Jan van Zeist and F. Matthias Bickelhaupt\*

We provide an account of the activation strain model and how this model yields insight into the origin of reaction barriers and trends therein, by decomposing the reaction's energy profile ( $\Delta E$ ) into strain energy in the reactants ( $\Delta E_{\text{strain}}$ ) plus interaction between the reactants ( $\Delta E_{\text{int}}$ ).

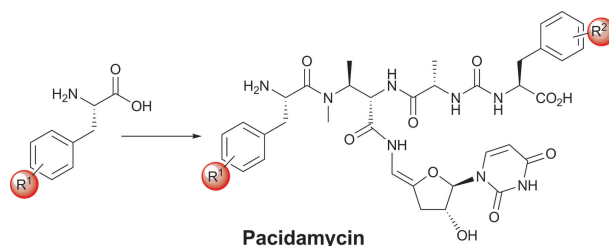


3128

### New pacidamycins biosynthetically: probing N- and C-terminal substrate specificity

Amany E. Ragab, Sabine Grüschow, Emma J. Rackham and Rebecca J. M. Goss\*

Feeding phenylalanine analogues to *Streptomyces coeruleorubidus* reveals the remarkable steric and electronic flexibility of this biosynthetic pathway and leads to the generation of a series of new halopacidamycins.

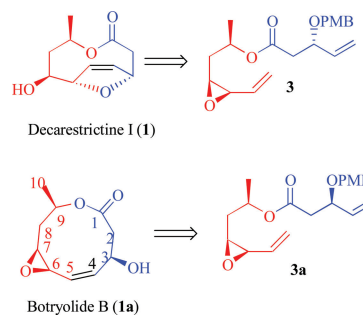


3130

### Total synthesis of decarestrictine I and botrylide B via RCM protocol

Palakodety Radha Krishna\* and T. Jagannadha Rao

A convergent stereoselective total synthesis of decarestrictine I (**1**) and botrylide B (**1a**) invoking a common synthetic strategy is reported.

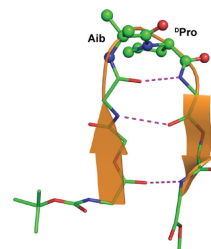


3133

### Peptide hairpin nucleation with the obligatory Type I' $\beta$ -turn Aib-<sup>D</sup>Pro segment

Upadhyayula Surya Raghavender, Subrayashastry Aravinda, Rajkishor Rai, Narayanaswamy Shamala\* and Padmanabhan Balaram\*

$\beta$ -Hairpin nucleated by an Aib-<sup>D</sup>Pro Type I'  $\beta$ -turn segment



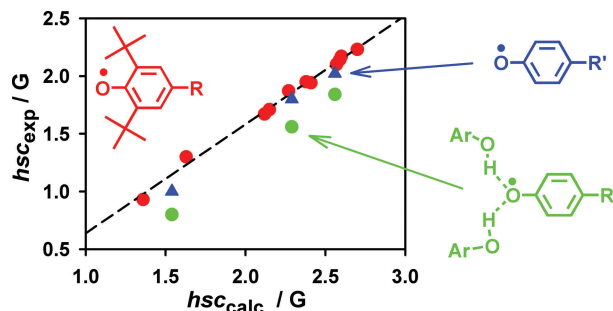
## PAPERS

3136

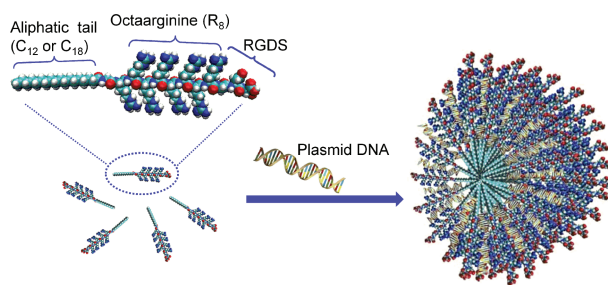
### Hydrogen hyperfine splitting constants for phenoxy radicals by DFT methods: regression analysis unravels hydrogen bonding effects

Riccardo Amorati,\* Gian Franco Pedulli and Maurizio Guerra

DFT calculations provide, after scaling the results, quantitative estimates of hydrogen hyperfine splitting constants in phenoxy radicals. The deviations observed for unhindered phenoxy radicals are explained in terms of H-bond formation with their parent phenols.



3142

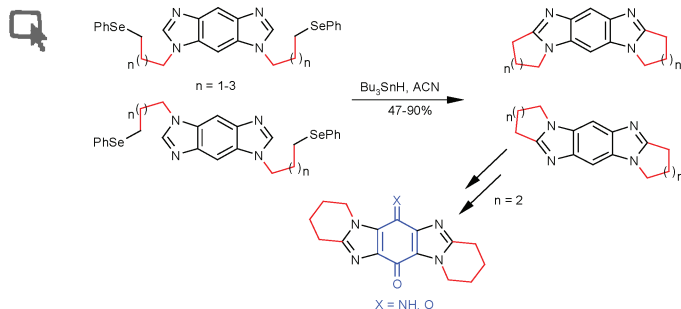


### Amphiphilic cationic lipopeptides with RGD sequences as gene vectors

Jing-Xiao Chen, Hui-Yuan Wang, Chang-Yun Quan, Xiao-Ding Xu, Xian-Zheng Zhang\* and Ren-Xi Zhuo

Two kinds of arginine-rich amphiphilic lipopeptides with hydrophobic aliphatic tails were designed and synthesized as functional gene vectors. Due to the incorporation of RGD sequences, these two amphiphilic lipopeptides exhibited improved transfection efficiency in HeLa cells.

3149

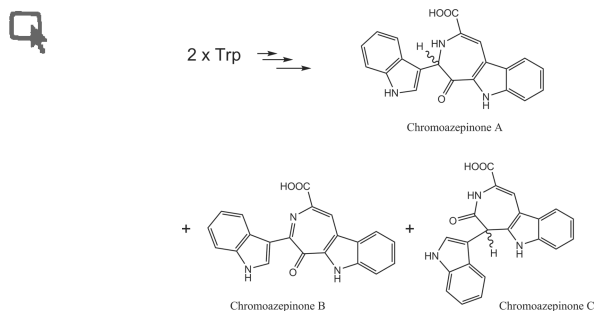


### One-pot double intramolecular homolytic aromatic substitution routes to dialicyclic ring fused imidazobenzimidazolequinones and preliminary analysis of anticancer activity

Vincent Fagan, Sarah Bonham, Michael P. Carty and Fawaz Aldabbagh\*

New quinone and iminoquinone anticancer agents that show specificity towards cervical and prostate cancer cell lines were prepared *via* double alkyl radical cyclizations onto imidazobenzimidazoles.

3157

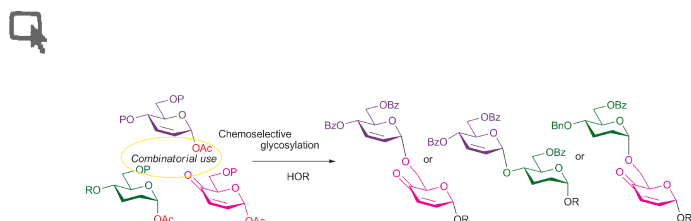


### Novel tryptophan metabolites, chromoazepinone A, B and C, produced by a blocked mutant of *Chromobacterium violaceum*, the biosynthetic implications and the biological activity of chromoazepinone A and B

Takaaki Mizuoka, Kazufumi Toume, Masami Ishibashi and Tsutomu Hoshino\*

The chemical mutagenesis of *Chromobacterium violaceum* afforded novel tryptophan metabolites, named chromoazepinone A–C. The biosynthetic pathways for the novel compounds are proposed and the inhibition effect of Wnt signal transcriptional activity is reported.

3164

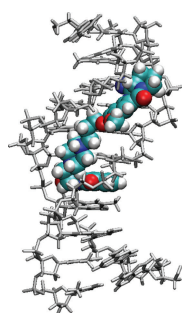


### Effective and chemoselective glycosylations using 2,3-unsaturated sugars

Shunichi Kusumi, Kaname Sasaki, Sainan Wang, Tatsuya Watanabe, Daisuke Takahashi and Kazunobu Toshima\*

The 2,3-unsaturated glycosyl donors were found to exhibit high reactivity, while the corresponding 2,3-unsaturated-4-keto glycosyl donors showed low reactivity, under several conditions. These findings make it possible to realize chemoselective glycosylations *via* combinatorial uses of 2,3-unsaturated, 2,3-unsaturated-4-keto, and 2,3-dideoxy glycosyl donors providing various types of deoxyoligosaccharides in short-steps.

3179

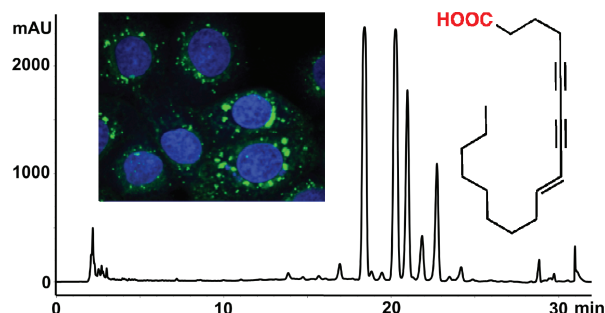


### NMR structural studies on the covalent DNA binding of a pyrrolobenzodiazepine–naphthalimide conjugate

Michael Rettig, Walter Langel, Ahmed Kamal and Klaus Weisz\*

The solution structure of a DNA adduct with a dual alkylating/intercalating PBD–naphthalimide conjugate has been determined by NMR and molecular dynamics simulations.

3188

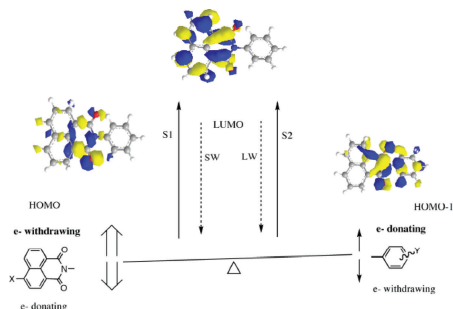


### Heterofibrins: inhibitors of lipid droplet formation from a deep-water southern Australian marine sponge, *Spongia (Heterofibrina) sp.*

Angela A. Salim, James Rae, Frank Fontaine, Melissa M. Conte, Zeinab Khalil, Sally Martin, Robert G. Parton and Robert J. Capon\*

A southern Australian marine sponge, *Spongia (Heterofibrina) sp.*, yielded new diene-ene fatty acids, which inhibit lipid droplet formation.

3195

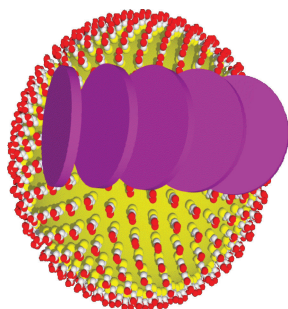


### Frontier molecular orbital analysis of dual fluorescent dyes: predicting two-color emission in *N*-Aryl-1,8-naphthalimides

Premchendar Nandhikonda, Michael P. Begaye, Zhi Cao and Michael D. Heagy\*

A predictive tool for the photoexcited states of *N*-phenyl-1,8-naphthalimides is proposed as a seesaw balanced photophysical model. A synthetic matrix of nine dyes demonstrates that this model serves as a guide to optimizing dual fluorescence emission.

3202



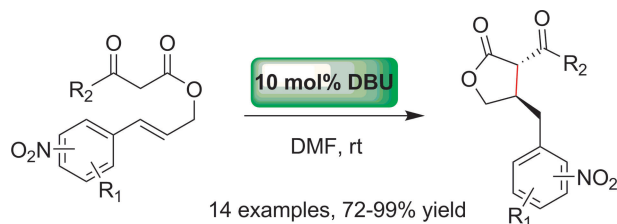
### Modified porphyrin–brucine conjugated to gold nanoparticles and their application in photodynamic therapy

Kamil Záruba, Jarmila Králová, Pavel Řezanka, Pavla Poučková, Lenka Veverková and Vladimír Král\*

Two porphyrin photosensitizers were immobilized on gold nanoparticles and their suitability for both *in vitro* and *in vivo* photodynamic therapy was tested.



3207

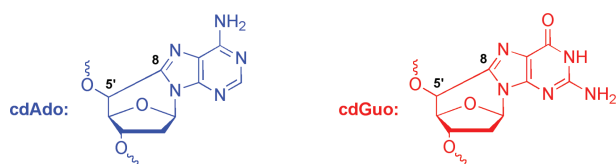


### Intramolecular Michael addition reaction for the synthesis of benzylbutyrolactones

Hu He, Li-Xin Dai and Shu-Li You\*

A Michael addition reaction of nitro-substituted aryl allyl  $\beta$ -ketocarboxylates has been developed. The reaction provides an efficient method for the preparation of  $\gamma$ -butyrolactone derivatives in good to excellent yields under mild conditions in the presence of catalytic amounts of DBU.

3211

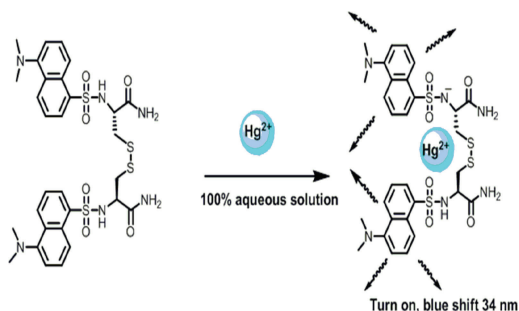


### Radiation-induced formation of purine 5',8-cyclonucleosides in isolated and cellular DNA: high stereospecificity and modulating effect of oxygen

Nourredine Belmadoui, Fabien Boussicault, Maurizio Guerra, Jean-Luc Ravanat, Chrystostomos Chatgililoglu\* and Jean Cadet\*

The radiation-induced formation of cdAdo and cdGuo in isolated and cellular DNA has been reevaluated. Their levels were found to decrease steadily with the increase of  $O_2$  concentration in isolated DNA, the 5'*R* diastereomers being predominant.

3220

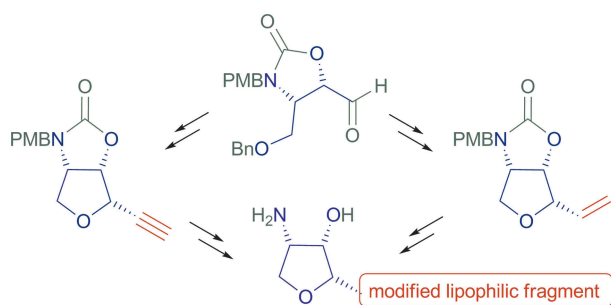


### A highly sensitive and selective detection of Hg(II) in 100% aqueous solution with fluorescent labeled dimerized Cys residues

Bishnu Prasad Joshi, Chuda Raj Lohani and Keun-Hyeong Lee\*

A highly sensitive sensor ( $K_d = 41$  nM) for detecting Hg(II) ion in 100% aqueous solution, based on the dimerized L-Cys residues with two dansyl fluorophores was satisfactory for monitoring the maximum allowable level (2 ppb) of mercury ion in drinking water demanded by EPA.

3227



### Flexible and enantioselective access to jaspine B and biologically active chain-modified analogues thereof

Yahya Salma, Stéphanie Ballereau, Carine Maaliki, Sonia Ladeira, Nathalie Andrieu-Abadie and Yves Génisson\*

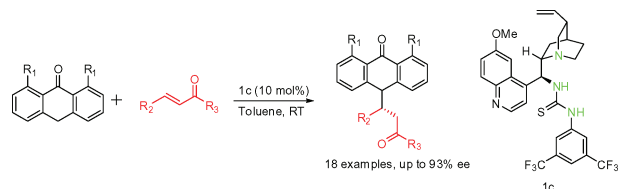
Jaspine B as well as five chain-modified analogues thereof were prepared allowing identification of a series of potent and cytotoxic inhibitors of sphingomyelin production in murine melanoma cells.

3244

### Asymmetric organocatalytic Michael addition of anthrone to enone

Chunlin Wu, Wenjun Li, Juanjuan Yang, Xinmiao Liang\* and Jinxing Ye\*

The enantioselective organocatalytic Michael addition of anthrones to  $\alpha,\beta$ -unsaturated ketones catalyzed by a bifunctional organocatalyst in toluene can afford the desired Michael adducts in high yields and excellent enantioselectivities.

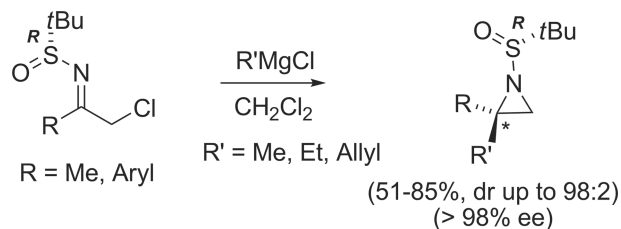


3251

### Asymmetric synthesis of new chiral *N*-sulfinyl 2,2-disubstituted aziridines by Grignard additions across $\alpha$ -chloro *N*-sulfinyl ketimines

Filip Colpaert, Sven Mangelinckx, Erika Leemans, Bram Denolf and Norbert De Kimpe\*

The reaction of chiral  $\alpha$ -chloro *N*-*tert*-butanesulfinyl ketimines, derived from  $\alpha$ -chloro ketones, with various Grignard reagents was developed as an attractive general two-step stereoselective pathway to new chiral *N*-sulfinyl 2,2-disubstituted aziridines.

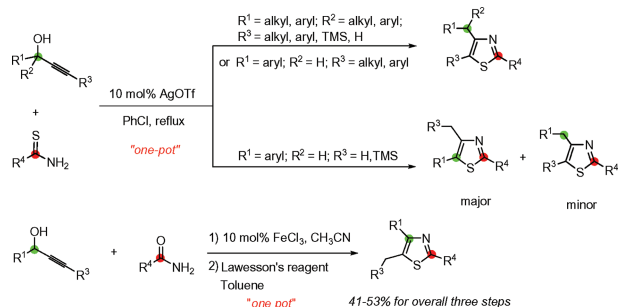


3259

### Facile one-pot synthesis of three different substituted thiazoles from propargylic alcohols

Xun Gao, Ying-ming Pan, Min Lin, Li Chen and Zhuang-ping Zhan\*

Three different substituted thiazoles have been successfully synthesized from readily available propargylic alcohols. Various secondary propargylic alcohols or tertiary propargylic alcohols participated well in the reaction, providing the desired products in good yields. This method provides a flexible and rapid route to substituted thiazoles.

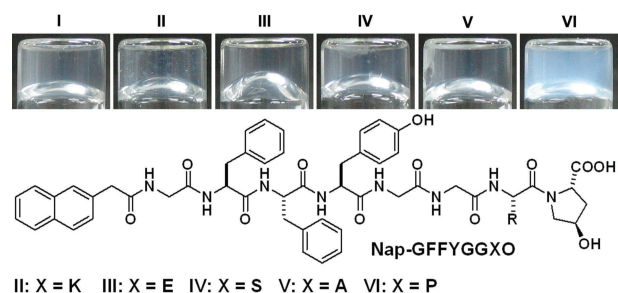


3267

### Supramolecular hydrogels inspired by collagen for tissue engineering

Yuehan Hu, Huaimin Wang, Jingyu Wang, Sibing Wang, Wang Liao, Yonggang Yang, Yongjun Zhang, Deling Kong\* and Zhimou Yang\*

A small library of small molecules inspired by collagen were designed and synthesized, whose possibility for cell culture in 2D environments was studied in detail.

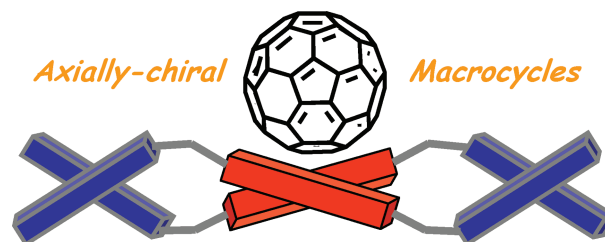


3272

### Nesting complexation of C<sub>60</sub> with large, rigid D<sub>2</sub> symmetrical macrocycles

Marco Caricato, Carmine Coluccini, Daniele Dondi, Douglas A. Vander Griend and Dario Pasini\*

Chiral macrocycles, incorporating enantiopure binaphthyl units and rigid, conjugated spacing moieties, possess the right ensemble of suitable functionalities for the formation of nesting complexes with C<sub>60</sub>.

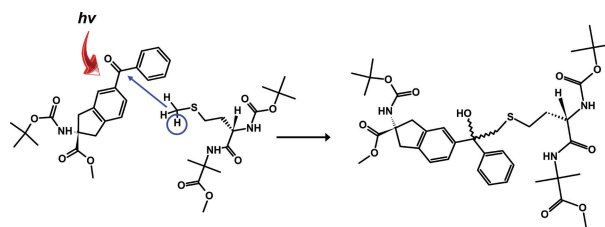


3281

### A new tool for photoaffinity labeling studies: a partially constrained, benzophenone based, $\alpha$ -amino acid

Karen Wright,\* Alessandro Moretto, Marco Crisma, Michel Wakselman, Jean-Paul Mazaleyrat, Fernando Formaggio and Claudio Toniolo\*

The novel  $\alpha$ -amino acid BpAib, a partially conformationally constrained analogue of the 3-(4-benzoylphenyl)alanine (Bpa) photoaffinity label, was synthesized, optically resolved and fully characterized. An intermolecular photocrosslinking experiment highlighted its regioselective reactivity, which is closely comparable to that of Bpa.

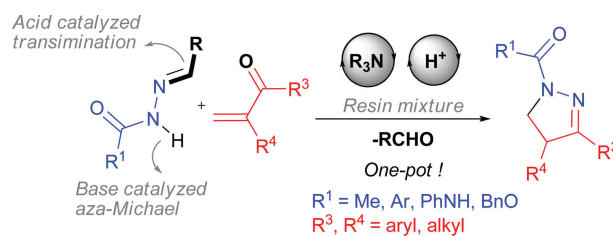


3287

### Synthesis of pyrazolines by a site isolated resin-bound reagents methodology

Vincent Gembus, Jean-Jacques Bonnet, François Janin, Pierre Bohn, Vincent Levacher and Jean-François Brière\*

Toward the elaboration of biologically important 3,4-substituted pyrazolines, an organocatalyzed aza-Michael/transimination domino sequence between hydrazones and enones was achieved by a mixture of heterogeneous resin-bound acid/base reagents, allowing the simultaneous use of otherwise destructive reactive functionalities using the site isolation concept.

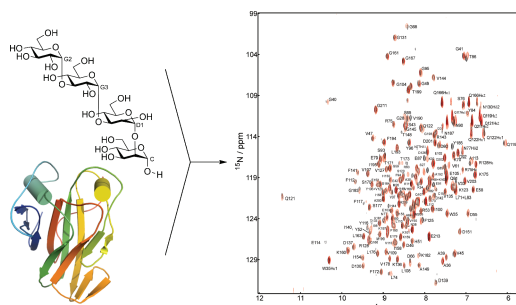


3294

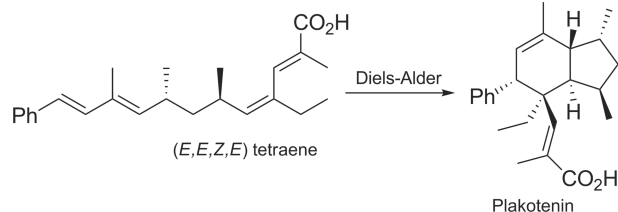
### The Glc<sub>2</sub>Man<sub>2</sub>-fragment of the N-glycan precursor – a novel ligand for the glycan-binding protein *malectin*?

Lisa N. Müller, Claudia Muhle-Goll and Moritz B. Biskup\*

The G2-G3-D1-C region of the tetrasaccharidic N-glycan precursor was synthesized and its interaction with the carbohydrate binding protein *malectin* was investigated. The protein *malectin* is involved in early stage processing of N-glycosylated proteins.



3300

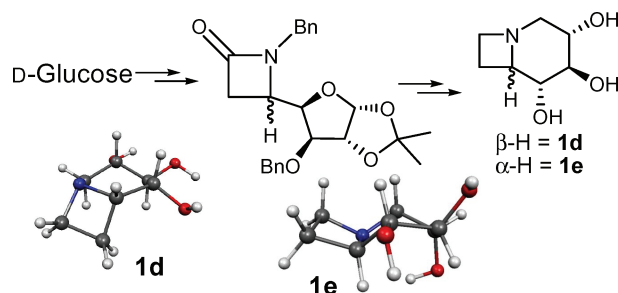


### Enantioselective total synthesis of plakotenin, a cytotoxic metabolite from *Plakortis sp*

Stephanie Arzt, Emmanuel Bourcet, Thierry Muller and Stefan Bräse\*

The first total enantioselective synthesis of plakotenin is described, proving the relative and absolute stereochemistry of natural plakotenin. A biomimetic intramolecular Diels–Alder reaction served as a key step in the total synthesis.

3307

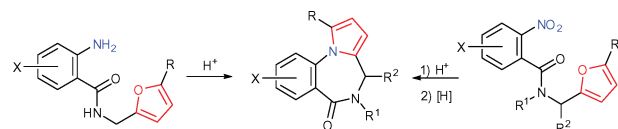


### Synthesis, computational study and glycosidase inhibitory activity of polyhydroxylated conidine alkaloids—a bicyclic iminosugar

Shrihari P. Sanap, Sougata Ghosh, Amit M. Jabgunde, Rahul V. Pinjari, Shridhar P. Gejji, Shailza Singh, Balu A. Chopade and Dilip D. Dhavale\*

A short and efficient synthesis of two hitherto unreported conidine iminosugars, one of which is selective inhibitor of  $\alpha$ -mannosidase, and their conformational study by  $^1\text{H}$  NMR, DFT calculations and molecular docking is described.

3316

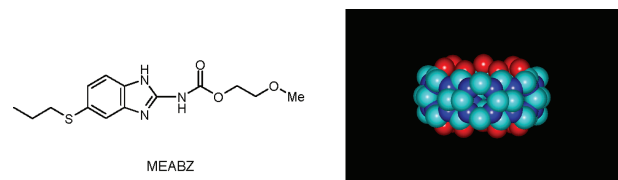


### Furan ring opening–pyrrole ring closure: a new synthetic route to aryl(heteroaryl)-annulated pyrrolo[1,2-*a*][1,4]diazepines

Alexander V. Butin,\* Tatyana A. Nevolina, Vitaly A. Shcherbinin, Igor V. Trushkov, Dmitry A. Cheshkov and Gennady D. Krapivin

Two new routes to pyrrolo[1,2-*a*][1,4]diazepines are proposed which are based on intramolecular furan cyclization.

3328




### Enhanced cytotoxicity of benzimidazole carbamate derivatives and solubilisation by encapsulation in cucurbit[*n*]uril

Yunjie Zhao, Mohammad H. Pourgholami, David L. Morris, J. Grant Collins\* and Anthony I. Day\*

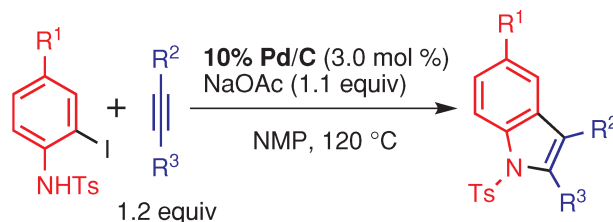
A new highly cytotoxic benzimidazole carbamate drug (MEABZ) has been synthesized, and encapsulation of the drug in the macrocycle cucurbit[*n*]uril (picture) significantly increased its water solubility.

3338

 **Palladium on carbon-catalyzed synthesis of 2- and 2,3-substituted indoles under heterogeneous conditions**

Yasunari Monguchi, Shigeki Mori, Satoka Aoyagi, Azusa Tsutsui, Tomohiro Maegawa and Hironao Sajiki\*

A mild, efficient and LiCl-free synthetic method for indole derivatives based on the heteroannulation of alkynes with 2-iodoanilines was achieved using palladium on carbon and NaOAc in heated NMP.



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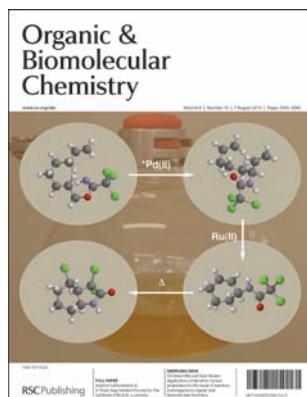
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## IN THIS ISSUE

ISSN 1477-0520 CODEN OBCRAK 8(15) 3345–3580 (2010)



### Cover

See Sutherland *et al.*, pp. 3418–3425.  
A one-pot, three-step tandem process involving an Overman rearrangement, a ring closing metathesis reaction and a Kharasch cyclisation has been developed for the asymmetric synthesis of bicyclic  $\gamma$ -lactams.

Image reproduced by permission of Fiona I. McGonagle, Lindsay Brown, Andrew Cooke and Andrew Sutherland from *Org. Biomol. Chem.*, 2010, **8**, 3418.



### Inside cover

See Menéndez *et al.*, pp. 3426–3436.  
The inside cover picture shows the range of structurally diverse indole-related nitrogen heterocycles that can be synthesized on the basis of a CAN-catalyzed three-component reaction between primary amines,  $\beta$ -dicarbonyl compounds and (2-bromo)naphthoquinones.

Image reproduced by permission of Padmakar A. Suryavanshi, Vellaisamy Sridharan and J. Carlos Menéndez from *Org. Biomol. Chem.*, 2010, **8**, 3426.

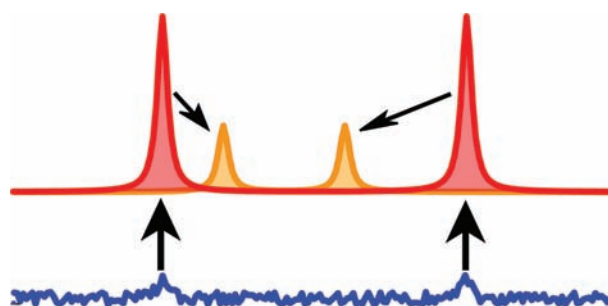
## EMERGING AREA

3361

### Applications of dynamic nuclear polarization to the study of reactions and reagents in organic and biomolecular chemistry

Christian Hilty\* and Sean Bowen

Hyperpolarization enhances sensitivity by several orders of magnitude, enables NMR spectroscopy with minute amounts of sample, and allows the determination of kinetics and mechanisms of reactions through real time measurement.



## PERSPECTIVE

3366

### Heterocycles in organic synthesis: thiazoles and triazoles as exemplar cases of synthetic auxiliaries

Alessandro Dondoni\*

Some heterocycles are precious tools in the tool-box of synthetic organic chemists as they can serve as auxiliaries for the formation of non-heterocyclic material. This Perspective article illustrates the key role of thiazole and triazole in the work carried out in the author's laboratory over three decades and deals with the synthesis of carbohydrate-based bioactive molecules.



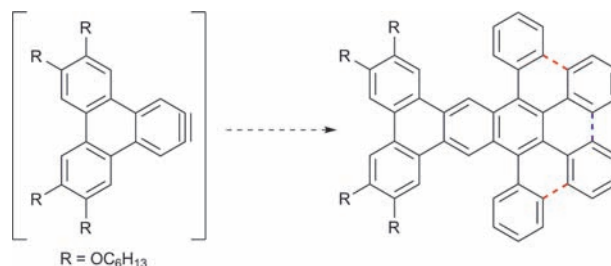
triazole serves as a linker while thiazole is a masked functionality

3386

### Aryne-mediated syntheses of structurally related acene derivatives

Diego Rodríguez-Lojo, Diego Peña,\* Dolores Pérez\* and Enrique Guitián

Three large substituted acene derivatives characterized by the *cata*-condensation of 5, 8 and 11 benzene rings have been obtained by cycloaddition reactions of the same aryne.

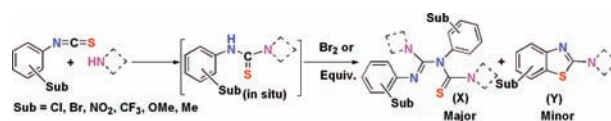


3389

### Arylthioureas with bromine or its equivalents gives no 'Hugerschoff' reaction product

Ramesh Yella, Siva Murru, Abdur Rezzak Ali and Bhisma K. Patel\*

The reaction of aryl-alkyl unsymmetrical thiourea with bromine or its equivalent gives product having thioamido guanidino moiety (X) and not the expected 2-aminobenzothiazole (Y). A plausible reaction mechanism has been proposed.

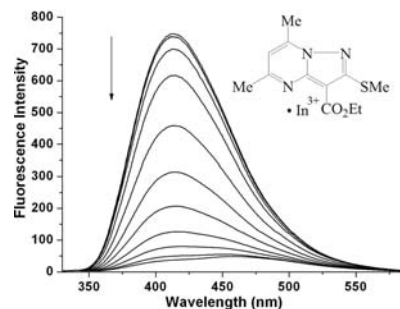


3394

### A sensitive and highly selective fluorescent sensor for In<sup>3+</sup>

Yan-Chao Wu,\* Hui-Jing Li and Hua-Zheng Yang

A simple neutral fluorescent sensor based on pyrazolo[1,5-*a*]pyrimidine exhibited a unique selectivity for indium(III) ion (In<sup>3+</sup>) over various other metal ions with dramatic fluorescence response in acetonitrile.

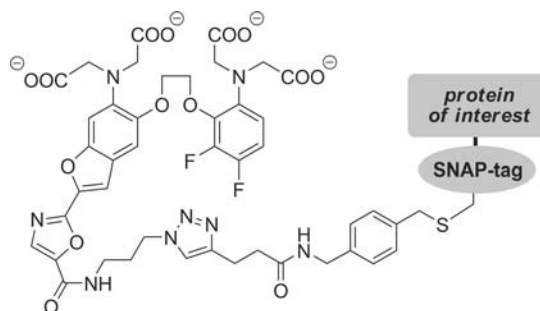


3398

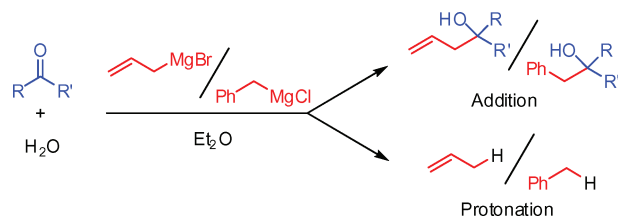
### Fura-2FF-based calcium indicator for protein labeling

Agostina A. Ruggiu, Michael Bannwarth and Kai Johnsson\*

A Fura-2FF-based fluorescent Ca<sup>2+</sup> indicator that can be covalently linked to SNAP-tag fusion proteins and retains its Ca<sup>2+</sup> sensing ability after coupling to protein is described.



3402



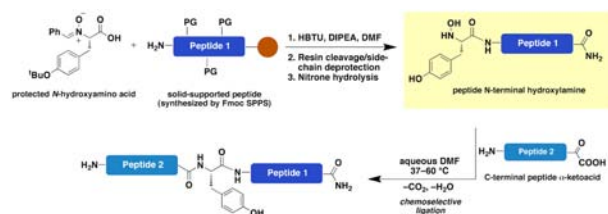
### Ultrafast Grignard addition reactions in the presence of water

Gyorgyi Osztrovszky, Torkil Holm\* and Robert Madsen\*

For two highly reactive Grignard reagents (allylMgBr and benzylMgCl) the rate of carbonyl addition is comparable to the rate of protonation by water.

PAPERS

3405

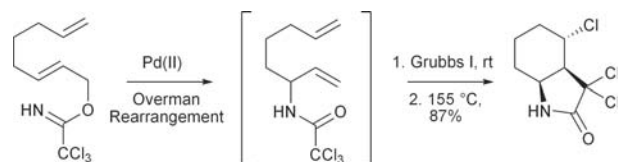


### Nitrene protecting groups for enantiopure N-hydroxyamino acids: synthesis of N-terminal peptide hydroxylamines for chemoselective ligations

S. Irene Medina, Jian Wu and Jeffrey W. Bode\*

Enantiopure peptide N-terminal hydroxylamines are key substrates for a chemoselective ligation with  $\alpha$ -ketoacids to form native peptide bonds. A robust method for their synthesis in enantiopure form *via* N-benzylidene nitrene protected intermediates is described. This procedure provides intermediates and protocols compatible with Fmoc-based solid phase peptide synthesis.

3418



### A three-step tandem process for the synthesis of bicyclic $\gamma$ -lactams

Fiona I. McGonagle, Lindsay Brown, Andrew Cooke and Andrew Sutherland\*

A one-pot, three-step tandem process has been developed for the direct synthesis of functionalised bicyclic [3.3.0], [4.3.0] and [5.3.0]  $\gamma$ -lactams from simple allylic trichloroacetimidates.

3426



### Expedient, one-pot preparation of fused indoles *via* CAN-catalyzed three-component domino sequences and their transformation into polyheterocyclic compounds containing pyrrolo[1,2-*a*]azepine fragments

Padmakar A. Suryavanshi, Vellaisamy Sridharan and J. Carlos Menéndez\*

The CAN-catalyzed three-component reaction between primary amines,  $\beta$ -dicarbonyl compounds and naphthoquinones or 2-bromonaphthoquinones afforded, respectively, 5-hydroxybenzo[*g*]indoles and benzo[*f*]indole-4,9-diones. Further transformations were also studied.

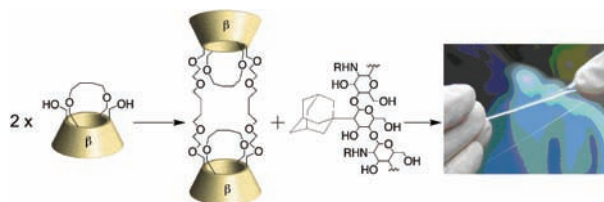


3437

### Duplex of capped-cyclodextrins, synthesis and cross-linking behaviour with a biopolymer

Olivia Bistri-Aslanoff, Yves Blériot, Rachel Auzely-Velty\* and Matthieu Sollogoub\*

The first doubly linked dimer of capped cyclodextrins was synthesized and studied as a cross-linking agent of adamantane-grafted chitosan.

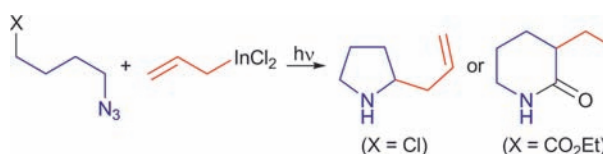


3444

### Radical allylations by reaction of azides with allylindium dichloride

Giorgio Bencivenni, Tommaso Lanza, Matteo Minozzi, Daniele Nanni,\* Piero Spagnolo and Giuseppe Zanardi

Allylindium dichloride is an effective reagent for converting suitable azides into allylated *N*-heterocycles through generation of indiumaminyl radicals followed by tandem 1,5-H shift and allylation of the resulting carbon radicals. Theoretical calculations showed that, compared to  $\text{AlSnMe}_3$ ,  $\text{AlInCl}_2$  favours the overall process because of both a lower BDE of the allyl-metal bond and a considerably faster rearrangement.

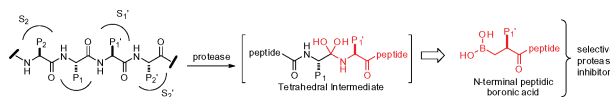


3451

### *N*-Terminal peptidic boronic acids selectively inhibit human ClpXP

Kenneth Knott, Jennifer Fishovitz, Steven B. Thorpe, Irene Lee and Webster L. Santos\*

We report the synthesis and development of *N*-terminal peptidic boronic acids as novel protease inhibitors. These boronic acids harvest the unique selectivity inherent on the *P'*-site of peptide substrates. Our effort provides the first selective inhibitor of hClpXP over hLon; both are ATP-dependent serine proteases present in mitochondrial matrix.

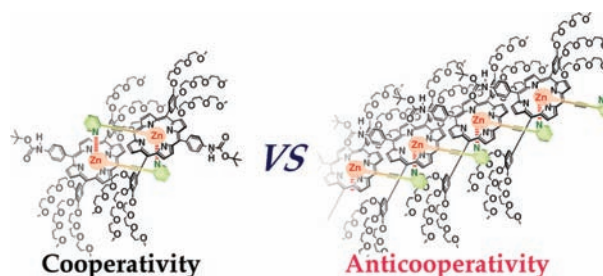


3457

### Ligand-assisted J-type aggregates of zinc porphyrin: anticooperative molecular organization in self-assembled bolaamphiphile

Mitsuhiko Morisue,\* Takefumi Morita and Yasuhisa Kuroda

Aqueous pyridine-appended porphyrin formed J-type aggregates *via* successive pyridyl-to-zinc coordination in self-assemblies. In contrast, an antiparallel dimer was organized *via* self-complementary coordination in non-coordinating organic solution.

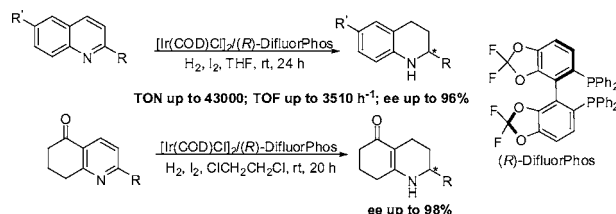


3464

### Highly efficient and enantioselective hydrogenation of quinolines and pyridines with Ir-Difluorophos catalyst

Weijun Tang, Yawei Sun, Lijin Xu,\* Tianli Wang, Qinghua Fan, Kim-Hung Lam and Albert S. C. Chan

The combination of chiral bisphosphine ligand Difluorophos with  $[\text{Ir}(\text{COD})\text{Cl}]_2$  resulted in a highly efficient catalyst system for asymmetric hydrogenation of quinolines and trisubstituted pyridines, affording the corresponding products with high enantioselectivities, excellent catalytic activities and productivities.

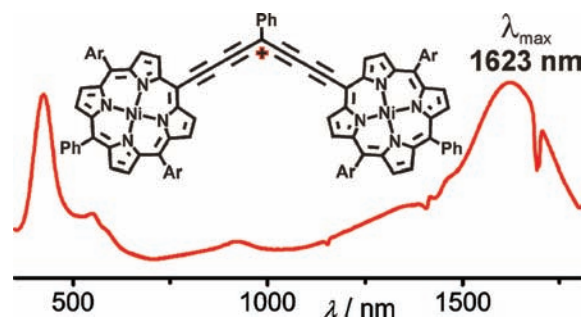


3472

### Extending conjugation in porphyrin dimer carbocations

Karl J. Thorley and Harry L. Anderson\*

A series of conjugated porphyrin dimer carbocations have been synthesised with varying length bridges between the porphyrin end groups and the carbocation centre. The absorption spectra of the carbocations show a strong length dependency, with intense bands deep into the near infrared.

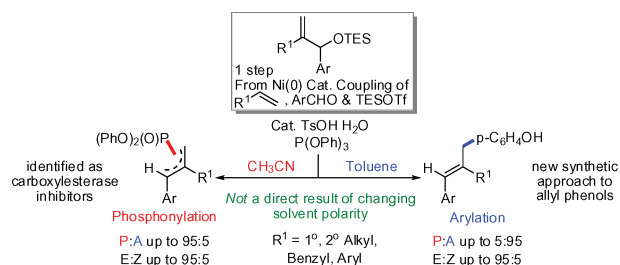


3480

### Nitrile assisted, Brønsted acid catalyzed regio and stereoselective diarylphosphonylation of allyl silyl ethers

Chun-Yu Ho,\* Chun-Wa Chan, Siu-Kwan Wo, Zhong Zuo\* and Lai-Ying Chan

We have discovered catalytic protocols for regio- and stereoselective synthesis of trisubstituted allyl diarylphosphonates or phenolic compounds from the corresponding allyl silyl ethers. The reaction media employed can have dramatic effect on reaction outcome.

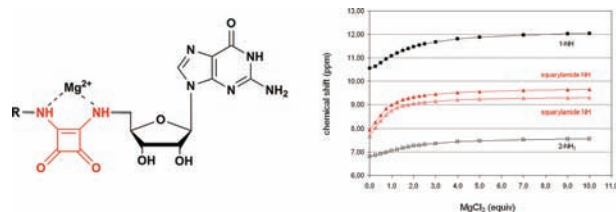


3488

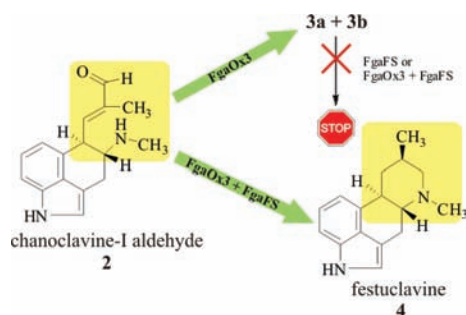
### Rationally designed squaryldiamides – a novel class of sugar-nucleotide mimics?

Sven Niewiadomski, Zeenat Beebejaun, Helen Denton, Terry K. Smith, Richard J. Morris and Gerd K. Wagner\*

New GDP-sugar mimics based on a squaryldiamide fragment coordinate readily to a divalent metal, and show some inhibitory activity against a GDP-mannose-dependent mannosyltransferase.



3500

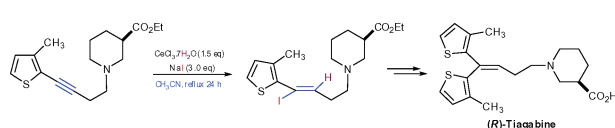


### Ergot alkaloid biosynthesis in *Aspergillus fumigatus*: Conversion of chanoclavine-I aldehyde to festuclavine by the festuclavine synthase FgaFS in the presence of the old yellow enzyme FgaOx3

C. Wallwey, M. Matuschek, X.-L. Xie and S.-M. Li\*

The conversion of chanoclavine-I aldehyde (**2**) to festuclavine (**4**) was demonstrated by using old yellow enzyme FgaOx3 and festuclavine synthase FgaFS. In the absence of FgaFS, **2** was converted by FgaOx3 to two shunt products **3a** and **3b**, which were not accepted by FgaFS as substrates.

3509

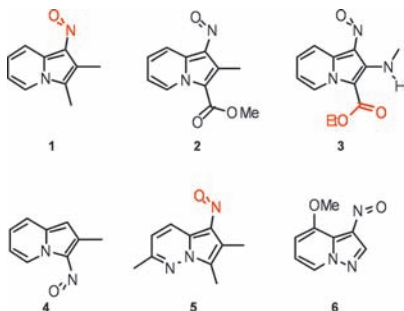


### A convergent approach to (*R*)-Tiagabine by a regio- and stereocontrolled hydroiodination of alkynes

Giuseppe Bartoli, Roberto Cipolletti, Giustino Di Antonio, Riccardo Giovannini, Silvia Lanari, Mauro Marcolini and Enrico Marcantoni\*

An efficient methodology for the iodofunctionalization of carbon–carbon triple bonds has efficiently been applied to the preparation of (*R*)-Tiagabine, a GABA uptake inhibitor marketed from the treatment of epilepsy.

3518

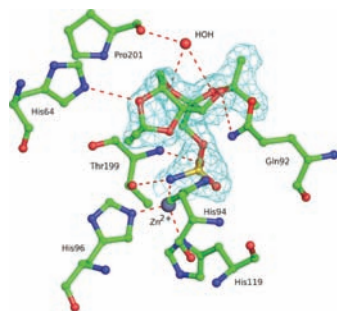


### Conformational equilibria and barriers to rotation in some novel nitroso derivatives of indolizines and 3- and 5-azaindolizines – an NMR and molecular modeling study

Ion Ghiviriga,\* Bahaa El-Dien M. El-Gendy, Henry Martinez, Dmytro Fedoseyenko, Eric P. Metais, Aziz Fadli and Alan R. Katritzky\*

The conformational preferences of compounds **1–6** have been identified by NMR and explained by molecular modeling.

3528



### The first example of a significant active site conformational rearrangement in a carbonic anhydrase-inhibitor adduct: the carbonic anhydrase I–topiramate complex

Vincenzo Alterio, Simona Maria Monti, Emanuela Truppo, Carlo Pedone, Claudiu T. Supuran\* and Giuseppina De Simone\*

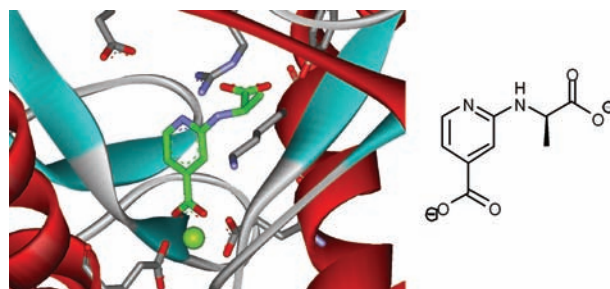
The crystallographic structure of the adduct which TPM, a widely used antiepileptic drug, forms with human Carbonic Anhydrase (CA) I, has been reported, showing for the first time a significant conformational rearrangement of the CA active site upon binding of the inhibitor.

3534

### Inhibition of chorismate-utilising enzymes by 2-amino-4-carboxypyridine and 4-carboxypyridone and 5-carboxypyridone analogues

Richard J. Payne,\* Esther M. M. Bulloch, Olivier Kerbarh and Chris Abell\*

A number of 2-amino-4-carboxypyridine, 4- and 5-carboxypyridone-based compounds were prepared. Several compounds proved to be low micromolar inhibitors when screened against three members of the chorismate-utilising enzyme family.

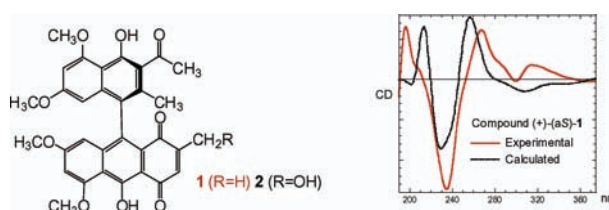


3543

### Structure and absolute configuration of toxic polyketide pigments from the fruiting bodies of the fungus *Cortinarius rufo-olivaceus*

Jin-Ming Gao,\* Jian-Chun Qin, Gennaro Pescitelli, Sebastiano Di Pietro, Ya-Tuan Ma and An-Ling Zhang

The structures, including the axial chirality configurations, of four polyketide pigments (**1–4**) isolated from *Cortinarius rufo-olivaceus*, were determined by spectroscopic analysis and their CD spectra and ZINDO and TDDFT calculations.

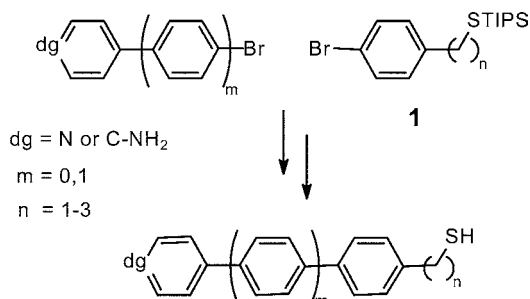


3552

### A divergent synthesis of oligoarylalkane thiols with Lewis-basic N-donor termini

Björn Schüpbach and Andreas Terfort\*

**The gate to functional surfaces:** Using a homologous series of triisopropylsilyl (TIPS) protected 4-bromophenylalkane thiols **1** as central building blocks, functional thiols for the generation of highly ordered self-assembled monolayers become accessible by short reaction sequences. The efficiency of this approach is demonstrated by the syntheses of six oligophenylalkane thiols with amino or pyridine head groups.

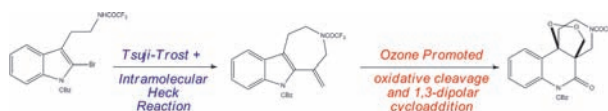


3563

### Formation and reactions of azepino[4,5-*b*]indoles: an unprecedented ozone reaction in the formation of novel benzo[*c*]naphthyridinones

Scott G. Stewart,\* Emilio L. Ghisalberti, Brian W. Skelton and Charles H. Heath

Herein we report the formation and interesting reactivity of several azepino[4,5-*b*]indole heterocycles bearing an additional olefin. Treatment of these ring systems with ozone results in an unprecedented secondary reaction of the Criegee intermediate, to afford a benzo[*c*]naphthyridinone containing a bridging cyclic peroxide.





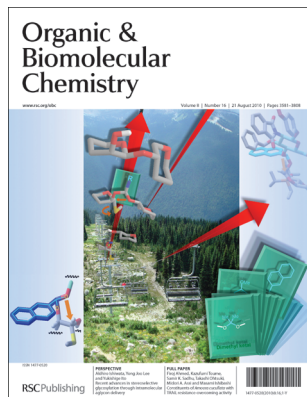
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## IN THIS ISSUE

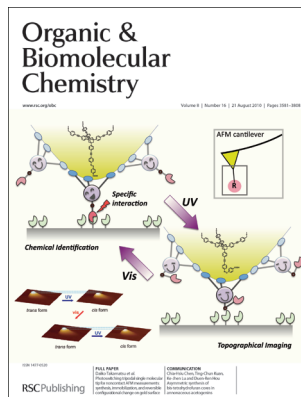
ISSN 1477-0520 CODEN OBCRAK 8(16) 3581–3808 (2010)



### Cover

See Akihiro Ishiwata *et al.*, pp. 3596–3608.  
The article by Ishiwata *et al.* describes invention and evolution of intramolecular aglycon delivery (IAD) approach which has proven powerful in giving a variety of O-glycosides stereoselectively.

Image reproduced by permission of Akihiro Ishiwata and Yukishige Ito from *Org. Biomol. Chem.*, 2010, **8**, 3596.



### Inside cover

See Daiko Takamatsu *et al.*, pp. 3655–3664.  
Robust, stationary, and photoswitchable tripods were synthesized as single molecule AFM tips for combined chemical force microscopy and topographical imaging.

Image reproduced by permission of Yoko Yamakoshi from *Org. Biomol. Chem.*, 2010, **8**, 3655.

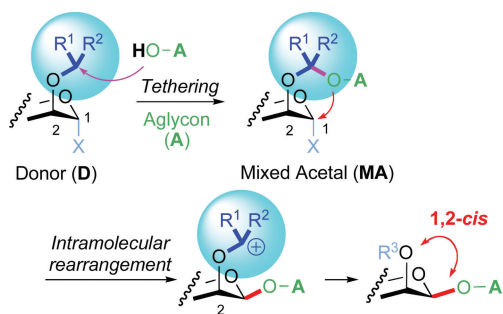
## PERSPECTIVES

3596

### Recent advances in stereoselective glycosylation through intramolecular aglycon delivery

Akihiro Ishiwata,\* Yong Joo Lee and Yukishige Ito\*

This account summarizes the newest naphthylmethyl (NAP) ether-mediated intramolecular aglycon delivery as well as all the types of mediations for stereospecific construction of various 1,2-*cis* linkages, not only for  $\beta$ -mannopyranoside, but also for other linkages almost without exception, including  $\beta$ -L-rhamnoside.

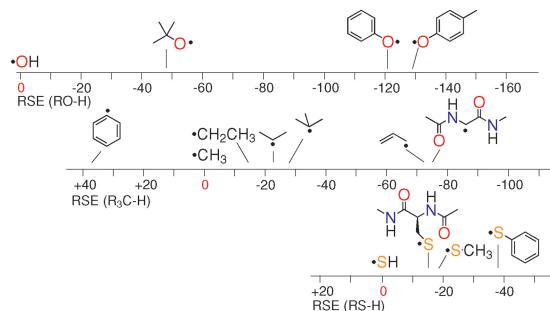


3609

### Radical stability and its role in synthesis and catalysis

Johnny Hioe and Hendrik Zipse\*

The use of Radical Stabilization Energy (RSE) values for the rationalization and analysis of radical reactions is demonstrated using four case studies from synthetic and biological chemistry: (a) Protecting Group/Radical Translocation (PRT) reactions; (b) Polarity Reversal Catalysis (PRC); (c) Biomimetic Oxidation Reactions; and (d) Class I Ribonucleotide Reductase (RNR I).

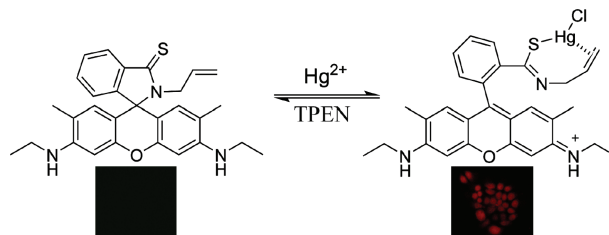


3618

**A reversible fluorescent Hg<sup>2+</sup> chemosensor based on a receptor composed of a thiol atom and an alkene moiety for living cell fluorescence imaging**

Weiyang Lin,\* Xiaowei Cao, Yundi Ding, Lin Yuan and Quanxing Yu

A novel reversible fluorescence turn-on Hg<sup>2+</sup> chemosensor was constructed based on a new receptor for fluorescence imaging in living cells.

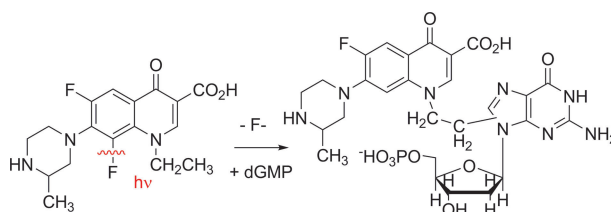


3621

**Fluoroquinolones as potential photochemotherapeutic agents: covalent addition to guanosine monophosphate**

Elisa Fasani,\* Ilse Manet, Massimo L. Capobianco, Sandra Monti,\* Luca Pretali and Angelo Albini\*

The aryl cation photochemically generated from 8-fluoroquinolones forms a covalent bond with guanosine monophosphate ( $k_r > 10^9 \text{ M}^{-1} \text{ s}^{-1}$ ).

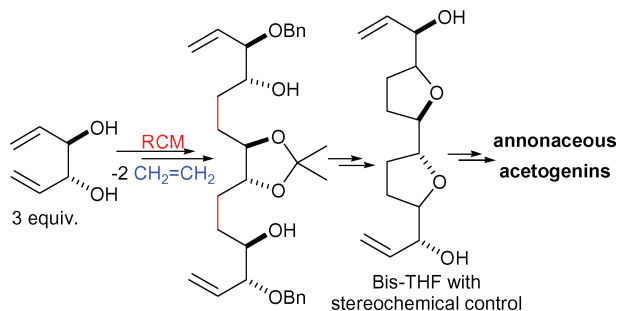


3624

**Asymmetric synthesis of bis-tetrahydrofuran cores in annonaceous acetogenins**

Chia-Hsiu Chen, Ting-Chun Kuan, Ke-Jhen Lu and Duen-Ren Hou\*

The bis-THF cores were synthesized from (3*R*,4*R*)-1,5-hexadiene-3,4-diol, and the methylene acetal function was developed as a new linker for RCM.

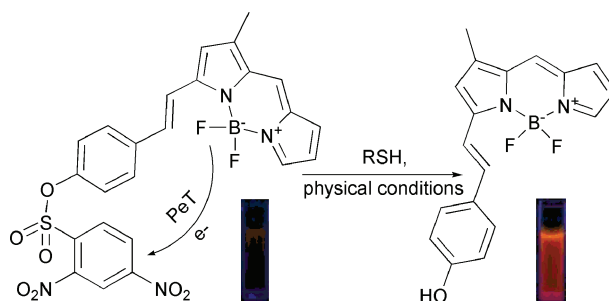


3627

**Design and synthesis of a highly selective fluorescent turn-on probe for thiol bioimaging in living cells**

Xin Li, Shijing Qian, Qiaojun He, Bo Yang, Jia Li and Yongzhou Hu\*

A highly-selective fluorescent turn-on probe for the rapid optical sensing of thiols has been designed, synthesized and applied to imaging of thiols in living cells.

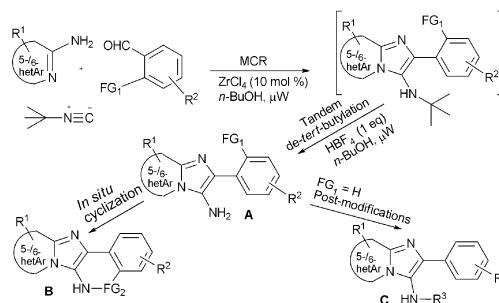


3631

**Towards molecular diversity: dealkylation of *tert*-butyl amine in Ugi-type multicomponent reaction product establishes *tert*-butyl isocyanide as a useful convertible isonitrile**

Sankar K. Guchhait\* and Chetna Madaan

Development of a novel tandem de-*tert*-butylation in an Ugi-type MCR product afforded for the first time *tert*-butyl isocyanide as a useful convertible isonitrile towards the generation of molecular diversity of N-fused imidazoles (A, B and C).

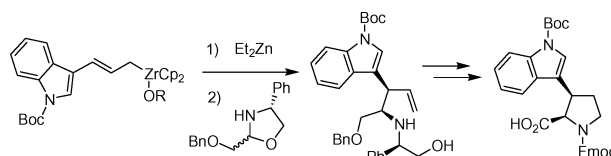


3635

**Asymmetric synthesis of proline-based conformationally constrained tryptophan mimetic**

Pierre-Olivier Delaye, Jean-Luc Vasse\* and Jan Szymoniak

The stereoselective synthesis of a constrained tryptophan mimetic is described, based on the generation of an unprecedented indole-containing allylmetal.



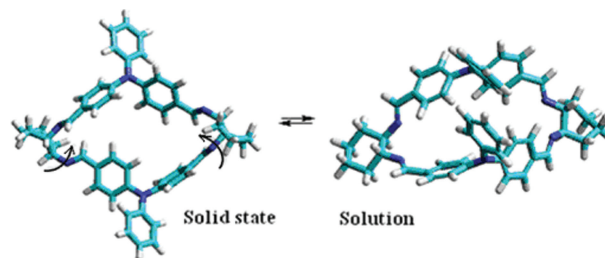
## PAPERS

3638

**Triphenylamine-based rhombimine macrocycles with solution interconvertible conformation**

Mircea Grigoras,\* Loredana Vacareanu, Teofilia Ivan and Gabriela Liliana Ailiesei

Three rhombimine macrocycles have been synthesized by [2+2] cyclocondensation reaction between (R,R)-1,2-diaminocyclohexane and 4,4'-bisformyl triphenylamine derivatives. Evidence from <sup>1</sup>H-NMR and UV suggests that there is a rotamer inversion in solution arising from the rotation of triphenylamine group around cyclohexyl-N single bonds.

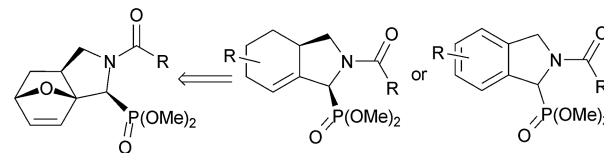


3644

**Experimental and computational study of the ring opening of tricyclic oxanorbornenes to polyhydro isoindole phosphonates**

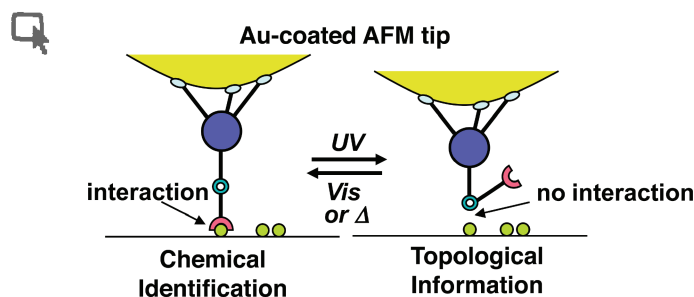
Diederica D. Claeys, Christian V. Stevens,\* Bart I. Roman, Pieter Van De Caveye, Michel Waroquier and Veronique Van Speybroeck\*

Experimental and molecular modelling study of the ring opening of tricyclic  $\alpha$ -amino phosphonates with Lewis-acid and clay-based catalysts.





3655

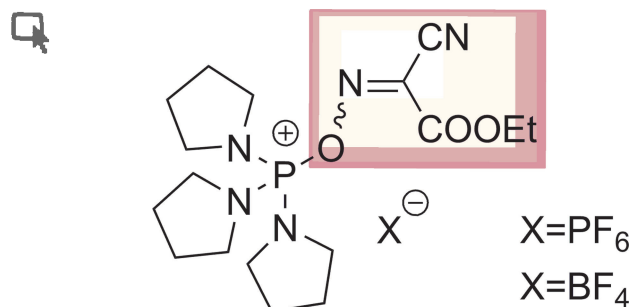


### Photoswitching tripodal single molecular tip for noncontact AFM measurements: synthesis, immobilization, and reversible configurational change on gold surface

Daiko Takamatsu, Ken-ichi Fukui,\* Safwan Aroua and Yoko Yamakoshi\*

Photoswitching tripods were synthesized as molecular tips for chemical force microscopy. Stationary immobilized molecules on the gold surface provided reversible configurational changes indicating a great potential for both chemical and topographical imaging by AFM.

3665

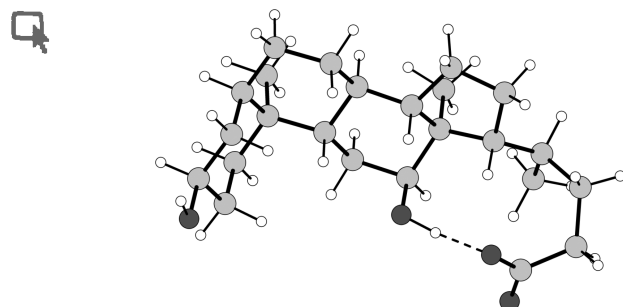


### PyOxP and PyOxB: the Oxyma-based novel family of phosphonium salts

Ramon Subirós-Funosas, Ayman El-Faham\* and Fernando Albericio\*

Here we present the synthesis and evaluation of the phosphonium salts *O*-[(1-cyano-2-ethoxy-2-oxoethylidene)amino]-oxytri(pyrrolidin-1-yl) phosphonium hexafluorophosphate (PyOxP) and tetrafluoroborate (PyOxB).

3674

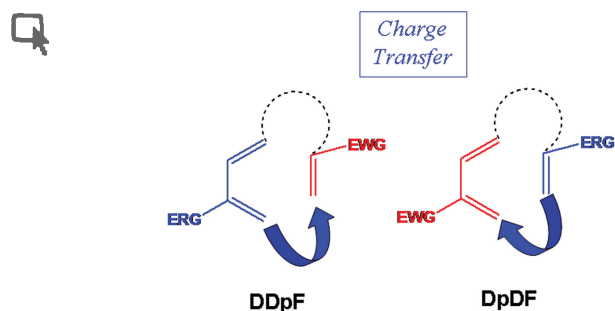


### Relative acidity scale of bile acids through ESI-MS measurements

Olga Bortolini,\* Giancarlo Fantin, Valeria Ferretti, Marco Fogagnolo, Pier Paolo Giovannini and Alessandro Medici

The anion proton affinity of the most important human bile acids and those of the corresponding keto bile acids have been examined in order to establish a true (intrinsic) relative acidity scale. The acidity of cholic and deoxycholic acids were confirmed to be significantly high. A rationale of the differences found for the various bile acids are discussed, also supported by theoretical calculations.

3678



### Quantitative characterization of group electrophilicity and nucleophilicity for intramolecular Diels–Alder reactions

Jorge Soto-Delgado,\* Luis R. Domingo and Renato Contreras\*

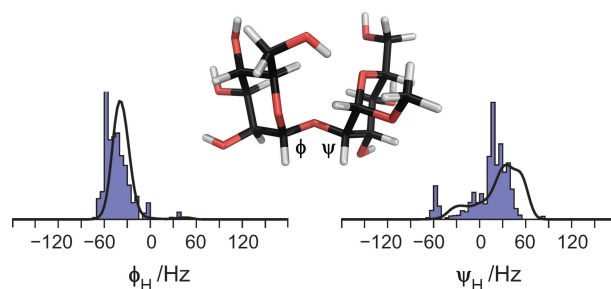
The transferability of the empirical reactivity rules established for the intermolecular DA cycloadditions to the intramolecular DA processes is discussed.

3684

**Population distribution of flexible molecules from maximum entropy analysis using different priors as background information: application to the  $\phi$ ,  $\psi$ -conformational space of the  $\alpha$ -(1 $\rightarrow$ 2)-linked mannose disaccharide present in *N*- and *O*-linked glycoproteins**

Elin Säwén, Tariq Massad, Clas Landersjö, Peter Damberg\* and Göran Widmalm\*

Spectroscopy data and background information was used to determine solution conformational preferences at a glycosidic linkage.

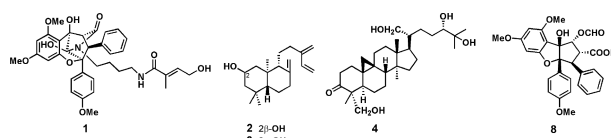


3696

**Constituents of *Amoora cucullata* with TRAIL resistance-overcoming activity**

Firoj Ahmed, Kazufumi Toume, Samir K. Sadhu, Takashi Ohtsuki, Midori A. Arai and Masami Ishibashi\*

Bioassay-guided fractionation of mangrove, *Amoora cucullata*, led to the isolation of four new compounds (1–4) along with known compounds (5–11), among which 8 showed the most potent TRAIL resistance-overcoming activity.

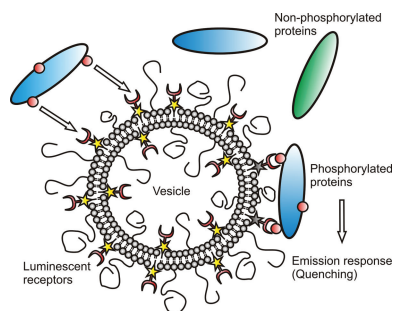


3704

**Luminescent vesicular receptors for the recognition of biologically important phosphate species**

Benjamin Gruber, Stefan Stadlbauer, Kristina Woinaroschy and Burkhard König\*

Novel luminescent zinc complexes with affinity to phosphate ions have been prepared and incorporated into vesicle membranes. The obtained particles respond to phosphate binding by quenching of fluorescence emission and could be used for the selective recognition of phosphorylated proteins.

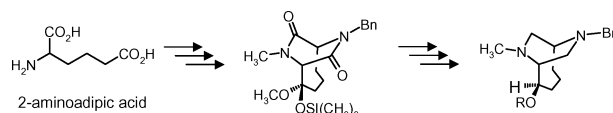


3715

**Bicyclic  $\sigma$  receptor ligands by stereoselective Dieckmann analogous cyclization of piperazinebutyrate**

Sunil Kumar Sunnam, Dirk Schepmann, Birgit Wibbeling and Bernhard Wünsch\*

A Dieckmann analogous cyclization was used to obtain novel bicyclic systems representing conformationally restricted piperazine derivatives. The intermediate mixed methyl silyl ketal allows further introduction of substituents into the four-carbon bridge to modify receptor interactions.

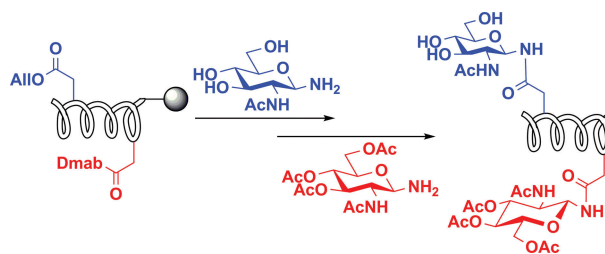


3723

### Synthesis of *N*-linked glycopeptides *via* solid-phase aspartylation

Trent Conroy, Katrina A. Jolliffe and Richard J. Payne\*

An efficient solid-phase strategy for the preparation of *N*-linked glycopeptides is described which utilises orthogonal side chain protection of aspartic acid residues with allyl or Dmab esters. Glycopeptides were prepared in high yield after selective deprotection followed by aspartylation with a glycosylamine. The orthogonality of the two protecting groups was exploited in the preparation of an *N*-linked glycopeptide bearing two different glycan moieties.

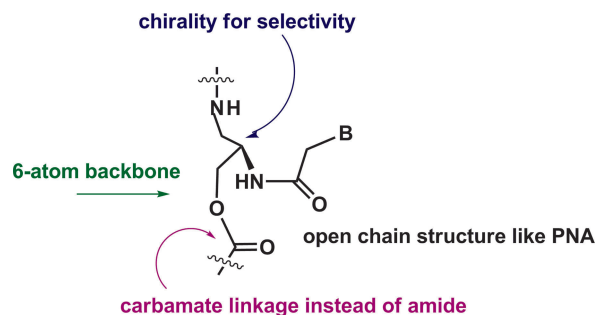


3734

### Design, synthesis and DNA/RNA binding studies of nucleic acids comprising stereoregular and acyclic polycarbamate backbone: polycarbamate nucleic acids (PCNA)

Vangala Madhuri and Vijayanti A. Kumar\*

The designed, chiral, acyclic polycarbamate nucleic acids (PCNA) exhibited sequence and orientation specific binding to nucleic acids. Complexes of PCNA with DNA were as stable as PNA:DNA complexes and those with RNA were as stable as natural DNA:RNA complexes.

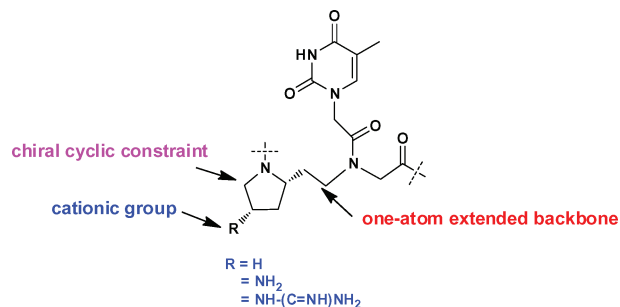


3742

### Amino/guanidino-functionalized *N*-(pyrrolidin-2-ethyl)glycine-based pet-PNA: Design, synthesis and binding with DNA/RNA

Sachin S. Gokhale and Vijayanti A. Kumar\*

One atom extended, chiral, amino/guanidino functionalized pyrrolidin-2-ethyl PNA, pet-PNA, allows sequence specific and orientation selective binding to target DNA/RNA in either duplex or triplex modes.

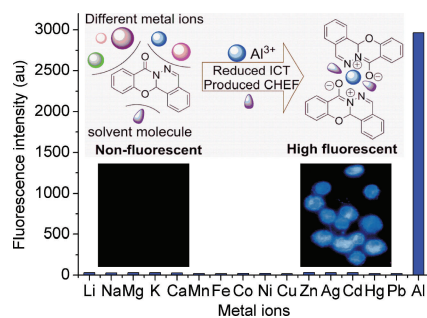


3751

### A selective, cell-permeable fluorescent probe for Al<sup>3+</sup> in living cells

Lina Wang, Wenwu Qin, Xiaoliang Tang, Wei Dou, Weisheng Liu,\* Qingfeng Teng and Xiaojun Yao

A new chemosensor which could be used for Al<sup>3+</sup> ion monitoring in environmental and biological systems was synthesized.



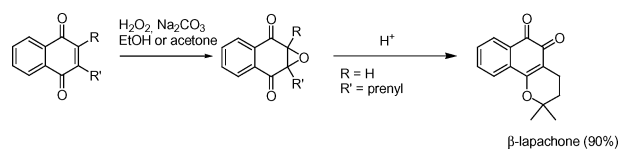


3790

### Synthesis of naturally occurring naphthoquinone epoxides and application in the synthesis of $\beta$ -lapachone

Sven Claessens, Pascal Habonimana and Norbert De Kimpe\*

Optimized epoxidation conditions of mono- and dialkylated naphthoquinones are presented making use of  $\text{H}_2\text{O}_2/\text{Na}_2\text{CO}_3$ . The optimized epoxidation conditions are applied in a short and high yielding synthesis of the pharmaceutically important  $\beta$ -lapachone.

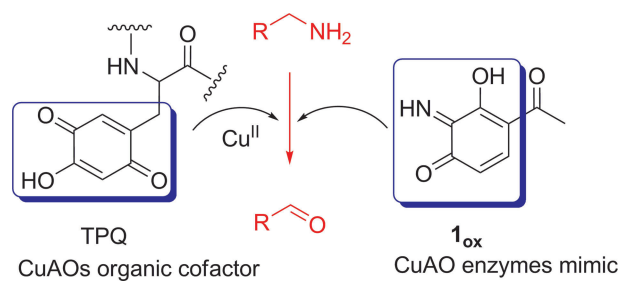


3796

### A small molecule that mimics the metabolic activity of copper-containing amine oxidases (CuAOs) toward physiological mono- and polyamines

Martine LARGERON,\* Maurice-Bernard Fleury and Margherita Strolin Benedetti

Can a small molecule replicate the activity and specificity of copper-containing amine oxidase enzymes toward endogenous mono- and polyamines?

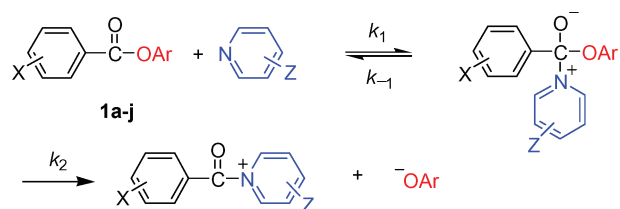


3801

### Nonlinear Hammett plots in pyridinolysis of 2,4-dinitrophenyl X-substituted benzoates: change in RDS versus resonance contribution

Ik-Hwan Um,\* Li-Ra Im, Eun-Hee Kim and Ji Hye Shin

The electronic nature of substituent X in the benzoyl moiety does not affect the rate-determining step.



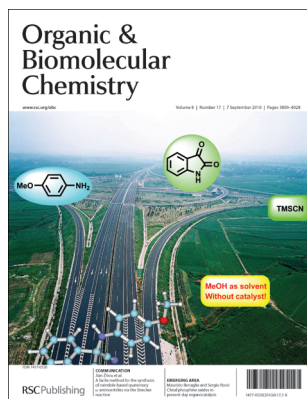
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## IN THIS ISSUE

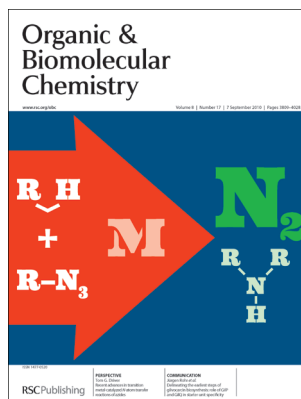
ISSN 1477-0520 CODEN OBCRAK 8(17) 3809–4028 (2010)



### Cover

See Jian Zhou *et al.*, pp. 3847–3850.  
The direct  $\alpha$ -cyanoamination of isatins using TMS-CN was accomplished in methanol without any catalyst.

Image reproduced by permission of Yun-Lin Liu, Feng Zhou, Jun-Jie Cao, Cong-Bin Ji, Miao Ding and Jian Zhou from *Org. Biomol. Chem.*, 2010, **8**, 3847.



### Inside cover

See Tom G. Driver, pp. 3831–3846.  
Azides are useful progenitors of metal nitrene species that transform simple starting materials into complex, functionalized products. Cover art designed and prepared by Benjamin Kiel of House Industries.

Image reproduced by permission of Tom G. Driver from *Org. Biomol. Chem.*, 2010, **8**, 3831.

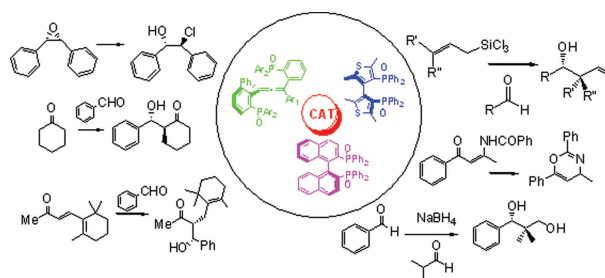
## EMERGING AREA

3824

### Chiral phosphine oxides in present-day organocatalysis

Maurizio Benaglia\* and Sergio Rossi

This contribution highlights the relatively few examples of stereoselective transformations organocatalyzed by chiral phosphine oxides, discussing the different mechanisms and identifying topics for future investigation in what can be defined as an “Emerging Area”.



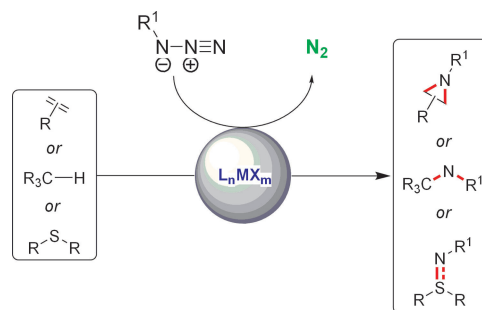
## PERSPECTIVE

3831

### Recent advances in transition metal-catalyzed *N*-atom transfer reactions of azides

Tom G. Driver

Transition metal-catalyzed *N*-atom transfer reactions from azides represents a potential efficient and environmentally benign method for the construction of carbon–nitrogen and sulfur–nitrogen bonds. This perspective examines the progress toward achieving green *N*-atom transfer processes from azides.

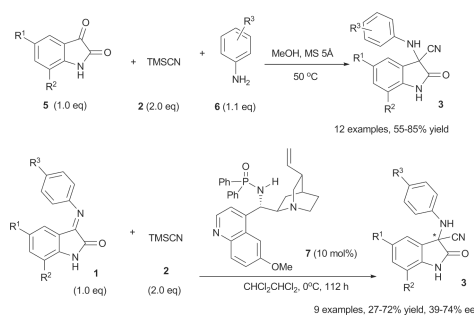


3847

### A facile method for the synthesis of oxindole based quaternary $\alpha$ -aminonitriles *via* the Strecker reaction

Yun-Lin Liu, Feng Zhou, Jun-Jie Cao, Cong-Bin Ji, Miao Ding and Jian Zhou\*

The direct  $\alpha$ -cyanoamination of isatins using TMSCN has been developed, which is carried out in methanol without any catalyst. A new bifunctional cinchona alkaloid-based phosphinamide catalyst **7** could promote the Strecker reaction of isatins derived ketimine with TMSCN in up to 74% ee.

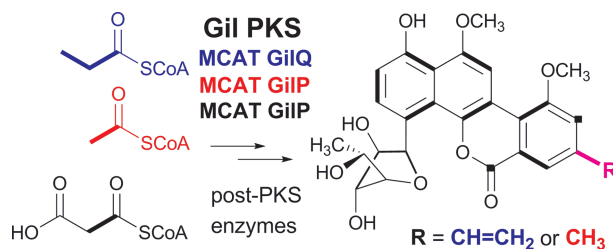


3851

### Delineating the earliest steps of gilvocarcin biosynthesis: role of GilP and GilQ in starter unit specificity

Micah D. Shepherd, Madan K. Kharel, Lili L. Zhu, Steven G. van Lanen and Jürgen Rohr\*

Unusual MCAT-type activities, not a distinct KASIII analogue, steer gilvocarcin biosynthesis toward preferentially priming with propionate over acetate starter units.

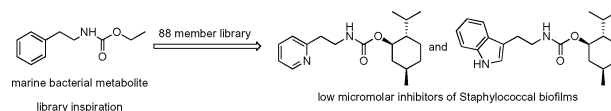


3857

### Synthesis and bacterial biofilm inhibition studies of ethyl *N*-(2-phenethyl) carbamate derivatives

Steven A. Rogers, Daniel C. Whitehead, Trey Mullikin and Christian Melander\*

An 88 member library based upon the marine bacterial metabolite ethyl *N*-(2-phenethyl) carbamate was evaluated for bacterial biofilm inhibition against a panel of medically relevant strains.

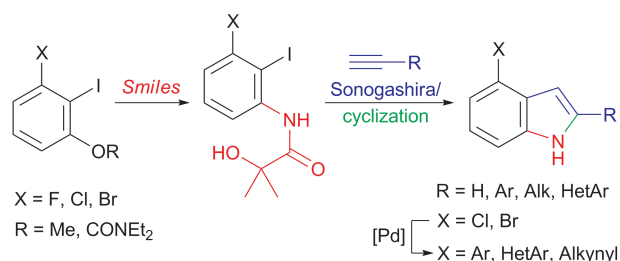


3860

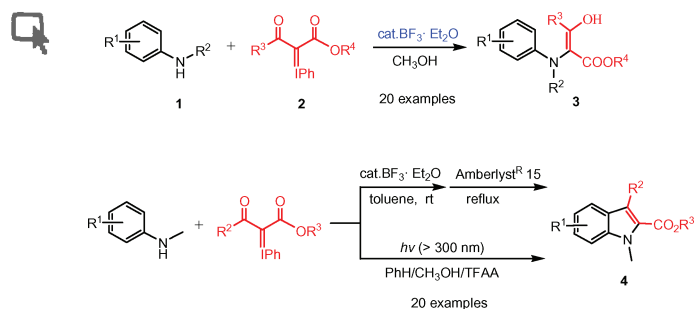
### Synthesis of 4-functionalized-1*H*-indoles from 2,3-dihalophenols

Roberto Sanz,\* Verónica Guilarte and Nuria García

A new synthesis of 4-halo-1*H*-indoles has been developed from easily available 2,3-dihalophenol derivatives. The key steps are Smiles rearrangement and a one-pot or stepwise Sonogashira coupling/NaOH-mediated cyclization. Subsequent functionalization allows access to a wide variety of 2,4- or 2,3,4-regioselectively functionalized indoles.



3865



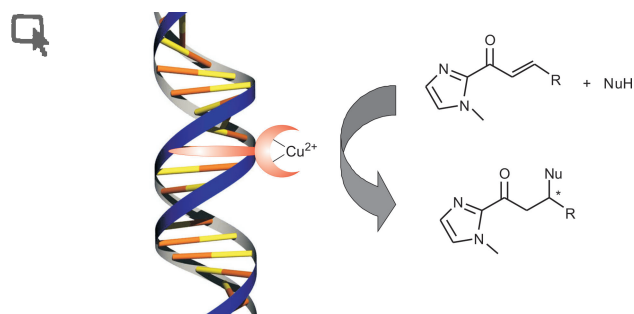
### The acid-promoted reactions of phenyliodonium ylides with substituted anilines and their applications to the synthesis of indoles

Xianpei Wang, Bing Han, Junyan Wang and Wei Yu\*

The reactions of phenyliodonium ylides with substituted anilines constitute a new protocol for the synthesis of indoles.

PAPERS

3868

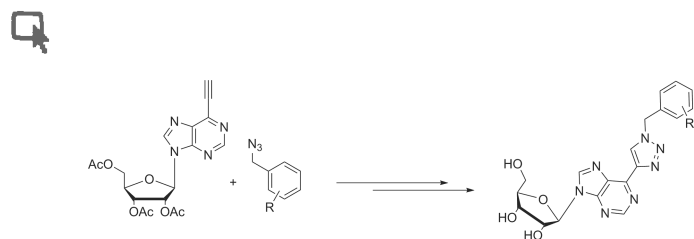


### On the Role of DNA in DNA-based Catalytic Enantioselective Conjugate Addition Reactions

Ewold W. Dijk, Arnold J. Boersma, Ben L. Feringa\* and Gerard Roelfes\*

DNA significantly affects the reaction rates of DNA-based catalytic enantioselective Friedel–Crafts alkylation and Michael addition reactions.

3874

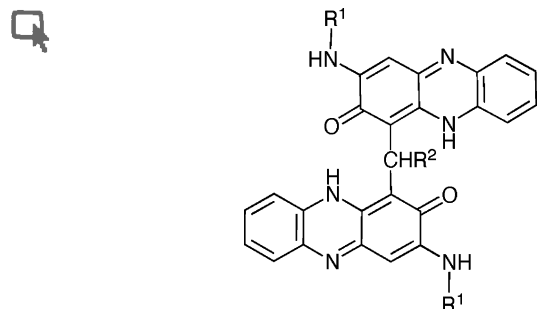


### Expeditious synthesis and biological evaluation of new C-6 1,2,3-triazole adenosine derivatives A1 receptor antagonists or agonists

S. C. Mathew, Y. By, A. Berthault, M.-A. Virolleaud, L. Carrega, G. Chouraqui, L. Commeiras, J. Condo, M. Attolini, A. Gaudel-Siri, J. Ruf, J. Rodriguez,\* J.-L. Parrain\* and R. Guieu\*

An expeditious synthesis and biological evaluation of new C-6 1,2,3-triazole adenosine derivatives A1 receptor antagonists or agonists are described.

3882



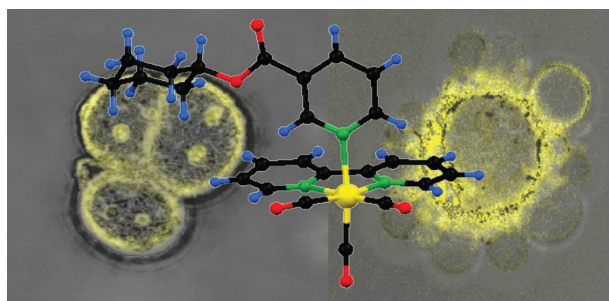
### New class of highly stable nonaromatic tautomers

Claire Seillan, Philippe Marsal and Olivier Siri\*

A new and efficient one-pot synthesis of unprecedented dimers which sacrifice by prototropic rearrangement their aromatic character (OH form) in favor of a new class of highly stable nonaromatic NH tautomers is described (either in solution or in solid-state).



3888

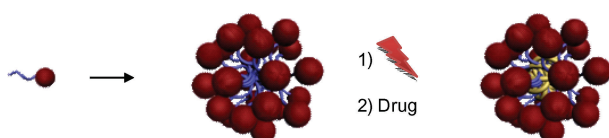


### Uptake and localisation of rhenium *fac*-tricarbonyl polypyridyls in fluorescent cell imaging experiments

V. Fernández-Moreira, F. L. Thorp-Greenwood, A. J. Amoroso, J. Cable, J. B. Court, V. Gray, A. J. Hayes, R. L. Jenkins, B. M. Kariuki, D. Lloyd, C. O. Millet, C. Ff. Williams and M. P. Coogan\*

A series of rhenium *fac*-tricarbonyl polypyridyl complexes of varying charge, lipophilicity and chemical reactivity are described along with their application in fluorescence cell imaging.

3902

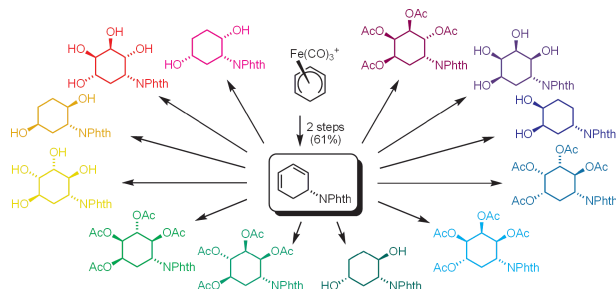


### Enhanced drug loading in polymerized micellar cargo

Julien Ogier, Thomas Arnaud,\* Géraldine Carrot, Antoine Lhumeau, Jean-Marie Delbos, Claire Boursier, Olivier Loreau, Francois Lefoulon and Eric Doris\*

Self-assembly and polymerization of polydiacetylenic amphiphiles afforded a micellar cargo which permitted high loading and aqueous solubilization of lipophilic drugs.

3908

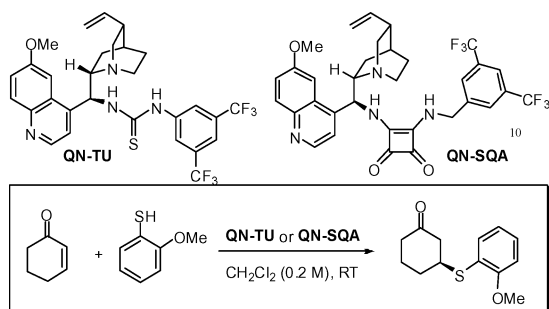


### *De novo* synthesis of polyhydroxyl aminocyclohexanes

Anobick Sar, Sergey Lindeman and William A. Donaldson\*

The syntheses of 12 stereochemically diverse polyhydroxyl aminocyclohexanes derivatives are described. These short syntheses require 2–5 steps from *N*-(2,4-cyclohexadien-1-yl)phthalimide, which is prepared in two steps from tricarbonyl(cyclohexadienyl)iron(1+).

3918

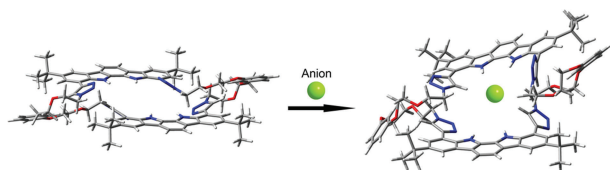


### DOSY NMR for monitoring self aggregation of bifunctional organocatalysts: increasing enantioselectivity with decreasing catalyst concentration

Hyeong Bin Jang, Ho Sik Rho, Joong Suk Oh, Eun Hye Nam, Sang Eun Park, Han Yong Bae and Choong Eui Song\*

In this report, we demonstrate that self-aggregation is an intrinsic problem of bifunctional organocatalysts.

3923

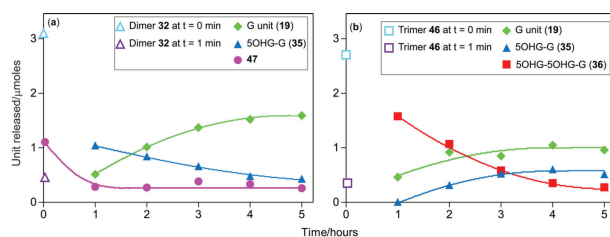


### Self-assembly of indolocarbazole-containing macrocyclic molecules

Yingjie Zhao, Yuliang Li,\* Yongjun Li,\* Changshui Huang, Huibiao Liu, Siu-Wai Lai, Chi-Ming Che and Daoben Zhu

A successful approach for the synthesis of indolocarbazole-containing based upon  $\pi$ - $\pi$  stacking preorganization of indolocarbazole planes and click-chemistry reactions has been developed.

3928

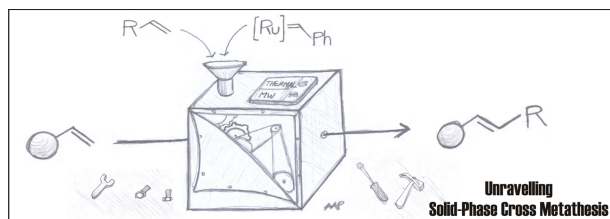


### Insights into lignin primary structure and deconstruction from *Arabidopsis thaliana* COMT (caffeic acid *O*-methyltransferase) mutant *Atomt1*

Syed G. A. Moinuddin, Michaël Jourdes, Dhrubojyoti D. Laskar, Chanyoung Ki, Claudia L. Cardenas, Kye-Won Kim, Dianzhong Zhang, Laurence B. Davin and Norman G. Lewis\*

Partial sequencing of native and mutant (*Atomt1*) lignins established a coherent conservation of 8-*O*-4' modified 8-*O*-4' inter-unit linkages during ligand primary structure macromolecular assembly.

3947

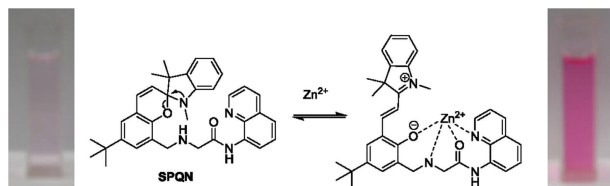


### Unravelling the olefin cross metathesis on solid support. Factors affecting the reaction outcome

Andrés A. Poeylout-Palena and Ernesto G. Mata\*

Several factors which modulate the fate of cross metathesis in solid phase organic synthesis were examined including the effect of microwave irradiation.

3957



### A colorimetric and fluorescent turn-on chemosensor operative in aqueous media for Zn<sup>2+</sup> based on a multifunctionalized spirobenzopyran derivative

Jian-Fa Zhu, Han Yuan, Wing-Hong Chan\* and Albert W. M. Lee

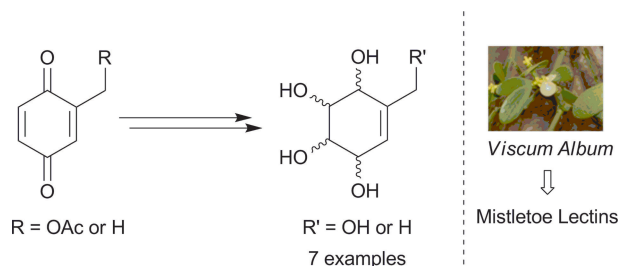
Multifunctional spiropyran derivative SPQN was synthesized as a Zn<sup>2+</sup> chromogenic and fluorescent sensor. In 50% aqueous ethanol solution, upon binding with Zn<sup>2+</sup>, SPQN displays color change, chelation-enhanced fluorescence and ratiometric fluorescence output.

3965

### De novo synthesis and lectin binding studies of unsaturated carba-pyranoses

Timo Leermann,\* Oliver Block, Michael A. L. Podeschwa, Uwe Pfüller and Hans-Josef Altenbach

Galactose analogues were synthesized from branched *para*-benzoquinones and their potential to act as competitive inhibitors in lectin-carbohydrate interactions was investigated by means of Surface Plasmon Resonance (SPR) Spectroscopy.

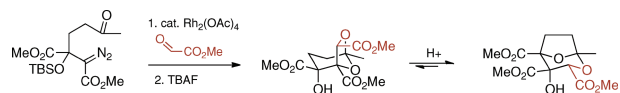


3975

### Synthetic and computational studies on the tricarboxylate core of 6,7-dideoxysqualestatin H5 involving a carbonyl ylide cycloaddition–rearrangement

David M. Hodgson,\* Carolina Villalonga-Barber, Jonathan M. Goodman and Silvina C. Pellegrinet

Using diazodiketoesters, rhodium(II) acetate catalysed tandem carbonyl ylide formation and dipolar cycloaddition with methyl glyoxylate generates 6,8-dioxabicyclo[3.2.1]octanes. Subsequent acid-catalysed rearrangement favours, at equilibrium, the 2,8-dioxabicyclo[3.2.1]octane skeleton of the squalostatins–zaragozic acids.

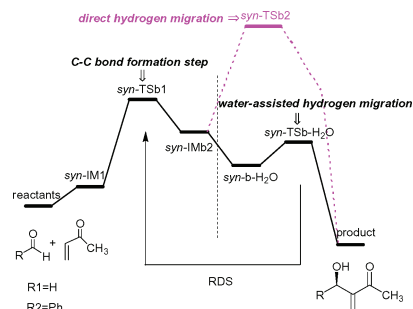


3985

### Computational investigation on the mechanism and the stereoselectivity of Morita–Baylis–Hillman reaction and the effect of the bifunctional catalyst *N*-methylprolinol

Liang Dong, Song Qin, Zhishan Su, Huaqing Yang and Changwei Hu\*

When water participates in the reaction, the energy barrier of the hydrogen migration step decreases dramatically, and the RDS turns to be the C–C bond formation step.

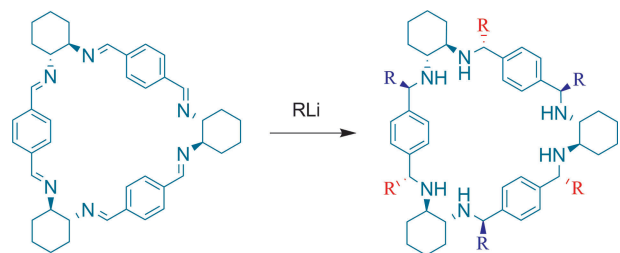


3992

### Stereoselective synthesis of ring C-hexasubstituted trialamines

Diego Savoia,\* Andrea Gualandi and Helen Stoeckli-Evans

The addition of organolithium reagents to the trialamine derived from (*R,R*)-1,2-diaminocyclohexane and terephthalaldehyde gave the corresponding trialamines with complete stereocontrol and the *R* configuration of all six newly formed stereocenters

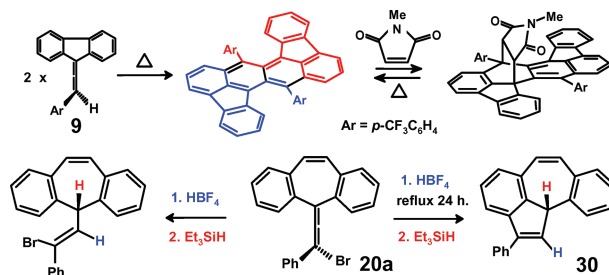


3997

**Syntheses, X-ray crystal structures and reactivity of fluorenylidene- and dibenzosuberonylidene-allenes: convenient precursors to dispirotetracenes, di-indenotetracenes and 2-phenyl-11*bH*-dibenz[*cd,h*]azulene**

E. V. Banide, C. O'Connor, N. Fortune, Y. Ortin, S. Milosevic, H. Müller-Bunz and M. J. McGlinchey\*

3,3-(Biphenyl-2,2'-diyl)-1- $\alpha,\alpha,\alpha$ -trifluoro-*p*-tolyl-allene, **9**, sequentially forms a series of 1,2-dialkylidene-cyclobutane dimers and, ultimately, a dispirotetracene and a di-indenotetracene; the latter compound forms a Diels–Alder adduct with *N*-methylmaleimide.

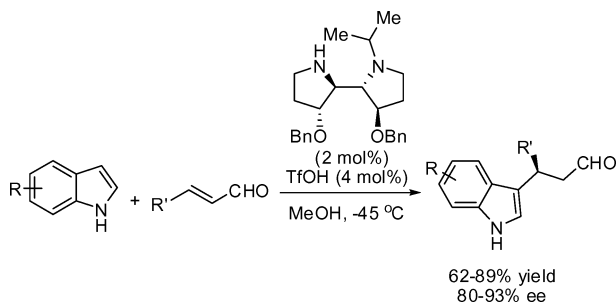


4011

**Highly efficient asymmetric organocatalytic Friedel–Crafts alkylation of indoles with  $\alpha,\beta$ -unsaturated aldehydes**

Shangbin Jin, Chenguang Li, Yuanhui Ma, Yuhe Kan, Yong Jian Zhang\* and Wanbin Zhang\*

The development of an improved organocatalyst, *N*-isopropylated bipyrrrolidine, for highly efficient asymmetric Friedel–Crafts alkylation of indoles with  $\alpha,\beta$ -unsaturated aldehydes is presented.

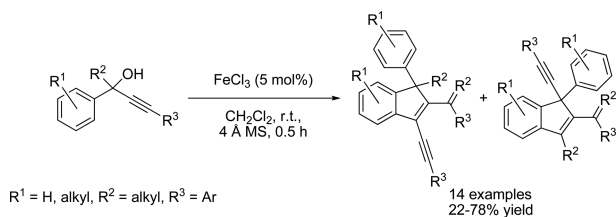


4016

**Unexpected iron(III) chloride-catalysed dimerisation of 1,1,3-trisubstituted-prop-2-yn-1-ols as an expedient route to highly conjugated indenenes**

Weidong Rao and Philip Wai Hong Chan\*

A method to prepare highly conjugated indenenes efficiently by iron(III) chloride-catalysed dimerisation of trisubstituted propargylic alcohols under very mild conditions at room temperature is described. The reactions are rapid and operationally straightforward, giving the indene products in good yields and regioselectivity.



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## IN THIS ISSUE

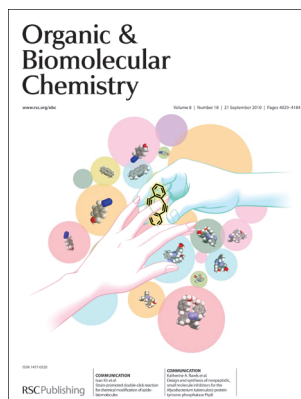
ISSN 1477-0520 CODEN OBCRAK 8(18) 4029–4184 (2010)



### Cover

See Thomas C. Nugent *et al.*, pp. 4085–4089  
Archimedes' screw, an ingenious device synonymous with water transport, is depicted here as the water active 1,2-diamine catalyst converting low value starting materials into high value multifunctional aldol products. Graphic Art Credit: Michael Holt (Bremen, Germany).

Image reproduced by permission of Thomas C. Nugent from *Org. Biomol. Chem.*, 2010, **8**, 4085.



### Inside cover

See Isao Kii *et al.*, pp. 4051–4055.  
The wedding ring. He is putting the Sondheimer diyne on her finger and they are covalently joined together. This wedding ring provides a novel convergent method, "strain-promoted double-click reaction" enabling us to modify azido-biomolecules with a small reporter azide.

Image reproduced by permission of Takamitsu Hosoya from *Org. Biomol. Chem.*, 2010, **8**, 4051.

## PERSPECTIVE

4043

### In water, on water, and by water: mimicking nature's aldolases with organocatalysis and water

Nobuyuki Mase\* and Carlos F. Barbas, III\*

Organocatalysis and water combine two environmentally friendly concepts in a single system. The explosive development of organocatalytic direct transformations in aqueous media without added organic solvent is reviewed.



## COMMUNICATIONS

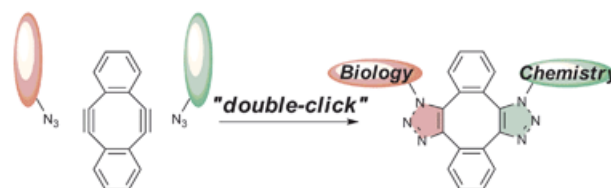
4051



### Strain-promoted double-click reaction for chemical modification of azido-biomolecules

Isao Kii,\* Akira Shiraishi, Toshiyuki Hiramatsu, Takeshi Matsushita, Hidehiro Uekusa, Suguru Yoshida, Makoto Yamamoto, Akira Kudo, Masatoshi Hagiwara and Takamitsu Hosoya\*

The strain-promoted "double-click" (SPDC) reaction using Sondheimer diyne, a novel convergent method conjugating three molecules spontaneously, has enabled us to readily modify an azido-biomolecule with a small reporter azido-molecule.



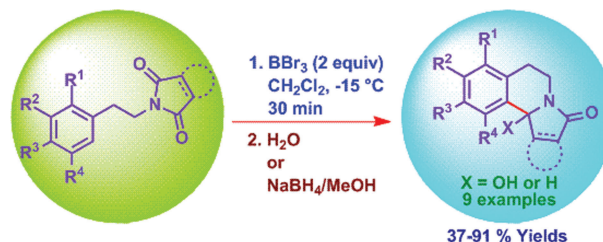
The Sondheimer diyne acts as a matchmaker between chemistry and biology.

4056

### An unusual reactivity of $\text{BBr}_3$ : Accessing tetrahydroisoquinoline units from *N*-phenethylimides

Jayaraman Selvakumar, Alexandros Makriyannis and Chinnasamy Ramaraj Ramanathan\*

A simple methodology to construct the tetrahydroisoquinoline containing skeleton through electrophilic activation of imide carbonyl group of *N*-phenethylimides using  $\text{BBr}_3$  as Lewis acid is developed.

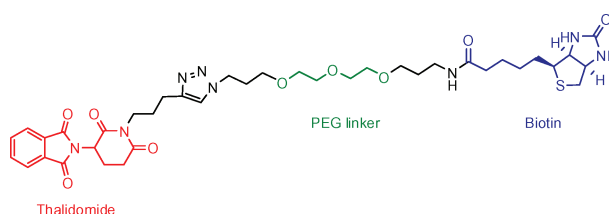


4059

### Efforts toward elucidating Thalidomide's molecular target: an expedient synthesis of the first Thalidomide biotin analogue

Scott G. Stewart,\* Carlos J. Braun, Marta E. Polomska, Mahdad Karimi, Lawrence J. Abraham and Keith A. Stubbs

The synthesis of the first Thalidomide–biotin analogue is described *via* a Huisgen 1,3-dipolar cycloaddition (click reaction) as the key synthetic step. This compound will help unlock investigations into the as yet unknown molecular mode of action of Thalidomide.

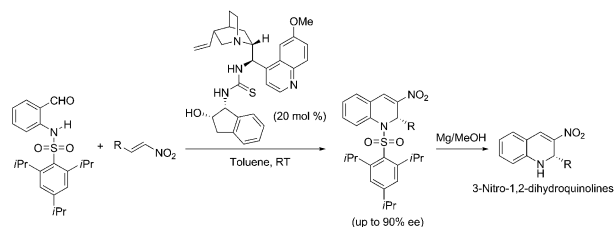


4063

### Bifunctional thiourea-promoted cascade aza-Michael-Henry-dehydration reactions: asymmetric preparation of 3-nitro-1,2-dihydroquinolines

Xiaoqian Liu and Yixin Lu\*

A cascade aza-Michael-Henry-dehydration reaction led to a one-step preparation of 3-nitro-1,2-dihydroquinolines in high yields and up to 90% ee.

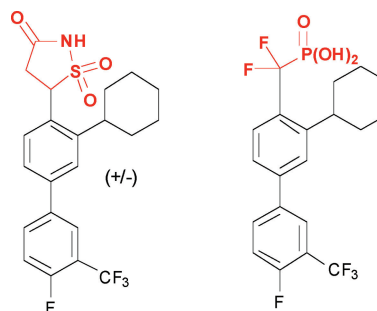


4066

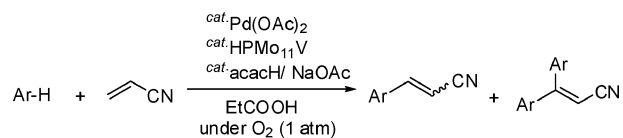
### Design and synthesis of nonpeptidic, small molecule inhibitors for the *Mycobacterium tuberculosis* protein tyrosine phosphatase PtpB

Katherine A. Rawls, Christoph Grundner and Jonathan A. Ellman\*

The design and synthesis of small molecules with low micromolar inhibition of *Mycobacterium tuberculosis* protein tyrosine phosphatase PtpB is described.



4071

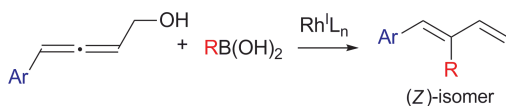


### Direct oxidative coupling of benzenes with acrylonitriles to cinnamionitriles catalyzed by Pd(OAc)<sub>2</sub>/HPMoV/O<sub>2</sub> system

Yasushi Obora,\* Yoshihisa Okabe and Yasutaka Ishii\*

A facile direct synthesis of cinnamionitriles from acrylonitriles and benzenes is successfully achieved by using Pd(OAc)<sub>2</sub>/HPMoV/O<sub>2</sub> catalyst system *via* the direct C–H bond activation of benzenes using molecular oxygen as a terminal oxidant.

4074

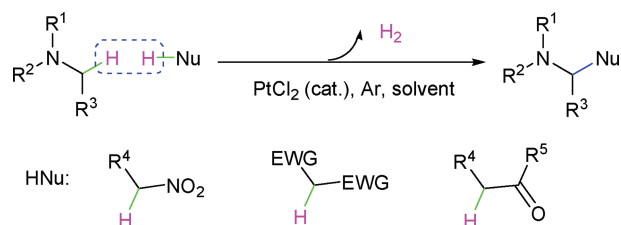


### Stereoselective synthesis of vinyl-substituted (Z)-stilbenes by rhodium-catalysed addition of arylboronic acids to allenic alcohols

Tomoya Miura, Hiroshi Shimizu, Tomohiro Igarashi and Masahiro Murakami\*

The reaction of 4-arylbuta-2,3-dien-1-ols with arylboronic acids in the presence of a rhodium(I) catalyst gave vinylsubstituted (Z)-stilbenes stereoselectively.

4077



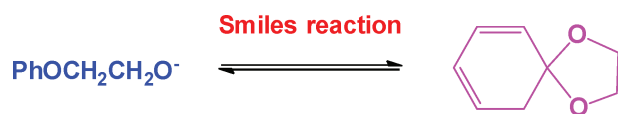
### Platinum-catalyzed cross-dehydrogenative coupling reaction in the absence of oxidant

Xing-Zhong Shu, Yan-Fang Yang, Xiao-Feng Xia, Ke-Gong Ji, Xue-Yuan Liu and Yong-Min Liang\*

A third strategy for cross-dehydrogenative coupling reaction has been reported *via* platinum catalysis in the absence of oxidant.

## PAPERS

4080



### The gas phase Smiles rearrangement of anions PhO(CH<sub>2</sub>)<sub>n</sub>O<sup>−</sup> (n = 2–4). A joint theoretical and experimental approach

Tianfang Wang, Nico M. M. Nibbering and John H. Bowie\*

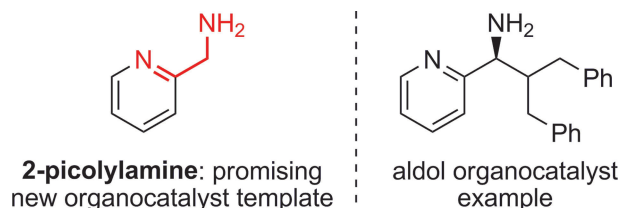
A combination of theory and experiment shows that energized PhOCH<sub>2</sub>CH<sub>2</sub>O<sup>−</sup> exclusively undergoes the Smiles rearrangement.

4085

### Picolylamine as an organocatalyst template for highly diastereo- and enantioselective aqueous aldol reactions

Thomas C. Nugent,\* M. Naveed Umar and Ahtaram Bibi

A pyridine based 1,2-diamine containing only one stereogenic center has been identified for fast aldol reactions. Using 2–5 mol% of (*R*)- or (*S*)-PicAm-2, cyclohexanone (3.3 equiv) readily undergoes aldol reactions with *o*-, *m*-, and *p*-substituted aromatic aldehyde partners. Furthermore, the new catalyst excels when examining functionalized cyclic ketone addition to aldehydes (Scheme 2).

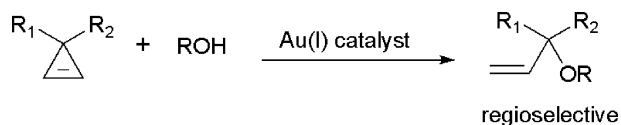


4090

### Gold(I)-catalysed alcohol additions to cyclopropenes

Maximilian S. Hadfield, Jürgen T. Bauer, Pauline E. Glen and Ai-Lan Lee\*

Gold(I)-catalysed addition of alcohols to 3,3-disubstituted cyclopropenes occurs in a highly regioselective and facile manner to produce alkyl *tert*-allylic ethers in good yields. The reaction is tolerant of sterically hindered substituents on the cyclopropene as well as primary and secondary alcohols as nucleophiles.

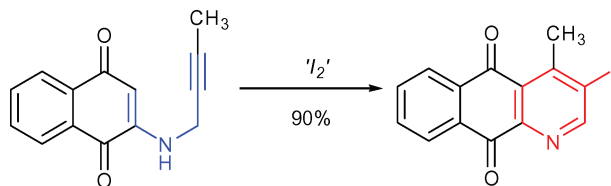


4096

### Azaanthraquinone assembly from *N*-propargylamino quinone via iodine-induced 6-*endo-dig* electrophilic cyclization

Na Fei, Qiwen Hou, Shaozhong Wang,\* Huaqin Wang and Zhu-Jun Yao

A metal-free protocol taking advantage of the excellent nucleophilicity of aminoquinone to assemble the azaanthraquinone framework was developed by employing an iodine-induced 6-*endo-dig* electrophilic cyclization.

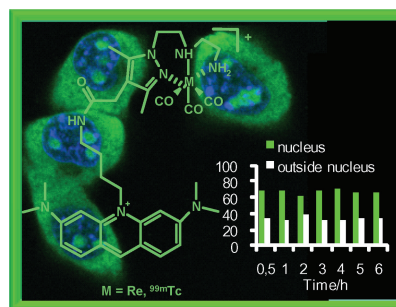


4104

### Tricarbonyl M(I) (M = Re, <sup>99m</sup>Tc) complexes bearing acridine fluorophores: synthesis, characterization, DNA interaction studies and nuclear targeting

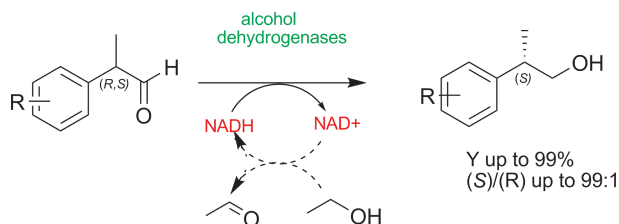
Teresa Esteves, Catarina Xavier, Sofia Gama, Filipa Mendes, Paula D. Raposinho, Fernanda Marques, António Paulo, João Costa Pessoa, José Rino, Giampietro Viola and Isabel Santos\*

Nuclear-targeting and DNA intercalation of Re and <sup>99m</sup>Tc-tricarbonyl complexes.





4117

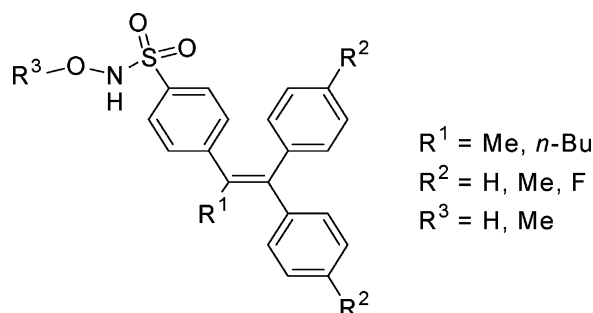


### Chemoenzymatic synthesis of (2*S*)-2-arylpropanols through a dynamic kinetic resolution of 2-arylpropanals with alcohol dehydrogenases

Paola Galletti,\* Enrico Emer, Gabriele Gucciardo, Arianna Quintavalla, Matteo Pori and Daria Giacomini\*

(2*S*)-2-Arylpropanols, useful intermediates in the synthesis of Profens, were obtained by means of a dynamic kinetic resolution (DKR) of racemic 2-arylpropanals. The DKR process combines an enzymatic reduction with a chemical base-racemization of the unreacted aldehyde.

4124

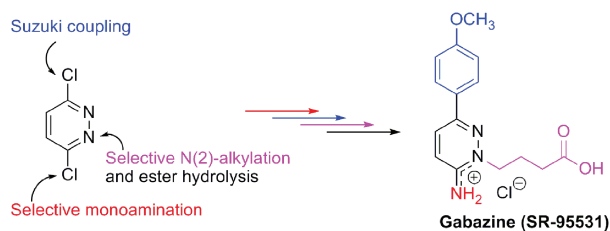


### Acyclic triaryl olefins possessing a sulfohydroxamic acid pharmacophore: synthesis, nitric oxide/nitroxyl release, cyclooxygenase inhibition, and anti-inflammatory studies

Zhangjian Huang, Carlos Velázquez, Khaled Abdellatif, Morshed Chowdhury, Sarthak Jain, Julie Reisz, Jenna DuMond, S. Bruce King and Edward Knaus\*

A group of sulfohydroxamic acids were synthesized and evaluated as COX isozyme inhibitors, NO and HNO donors, and anti-inflammatory agents.

4131

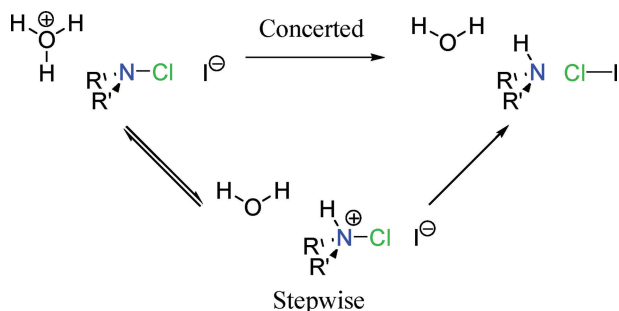


### Microwave-enhanced synthesis of 2,3,6-trisubstituted pyridazines: application to four-step synthesis of gabazine (SR-95531)

Navnath Gavande, Graham A. R. Johnston, Jane R. Hanrahan\* and Mary Chebib\*

Microwave-enhanced, highly efficient protocols for the synthesis of synthetically and biologically important 2,3,6-trisubstituted pyridazine architectures have been developed by sequential amination/Suzuki coupling/alkylation reactions. The synthesis of gabazine (SR-95531) has been achieved in four steps and 73% overall yield.

4137



### Acid-catalysed chlorine transfer from *N*-chloramines to iodide ion: experimental evidence for a predicted change in mechanism

Paula Calvo, Juan Crugeiras\* and Ana Ríos

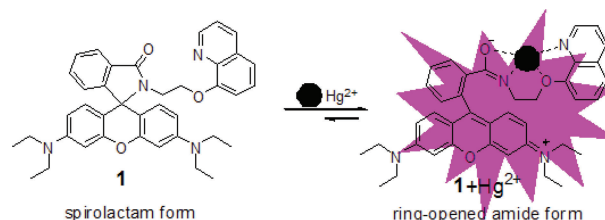
A change from a stepwise to a concerted mechanism for acid catalysis of chlorine transfer to iodide ion is observed upon decreasing the basicity of the leaving amine. This change appears to occur when the protonated chloramine ceases to have a significant lifetime in the presence of the nucleophile.

4143

### Rhodamine-based chemosensor for $\text{Hg}^{2+}$ in aqueous solution with a broad pH range and its application in live cell imaging

Yun Zhao, Yue Sun, Xin Lv, Yunlong Liu, Maliang Chen and Wei Guo\*

A rhodamine B-based chemosensor bearing an 8-hydroxyquinoline chelating group was found to exhibit dual chromo- and fluorogenic responses toward  $\text{Hg}^{2+}$  with high selectivity and sensitivity.

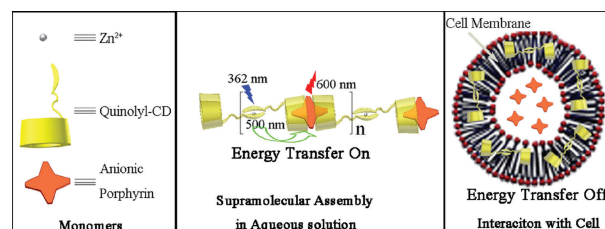


4148

### Construction and transmembrane dissociation behavior of supramolecular assembly of quinolinocyclodextrin with porphyrin

Miao Yu, Yong Chen, Ning Zhang and Yu Liu\*

A non-covalently constructed  $\text{Zn}^{2+}$ /cyclodextrin/porphyrin supramolecule exhibited environment-sensitive association/dissociation behaviors, which referred to a controlled transmembrane release property.

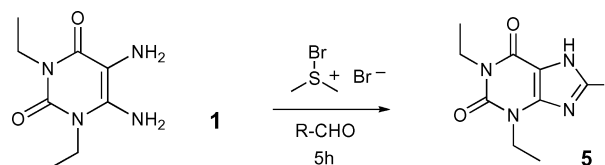


4155

### An efficient route to xanthine based $A_{2A}$ adenosine receptor antagonists and functional derivatives

Paul LaBeaume, Ma Dong, Michail Sitkovsky, Elizabeth V. Jones, Rhiannon Thomas, Sara Sadler, Amy E. Kallmerten and Graham B. Jones\*

A one-pot route to 8-substituted xanthines has been developed from 5,6-diaminouracils and carboxaldehydes. Yields are good and the process applicable to a range of substrates including a family of  $A_{2A}$  adenosine receptor antagonists.

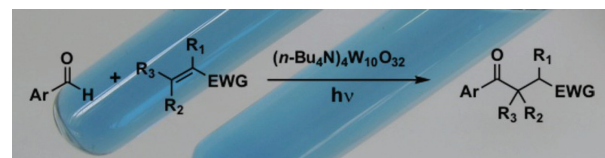


4158

### Benzoyl radicals from (hetero)aromatic aldehydes. Decatungstate photocatalyzed synthesis of substituted aromatic ketones

Davide Ravelli, Michele Zema, Mariella Mella, Maurizio Fagnoni\* and Angelo Albini

Benzoyl radicals are generated directly from (hetero)aromatic aldehydes upon tetrabutylammonium decatungstate ( $(n\text{-Bu}_4\text{N})_4\text{W}_{10}\text{O}_{32}$ ), TBADT photocatalysis under mild conditions. In the presence of  $\alpha,\beta$ -unsaturated esters, ketones and nitriles radical conjugate addition ensues and gives the corresponding  $\beta$ -functionalized aryl alkyl ketones.

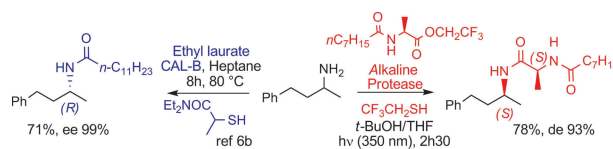


4165

### Switching from (*R*)- to (*S*)-selective chemoenzymatic DKR of amines involving sulfanyl radical-mediated racemization

Lahssen El Bliidi, Nicolas Vanthuyne, Didier Siri, Stéphane Gastaldi,\* Michèle P. Bertrand\* and Gérard Gil\*

Chemoenzymatic dynamic kinetic resolution of amines involving sulfanyl radical-induced racemization happened to be the very first switchable DKR process allowing the synthesis of either (*R*)- or (*S*)-amides.

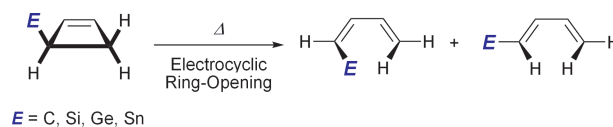


4169

### Substituent effect of group 14 elements on the ring-opening reaction of cyclobutene

Munehiro Hasegawa, Ippei Usui, Soichiro Konno and Masahiro Murakami\*

A series of cyclobutenes bearing group 14 elements at the 3-position were synthesized, and their rotational behaviors in the thermal ring-opening reaction are discussed.

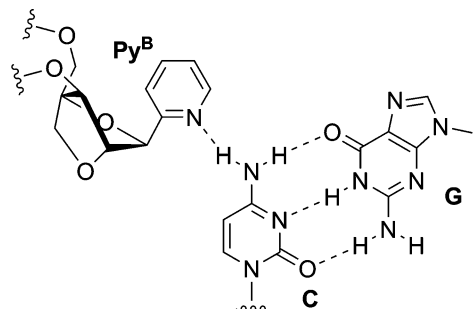


4176

### 2',4'-BNA bearing a 2-pyridine nucleobase for CG base pair recognition in the parallel motif triplex DNA

Yoshiyuki Hari,\* Sachiko Matsugu, Hiroyasu Inohara, Yuri Hatanaka, Masaaki Akabane, Takeshi Imanishi and Satoshi Obika\*

2',4'-BNA bearing a 2-pyridine nucleobase ( $\text{Py}^{\text{B}}$ , see picture) in triplex-forming oligonucleotides was able to recognize a CG base pair within dsDNA with high sequence-selectivity and strong binding affinity.



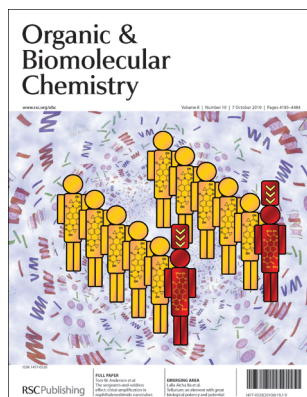
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## IN THIS ISSUE

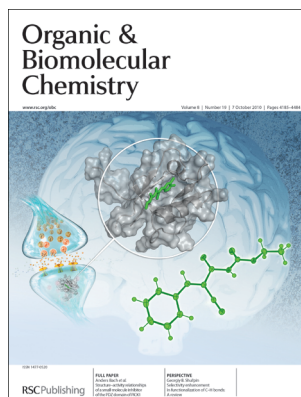
ISSN 1477-0520 CODEN OBCRAK 8(19) 4185–4484 (2010)



### Cover

See Anderson *et al.*, pp. 4274–4280.  
Chiral naphthalenediimide-based monomers impose a helical supramolecular structure upon achiral monomers much like sergeants organising soldiers in rank and file.

Image reproduced by permission of G. Dan Pantoş from *Org. Biomol. Chem.*, 2010, **8**, 4274.



### Inside cover

See Bach *et al.*, pp. 4281–4288.  
Structure-activity relationships of the first small-molecule inhibitor of the PDZ domain of PICK1, an important protein in the brain, have been explored.

Image reproduced by permission of Ulrik Gether and Kristian Strømgaard from *Org. Biomol. Chem.*, 2010, **8**, 4281.

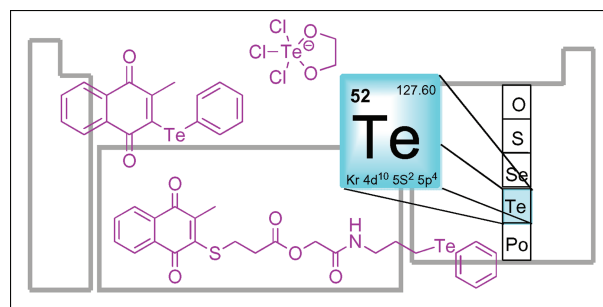
## EMERGING AREA

4203

### Tellurium: an element with great biological potency and potential

Lalla Aicha Ba, Mandy Döring, Vincent Jamier and Claus Jacob\*

Although their synthesis is not always straightforward, organotellurium compounds have recently attracted considerable interest among biological chemists, in particular in areas such as imaging, antibiotics and anticancer drug design.



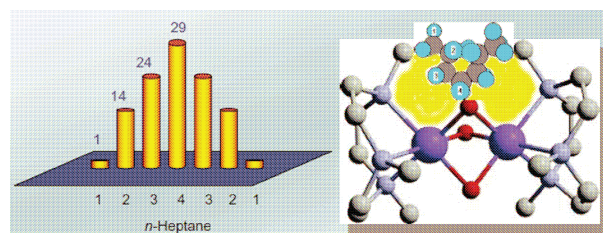
## PERSPECTIVE

4217

### Selectivity enhancement in functionalization of C–H bonds: A review

Georgiy B. Shul'pin\*

By applying the ideas of biochemistry, chemists can create new catalysts which selectively functionalize various C–H compounds.

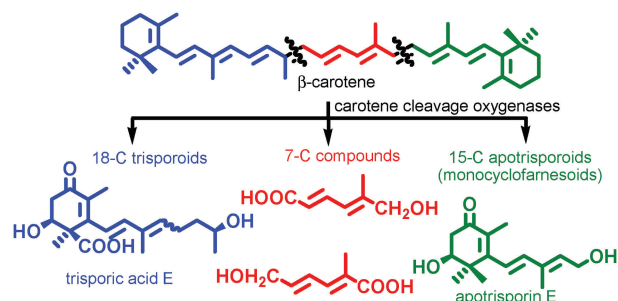


4229

### Splitting of $\beta$ -carotene in the sexual interaction of *Phycomyces*

Silvia Polaino, M. Mar Herrador, Enrique Cerdá-Olmedo and Alejandro F. Barrero\*

The new C7 natural products **1–2** are the result of enzymatic carotene degradation during the sexual interaction.

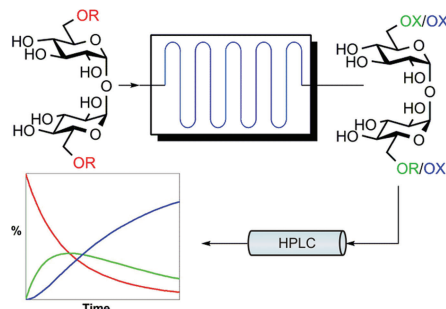


4232

### Flow chemistry kinetic studies reveal reaction conditions for ready access to unsymmetrical trehalose analogues

Mitul K. Patel and Benjamin G. Davis\*

Trehalose functionalization was studied in a microreactor, furnishing kinetic data that allowed the development of a synthetic route for large scale desymmetrizations.

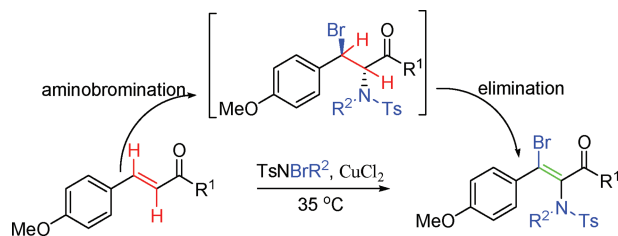


4236

### Copper-catalyzed aminobromination/elimination process: an efficient access to $\alpha,\beta$ -unsaturated vicinal haloamino ketones and esters

Hao Sun, Guangqian Zhang, Sanjun Zhi, Jianlin Han,\* Guigen Li and Yi Pan\*

A novel copper-catalyzed aminobromination-elimination process has been developed, which provides an easy access to  $\alpha,\beta$ -unsaturated vicinal haloamides derivatives.

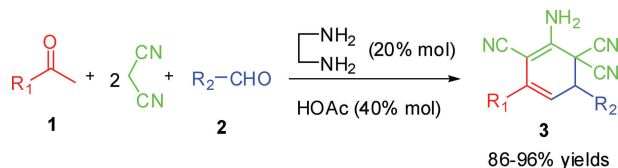


4240

### Primary 1,2-diamine catalysis III: an unexpected domino reaction for the synthesis of multisubstituted cyclohexa-1,3-dienamines

Junfeng Wang, Qin Li, Chao Qi, Yi Liu, Zemei Ge\* and Runtao Li\*

Primary 1,2-diamine was employed in the first organocatalyzed multicomponent domino reactions of aryl ketones, aldehydes and malononitrile, affording multisubstituted cyclohexa-1,3-dienamines **3** in satisfactory results.

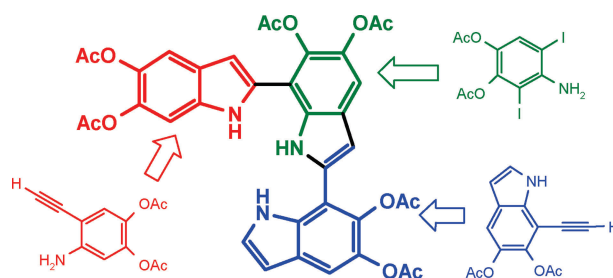


4243

**First synthetic entry to the trimer stage of 5,6-dihydroxyindole polymerization: *ortho*-alkynylaniline-based access to the missing 2,7':2',7''-triindole**

Luigia Capelli, Paola Manini,\* Alessandro Pezzella and Marco d'Ischia

An *ortho*-alkynylaniline-based strategy allowed the first access to a 5,6-dihydroxyindole trimer, 5,5',5'',6,6',6''-hexaacetoxy-2,7':2',7''-triindole, *via* a sequence of Sonogashira coupling and metal cation catalyzed intramolecular cyclization.

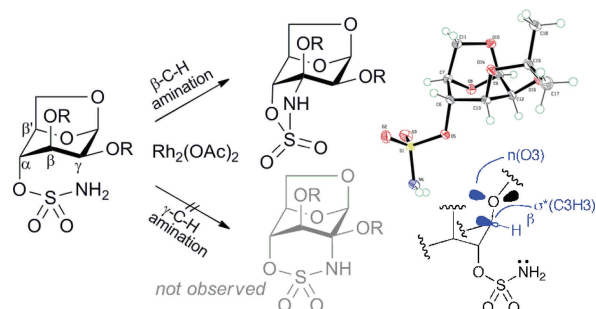


4246

**Inverted regioselectivity of C–H amination: Unexpected oxidation at  $\beta$ - rather than  $\gamma$ -C–H**

Filip J. Wyszynski, Amber L. Thompson and Benjamin G. Davis\*

From derivatives of 1,6-anhydro- $\beta$ -D-mannopyranose, five-membered sulfamidates were formed in preference to the typical six-membered oxathiazinane intramolecular insertion products.

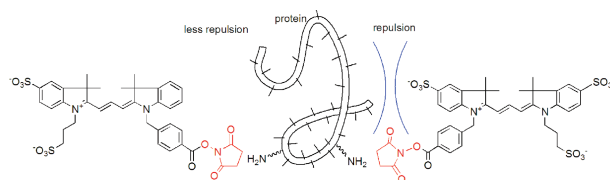


4249

**Asymmetric trimethine 3*H*-indocyanine dyes: efficient synthesis and protein labeling**

Fengling Song, Li Wang, Xiaoqiang Qiao, Bingshuai Wang, Shiguo Sun, Jiangli Fan, Lihua Zhang and Xiaojun Peng\*

To achieve better protein labeling performance, sulfo groups should be away from the NHS ester end.

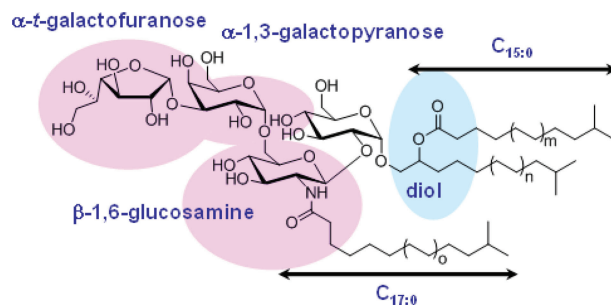


4252

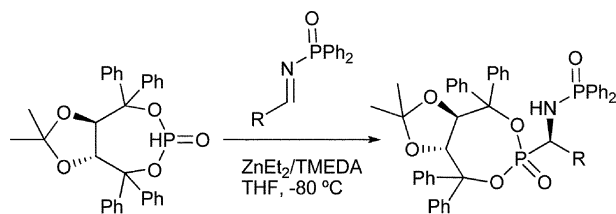
**Structural variation of glycolipids from *Meiothermus taiwanensis* ATCC BAA-400 under different growth temperatures**

Yu-Liang Yang, Feng-Ling Yang, Zih-You Huang, Yu-Hsuan Tsai, Wei Zou and Shih-Hsiung Wu\*

Structural variation of membrane glycolipids (including lipid and carbohydrate) under different growth temperature was revealed in thermophilic bacteria. The variation is assumed to stabilize membrane structure for survival in harsh environment.



4255



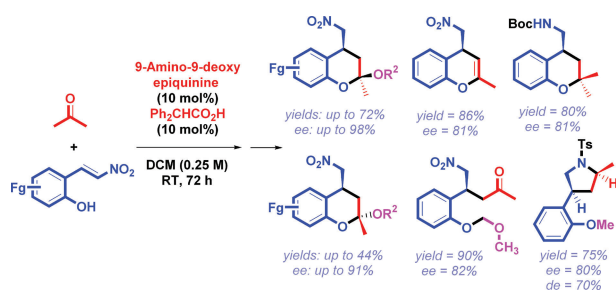
dr = 91:9 to &gt;95:5

### Diastereoselective hydrophosphonylation of imines using (*R,R*)-TADDOL phosphite. Asymmetric synthesis of $\alpha$ -aminophosphonic acid derivatives

Francisco Palacios,\* Tomasz K. Olszewski and Javier Vicario

Efficient synthesis of  $\alpha$ -aminophosphonic acids is achieved the key step being a diastereoselective hydrophosphonylation of *N*-diphenylphosphinyl imines using a chiral phosphonate derived from inexpensive natural tartaric acid.

4259



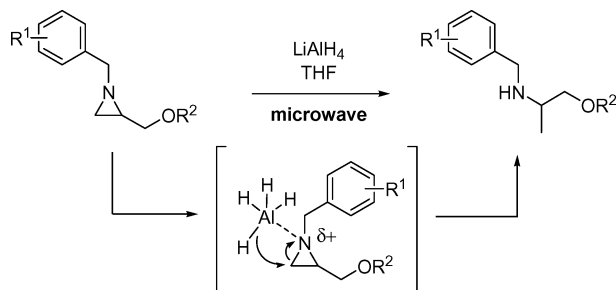
### Sequential combination of Michael and acetalization reactions: direct catalytic asymmetric synthesis of functionalized 4-nitromethyl-chromans as drug intermediates

Dhevalapally B. Ramachary\* and Rajasekar Sakthidevi

Functionalized chiral 4-nitromethyl-chromans as drug intermediates were achieved for the first time through sequential combination of Michael and acetalization reactions on 2-(2-nitro-vinyl)-phenols with acetone and alcohols under organocatalysis.

PAPERS

4266

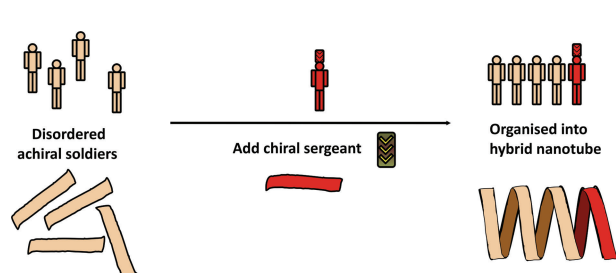


### Microwave-assisted regioselective ring opening of non-activated aziridines by lithium aluminium hydride

Sonja Stanković, Matthias D'hooghe and Norbert De Kimpe\*

A new protocol for the  $\text{LiAlH}_4$ -promoted regioselective ring opening of non-activated aziridines towards 2-aminopropanes under microwave irradiation was developed.

4274



### The sergeants-and-soldiers effect: chiral amplification in naphthalenediimide nanotubes

Tom W. Anderson, Jeremy K. M. Sanders and G. Dan Pantoş\*

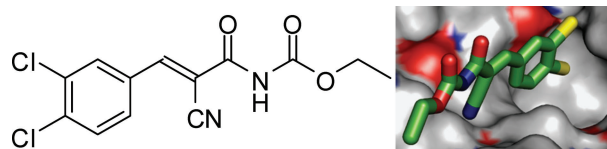
Self-assembling naphthalenediimide-based helical organic nanotubes display sergeants-and-soldiers behaviour, chiral monomers imposing a supramolecular structure upon achiral monomers. Nanotubes containing predominantly the most effective soldier are effective hosts for  $\text{C}_{60}$ .

4281

### Structure–activity relationships of a small-molecule inhibitor of the PDZ domain of PICK1

Anders Bach, Nicolai Stuhr-Hansen, Thor S. Thorsen, Nicolai Bork, Irina S. Moreira, Karla Frydenvang, Shahrokh Padrah, S. Brøgger Christensen, Kenneth L. Madsen, Harel Weinstein, Ulrik Gether\* and Kristian Strømgaard\*

Structure–activity studies of the first small-molecule inhibitor of the PICK1 PDZ domain leading to improved affinity.

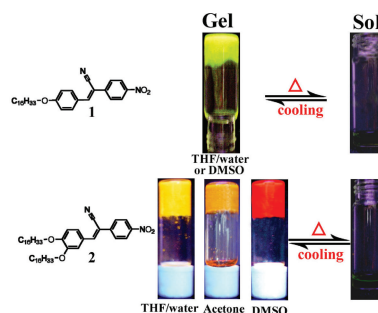


4289

### Multicolor fluorescent switches in gel systems controlled by alkoxy chain and solvent

Yue Xu, Pengchong Xue,\* Defang Xu, Xiaofei Zhang, Xingliang Liu, Huipeng Zhou, Junhui Jia, Xinchun Yang, Fengyong Wang and Ran Lu\*

All gels of **1** and **2** in different solvents possess aggregation-induced emission (AIE) characteristics. Moreover, the gels of **1** formed in THF–water and DMSO show the same packing model and similar AIE properties. However, the self-assembly and fluorescent characteristics of molecule **2** strongly depend on the solvent.

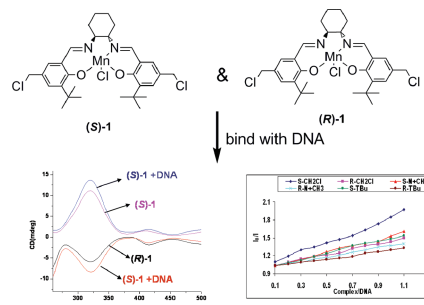


4297

### Influence of chirality using Mn(III) salen complexes on DNA binding and antioxidant activity

Noor-ul H. Khan,\* Nirali Pandya, Manoj Kumar, Prasanta Kumar Bera, Rukhsana I. Kureshy, Sayed H. R. Abdi and Hari C. Bajaj

Interaction of the synthesized chiral Mn(III) salen complexes *viz.* **S-1**, **R-1**, **S-2**, **R-2**, **S-3** and **R-3** with Calf Thymus DNA was studied by various physico-chemical methods. Among all the complexes used the best result in terms of binding constants ( $130.4 \times 10^4 \text{ M}^{-1}$ ) and strong antioxidant activity was achieved for (**S-1**).

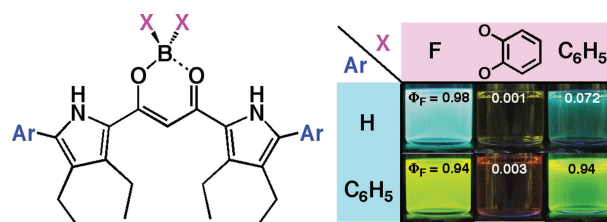


4308

### Modification at a boron unit: tuning electronic and optical properties of $\pi$ -conjugated acyclic anion receptors

Hiromitsu Maeda,\* Mayumi Takayama, Kazuki Kobayashi and Hideyuki Shinmori

Substituents at the boron unit of dipyrrolyldiketone boron complexes as  $\pi$ -conjugated acyclic anion receptors play crucial roles for tuning of solid-state molecular assemblies, anion-binding behaviour and electronic and optical properties.



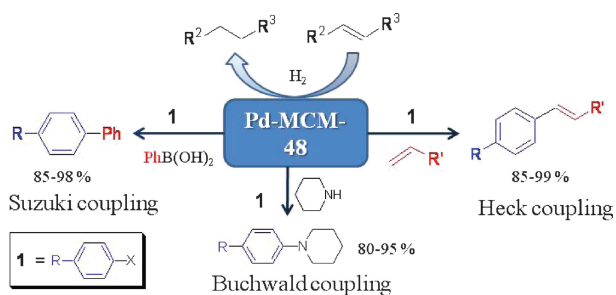


4316

### Pd-MCM-48: a novel recyclable heterogeneous catalyst for chemo- and regioselective hydrogenation of olefins and coupling reactions

Subhash Banerjee,\* Vagulejan Balasanthiran, Ranjit T. Koodali\* and Grigoriy A. Sereda\*

A novel, heterogeneous Pd-MCM-48 catalyst has been developed by encapsulating palladium nanoparticles into the cubic phase of mesoporous MCM-48 matrix for chemo- and regioselective hydrogenation of olefins and coupling reactions under ligand-free and aerobic conditions.

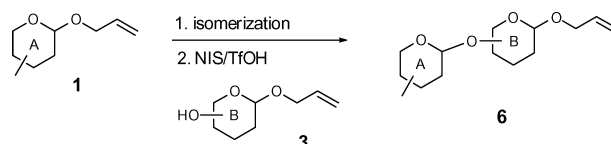


4322

### Facile glycosylation strategy with two-stage activation of allyl glycosyl donors. Application to concise synthesis of *Shigella flexneri* serotype Y O-antigen

Yun Wang, Xin Zhang and Pengfei Wang\*

A glycosylation method employing only allyl glycoside building blocks has been developed. The donor's glycosylation reactivity is turned on *via* isomerization of its anomeric allyl group into the corresponding prop-1-enyl moiety.

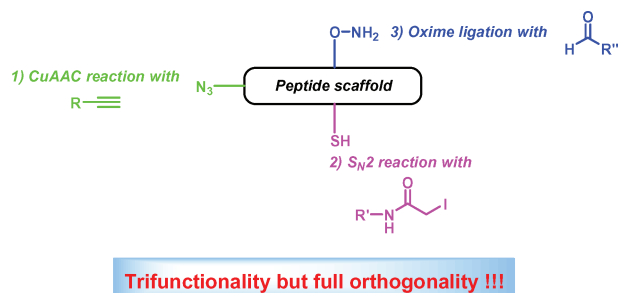


4329

### A universal and ready-to-use heterotrifunctional cross-linking reagent for facile synthetic access to sophisticated bioconjugates

Guillaume Clavé, Hervé Volland, Mélanie Flaender, Didier Gasparutto, Anthony Romieu\* and Pierre-Yves Renard\*

For the first time, three different bioconjugable functions namely aminoxy, azido and thiol are associated within the same peptidyl architecture to get a new generation of cross-linking reagents which offer unprecedented possibilities for the construction of highly sophisticated bioconjugates.

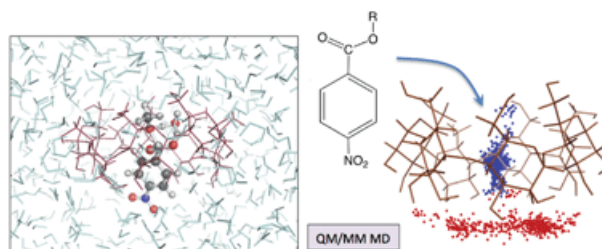


4346

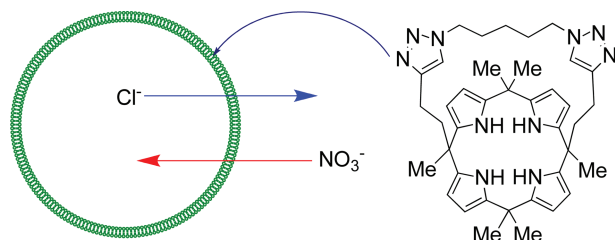
### Computer simulation of reactions in $\beta$ -cyclodextrin molecular reactors: transition state recognition

Violeta Yeguas, Ramón López, Alexandrine Lambert, Gérald Monard and Manuel F. Ruiz-López\*

Combined quantum mechanics and molecular dynamics calculations highlight the role of transition state shape in the mechanism and kinetics of ester hydrolysis mediated by  $\beta$ -cyclodextrins.



4356

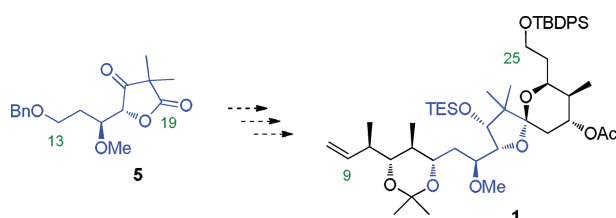


### Calix[4]pyrrole-based anion transporters with tuneable transport properties

Masafumi Yano, Christine C. Tong, Mark E. Light, Franz P. Schmidtchen and Philip A. Gale\*

Bilayer transport efficiency for transmembrane chloride transport was found to directly depend on the length of the alkyl chain present in the bis-triazole strap in a series of calix[4]pyrrole macrocycles.

4364

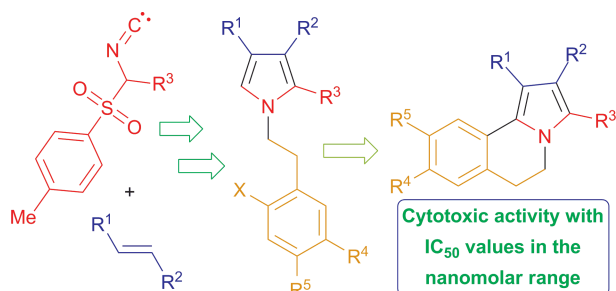


### Towards the total synthesis of calyculin C: preparation of the C<sub>9</sub>–C<sub>25</sub> spiroketal-dipropionate unit

Damien Habrant and Ari M. P. Koskinen\*

An asymmetric synthesis of the C<sub>9</sub>–C<sub>25</sub> spiroketal fragment of calyculin C is described. Key steps include two crotylation reactions, ynone formation by a Pd-catalyzed coupling of a thiol ester with a terminal alkyne and a double intramolecular hetero-Michael addition for the stereoselective construction of the spiroketal framework.

4374

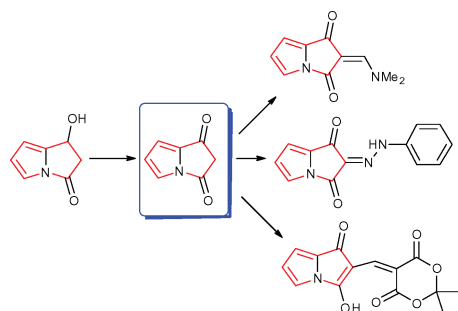


### Synthesis of 5,6-dihydropyrrolo[2,1-*a*]isoquinolines featuring an intramolecular radical-oxidative cyclization of polysubstituted pyrroles, and evaluation of their cytotoxic activity

Paul E. Reyes-Gutiérrez, José R. Camacho, Ma. Teresa Ramírez-Apan, Yazmin M. Osornio and Roberto Martínez\*

A three-step protocol for the synthesis of 5,6-dihydropyrrolo[2,1-*a*]isoquinolines is described. Structure–activity studies revealed the importance of the C-2 substituent for cytotoxicity.

4383



### Pyrrolizine-1,3-dione

Hamish McNab,\* James Montgomery, Simon Parsons and David G. Tredgett

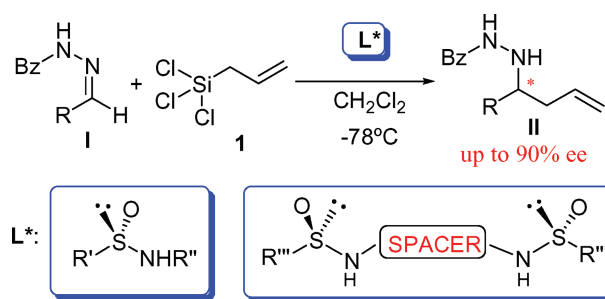
Pyrrolizine-1,3-dione is a unique system whose carbonyl groups show unusual physical properties; the active methylene unit couples with electrophiles.

4388

### Chiral sulfur derivatives in the allylation of acyl hydrazones: C<sub>2</sub>-symmetric bis-sulfinamides as enhanced chiral organic promoters.

Inmaculada Fernández,\* Ana Alcuía, Beatrice Gori, Victoria Valdivia, Rocio Recio, María Victoria García and Noureddine Khair\*

Monosulfinamides and C<sub>2</sub>-symmetric bis-sulfinamides have been found to be convenient neutral chiral promoters in the allylation of acyl hydrazones, the nature of the spacer and the substituent at the sulfinyl sulfur are key elements for the enantioselectivity of the process.

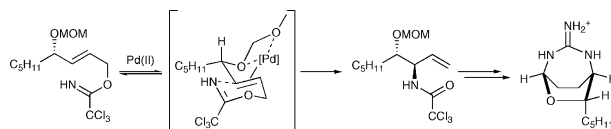


4394

### Stereoselective synthesis of the bicyclic guanidine alkaloid (+)-monanchorin

Ahmed M. Zaed and Andrew Sutherland\*

A new approach for the stereoselective synthesis of the bicyclic guanidine alkaloid (+)-monanchorin has been developed.

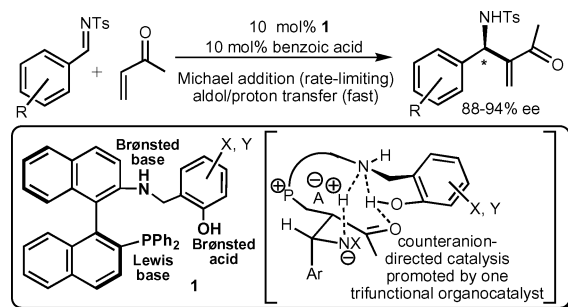


4400

### Mechanistic investigations of multidentate organocatalyst-promoted counterion catalysis for fast and enantioselective aza-Morita–Baylis–Hillman reactions at ambient temperature

Christopher Anstiss, Jean-Marc Garnier and Fei Liu\*

The first kinetic characterization of an enantioselective trifunctional organocatalyst-promoted counterion catalysis of asymmetric aza-Morita–Baylis–Hillman reactions.

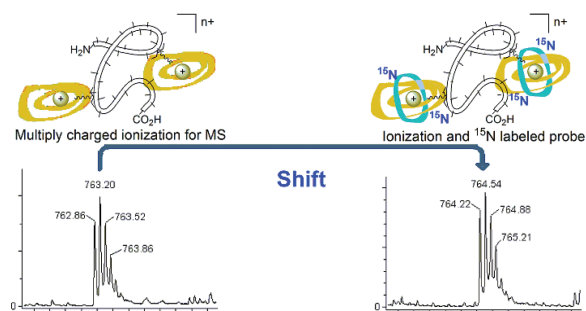


4408

### <sup>15</sup>N-Labeled ionic probes for bioanalytical mass spectrometry

Fumihiro Ito,\* Shin Ando, Masato Iuchi, Tomoko Nakamura, Satoko Yorita and Kentaro Yamaguchi\*

An ionization method that uses La-complex-based <sup>15</sup>N-labeled ionization probes containing the <sup>15</sup>N-labeled pybox, NHS-TMpybox, Mal-TMpybox and BrAc-TMpybox, was provided for isotope ratio mass spectrometry. This method was proven to effectively ionize isotope-labeled molecules.

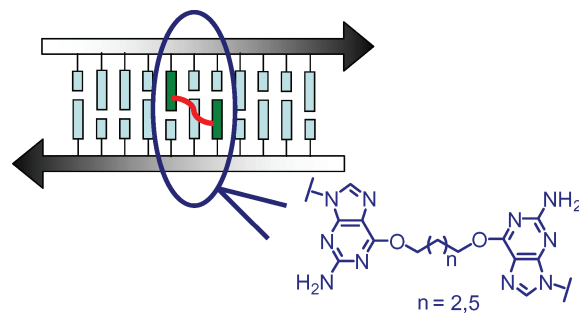


4414

**Synthesis and characterization of an O<sup>6</sup>-2'-deoxyguanosine-alkyl-O<sup>6</sup>-2'-deoxyguanosine interstrand cross-link in a 5'-GNC motif and repair by human O<sup>6</sup>-alkylguanine-DNA alkyltransferase**

Francis P. McManus, Qingming Fang, Jason D. M. Booth, Anne M. Noronha, Anthony E. Pegg and Christopher J. Wilds\*

O<sup>6</sup>-2'-Deoxyguanosine-alkyl-O<sup>6</sup>-2'-deoxyguanosine interstrand DNA cross-links in a 5'-GNC- motif were synthesized and found to undergo repair by human O<sup>6</sup>-alkylguanine-DNA alkyltransferase.

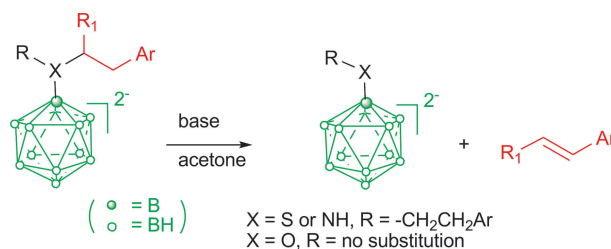


4427

**Undecahydro-closo-dodecaborates as good leaving groups in organic synthesis: generation of substituted styrenes via elimination of arylethyl dodecaborates**

Afaf R. Genady and Hiroyuki Nakamura\*

Functionalized arylethyl *closo*-dodecaborates are prepared by a simple one-step reaction. The functionalized styrene derivatives can be synthesized by treating arylethyl *closo*-dodecaborates with various bases.

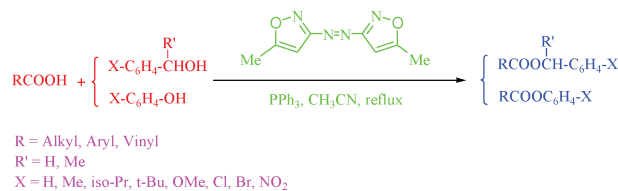


4436

**5,5'-Dimethyl-3,3'-azoisoxazole as a new heterogeneous azo reagent for esterification of phenols and selective esterification of benzylic alcohols under Mitsunobu conditions**

Nasser Iranpoor,\* Habib Firouzabadi\* and Dariush Khalili

5,5'-Dimethyl-3,3'-azoisoxazole is introduced as an efficient heterogeneous azo reagent for esterification of phenols and selective esterification of benzylic alcohols.

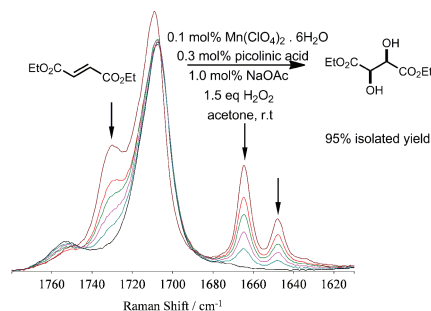


4444

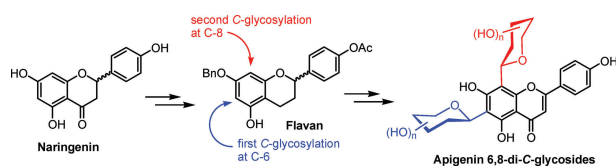
**Manganese catalyzed *cis*-dihydroxylation of electron deficient alkenes with H<sub>2</sub>O<sub>2</sub>**

Pattama Saisaha, Dirk Pijper, Ruben P. van Summeren, Rob Hoen, Christian Smit, Johannes W. de Boer, Ronald Hage, Paul L. Alsters, Ben L. Feringa and Wesley R. Browne\*

A high turnover method for the multigram scale selective *cis*-dihydroxylation of electron deficient alkenes using pyridine-2-carboxylic acid/Mn/H<sub>2</sub>O<sub>2</sub> is described.



4451

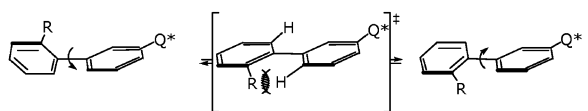


### Regioselective synthesis of di-C-glycosylflavones possessing anti-inflammation activities

Jiun-Jie Shie, Chih-An Chen, Chih-Chien Lin, Angela Fay Ku, Ting-Jen R. Cheng, Jim-Min Fang\* and Chi-Huey Wong\*

A series of 6,8-di-C-glycosylflavones bearing identical or distinct glycosyl moieties are synthesized and shown to exhibit anti-inflammation activity.

4463



[ Q\* = CH(CH<sub>3</sub>)<sub>2</sub>, Si(CH<sub>3</sub>)<sub>2</sub>CH(CH<sub>3</sub>)<sub>2</sub>, C(CF<sub>3</sub>)<sub>2</sub>OH etc ]

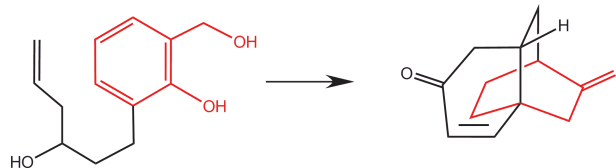
[ R = C<sub>6</sub>H<sub>5</sub>, CH=CH<sub>2</sub>, CCH, CN, CH<sub>2</sub>OH, CH=O, COOH, COOCH<sub>3</sub>, C<sub>6</sub>F<sub>5</sub>, C(CF<sub>3</sub>)<sub>2</sub>OH, CF<sub>3</sub>, OCF<sub>3</sub> ]

### The biphenyl-monitored effective size of unsaturated functional or fluorinated *ortho* substituents

Renzo Ruzziconi,\* Sara Spizzichino, Andrea Mazzanti,\* Ludovico Lunazzi and Manfred Schlosser\*

The effective size (*B* value) of a number of substituents has been probed by dynamic NMR measurements of the barriers to aryl-aryl rotation of the corresponding mono-*ortho* substituted biphenyls.

4472



### Intramolecular cycloaddition in 6,6-spiroepoxycyclohexa-2,4-dienone: simple aromatics to (±)-Platencin

Vishwakarma Singh,\* Bharat Chandra Sahu, Varsha Bansal and Shaikh M. Mobin

A formal synthesis of (±)-platencin from a simple aromatic precursor is reported. Oxidative dearomatization and intramolecular Diels-Alder reaction are the key features of the methodology.

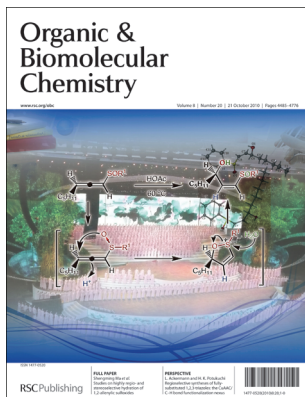
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## IN THIS ISSUE

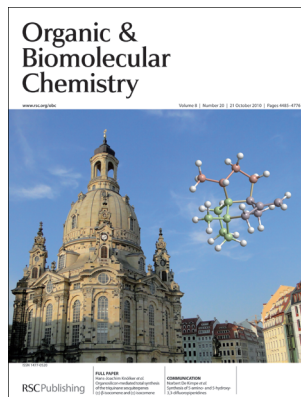
ISSN 1477-0520 CODEN OBCRAK 8(20) 4485–4776 (2010)



### Cover

See Shengming Ma *et al.*, pp. 4554–4561.  
1,2-Allenlyic sulfoxides were hydrated *via* the five-membered intermediate with excellent regio- and stereoselectivity affording synthetically useful stereodefined 2-alkenols.

Image reproduced by permission of Shengming Ma from *Org. Biomol. Chem.*, 2010, **8**, 4554.



### Inside cover

See Hans-Joachim Knölker *et al.*, pp. 4562–4568.  
The element silicon is the connection between the Frauenkirche in Dresden, built of sandstone, and the triquinane framework of the natural product  $\beta$ -isocomenone, constructed by a silicon-mediated cycloaddition.

Image reproduced by permission of Hans-Joachim Knölker from *Org. Biomol. Chem.*, 2010, **8**, 4562.

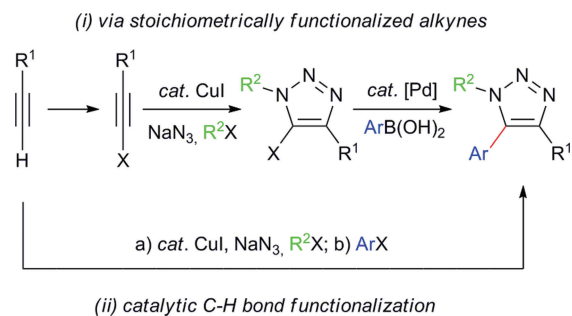
## PERSPECTIVE

4503

### Regioselective syntheses of fully-substituted 1,2,3-triazoles: the CuAAC/C–H bond functionalization nexus

Lutz Ackermann\* and Harish Kumar Potukuchi

Regioselective syntheses of 1,4,5-trisubstituted 1,2,3-triazoles were accomplished by three different strategies, relying on (i) the interception of stoichiometrically formed 5-cuprated-1,2,3-triazoles, (ii) the use of stoichiometrically functionalized alkynes or (iii) catalytic C–H bond functionalizations.



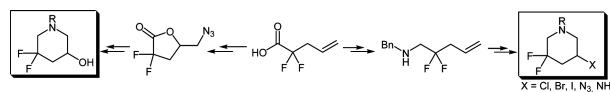
## COMMUNICATIONS

4514

### Synthesis of 5-amino- and 5-hydroxy-3,3-difluoropiperidines

Riccardo Surmont, Guido Verniest, Jan Willem Thuring, Peter ten Holte, Frederik Deroose and Norbert De Kimpe\*

Synthetic routes toward new 5-amino- and 5-hydroxy-3,3-difluoropiperidines involving *N*-halosuccinimide-induced cyclization of 2,2-difluoro-4-pentenylamines and iodolactonization of 2,2-difluoro-4-pentenoic acid are described.

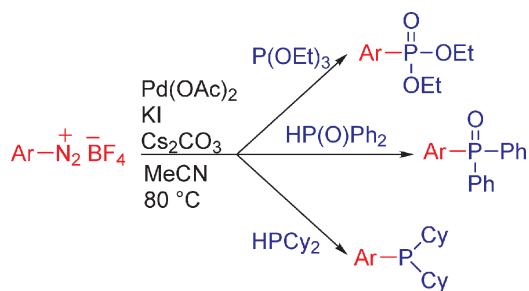


4518

**Arenediazonium tetrafluoroborates in palladium-catalyzed C–P bond-forming reactions. Synthesis of arylphosphonates, -phosphine oxides, and -phosphines**

Roberta Berrino, Sandro Cacchi,\* Giancarlo Fabrizi, Antonella Goggiamani and Paolo Stabile

A palladium-catalyzed synthesis of aryl–P derivatives from arenediazonium tetrafluoroborates has been developed that can be performed as a one-pot process from anilines.

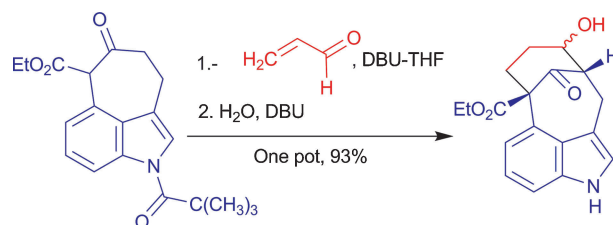


4521

**Concise and very efficient synthesis of the *N*-methylwelwistatin tetracyclic core based on an anionic domino process**

Miriam Ruiz, Pilar López-Alvarado and J. Carlos Menéndez\*

An anionic domino reaction is used to create the tetracyclic core of the alkaloid *N*-methylwelwistatin from Kornfeld's ketone.

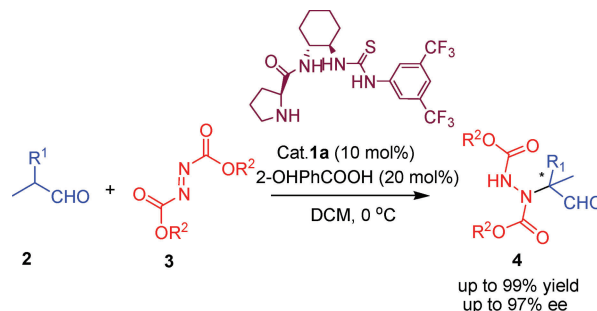


4524

**Effective construction of quaternary stereocenters by highly enantioselective  $\alpha$ -amination of branched aldehydes**

Ji-Ya Fu, Xiao-Ying Xu, Yan-Chun Li, Qing-Chun Huang and Li-Xin Wang\*

Chiral proline amide-thiourea bifunctional catalysts were successfully applied to the highly enantioselective amination of branched aldehydes with azadicarboxylates in excellent yields (up to 99%) and enantioselectivities (up to 97% ee).

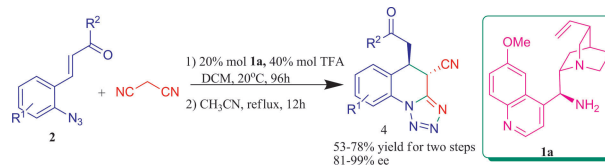


4527

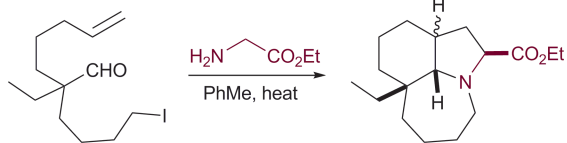
**The organocatalytic two-step synthesis of diversely functionalized tricyclic tetrazoles**

Xiong Huang, Ping Li, Xin-Sheng Li, Dong-Cheng Xu and Jian-Wu Xie\*

A simple method for the synthesis of diversely functionalized tricyclic tetrazoles from functionalized  $\alpha,\beta$ -unsaturated ketones and malononitrile was described.



4530

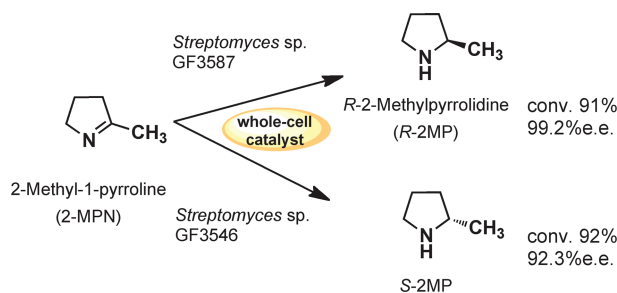


### Synthesis of the core ring system of the stemona alkaloids by cascade condensation, cyclization, intramolecular cycloaddition

Adam. J. M. Burrell, Luke Watson, Nathaniel G. Martin, Niall Oram and Iain Coldham\*

Heating amino-acids or amino-esters with 6-iodohexanals gives azomethine ylides that undergo intramolecular cycloaddition to the tricyclic core of stenine and neostenine

4533

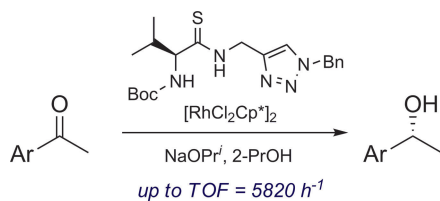


### Asymmetric synthesis of chiral cyclic amine from cyclic imine by bacterial whole-cell catalyst of enantioselective imine reductase

Koichi Mitsukura,\* Mai Suzuki, Kazuhiro Tada, Toyokazu Yoshida and Toru Nagasawa

*Streptomyces* sp. GF3587 and 3546 were found to be imine-reducing strains with high *R*- and *S*-selectivity by screening using 2-methyl-1-pyrroline (2-MPN).

4536

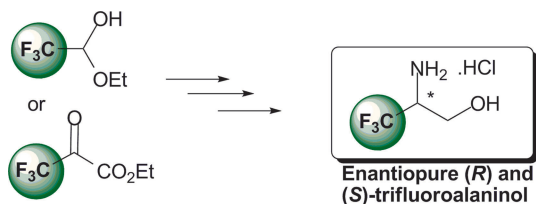


### Asymmetric transfer hydrogenation of ketones catalyzed by rhodium complexes containing amino acid triazole ligands

Fredrik Tinnis and Hans Adolfsson\*

Active and selective catalysts for the asymmetric reduction of ketones were obtained from  $[\text{RhCl}_2\text{Cp}^*]_2$ , and novel *L*-amino acid thioamide ligands functionalized with 1,2,3-triazoles.

4540



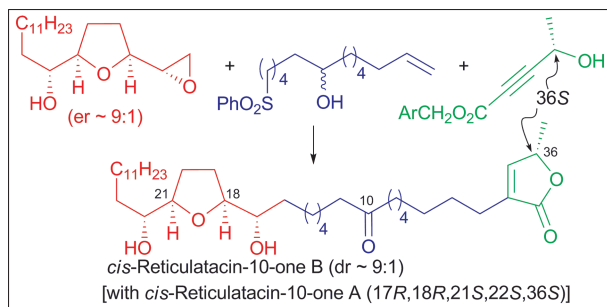
### Straightforward synthesis of enantiopure (*R*)- and (*S*)-trifluoroalaninol

Julien Pytkowicz, Olivier Stéphaney, Sinisa Marinkovic, Sébastien Inagaki and Thierry Brigaud\*

Enantiopure (*R*)- and (*S*)-trifluoroalaninol were conveniently synthesized in a few steps from fluoral hemiacetal or ethyl trifluoropyruvate.



4543



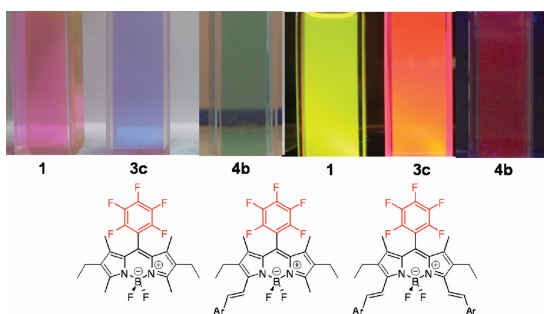
### Total synthesis of *cis*-reticulatacin-10-ones A and B: absolute stereochemical assignment

Sherif B. Abdel Ghani, Lynda J. Brown, Bruno Figadère and Richard C. D. Brown\*

The natural product *cis*-reticulatacin-10-one, isolated from *Annona muricata* L., was shown to be a mixture of A (17*R*,18*R*,21*S*,22*S*,36*S*) and B (17*S*,18*S*,21*R*,22*R*,36*S*) diastereoisomers by using chiral HPLC to compare the natural isolate with standards prepared by total synthesis.

PAPERS

4546

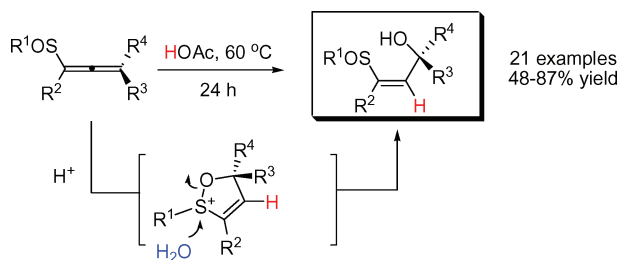


### Rational design of visible and NIR distyryl-BODIPY dyes from a novel fluorinated platform

Olivier Galangau, Cécile Dumas-Verdes, Rachel Méallet-Renault and Gilles Clavier\*

A new series of red emissive distyryl-BODIPY has been obtained from a novel fluorinated platform with various electron donor and, for the first time, electron acceptor aromatics.

4554

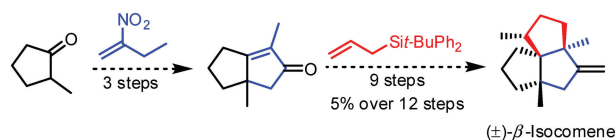


### Studies on highly regio- and stereoselective hydration of 1,2-allenyl sulfoxides

Zhao Fang, Chao Zhou, Chunling Fu\* and Shengming Ma\*

A highly regio- and stereoselective hydration of 1,2-allenyl sulfoxides with proton as the electrophile affords 3-sulfoxy-2(*Z*)-alkenols *via* a five-membered intermediate.

4562



### Organosilicon-mediated total synthesis of the triquinane sesquiterpenes (±)-β-isocomene and (±)-isocomene

Arndt W. Schmidt, Thomas Olpp, Elke Baum, Tina Stiffel and Hans-Joachim Knölker\*

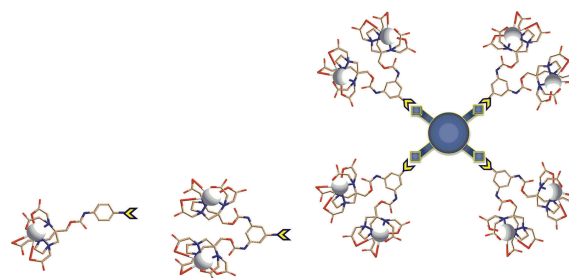
We describe an efficient total synthesis of the sesquiterpenes (±)-β-isocomene and (±)-isocomene using a Lewis acid-promoted [3 + 2] cycloaddition of allyl-*tert*-butyldiphenylsilane as the key-step.

4569

### AAZTA-based bifunctional chelating agents for the synthesis of multimeric/dendrimeric MRI contrast agents

Giuseppe Gugliotta, Mauro Botta and Lorenzo Tei\*

Novel mono- and dimeric bifunctional AAZTA-based chelating ligands were used as versatile modules for the synthesis of octameric Gd(III) complexes as MRI probes.

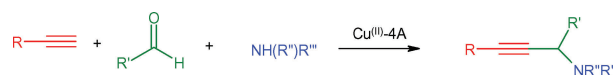


4575

### A simple method for the preparation of propargylamines using molecular sieve modified with copper(II)

Anna Fodor, Árpád Kiss, Nóra Debreczeni, Zoltán Hell\* and Iván Gresits

A new, heterogeneous, 4 Å molecular sieve-supported copper(II) catalyst was developed and was used successfully in the A<sup>3</sup> coupling.

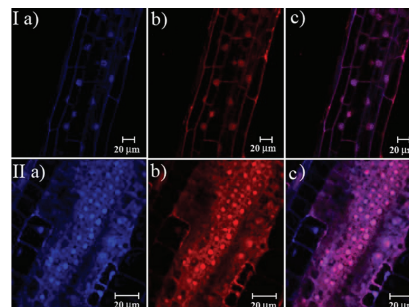


4582

### Two-photon fluorescence imaging of DNA in living plant turbid tissue with carbazole dicationic salt

Yuanhong Zhang, Junjie Wang, Pengfei Jia, Xiaoqiang Yu,\* Heng Liu,\* Xin Liu, Ning Zhao and Baibiao Huang\*

**Fluorescent imaging:** In living plant hypocotyls and roots of *Arabidopsis thaliana*, the imaging depth of 9E-BHVC is higher than that of DAPI.

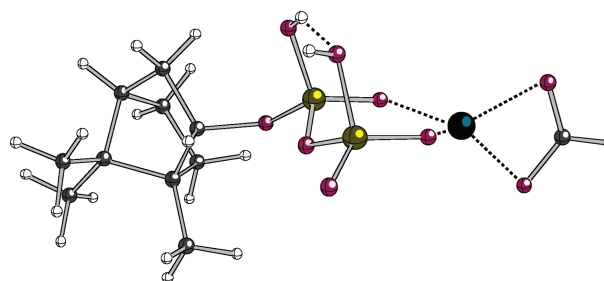


4589

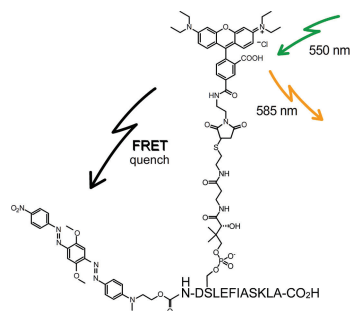
### Quantum chemical dissection of the classic terpinyl/pinyl/bornyl/camphyl cation conundrum—the role of pyrophosphate in manipulating pathways to monoterpenes

Young J. Hong and Dean J. Tantillo\*

Quantum chemical methods are used to reveal details of the conversion of geranyl diphosphate to bornyl diphosphate and several monoterpenes.



4601

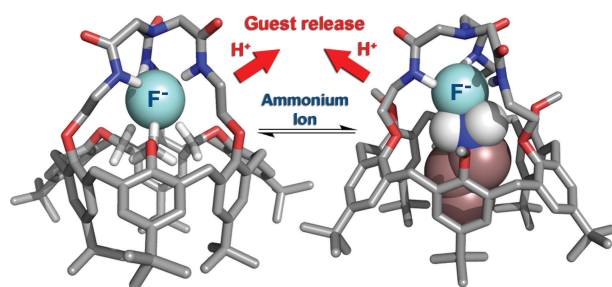


### Preparation of FRET reporters to support chemical probe development

Timothy L. Foley, Adam Yasgar, Christopher J. Garcia, Ajit Jadhav, Anton Simeonov and Michael D. Burkart\*

We describe economical routes for the preparation of rhodamine maleimide and non-emitting quencher probes to enable a high throughput screening campaign that seeks to identify inhibitors of phosphopantetheinyl transferase.

4607

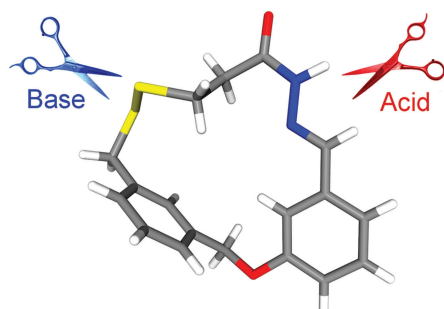


### An allosteric heteroditopic receptor for neutral guests and contact ion pairs with a remarkable selectivity for ammonium fluoride salts

Angélique Lascaux, Stéphane Le Gac, Johan Wouters, Michel Luhmer and Ivan Jabin\*

The syntheses and unique host–guest properties of two novel calix[6]arene-based heteroditopic receptors are presented.

4617

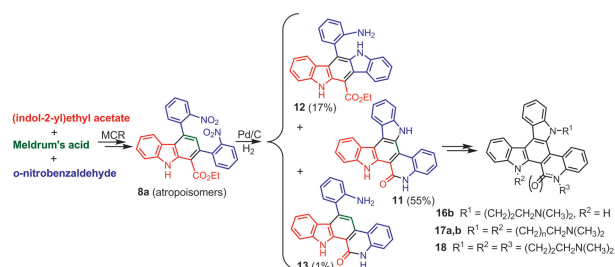


### Synthesis and solid state structure of a hydrazone-disulfide macrocycle and its dynamic covalent ring-opening under acidic and basic conditions

Max von Delius, Edzard M. Geertsema, David A. Leigh\* and Alexandra M. Z. Slawin

A macrocycle that can be selectively ring-opened under thermodynamic control at either a disulfide or a hydrazone linkage is described.

4625

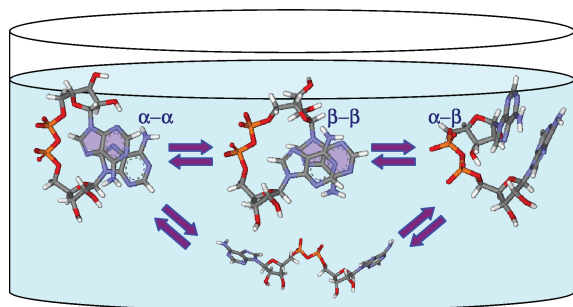


### Synthesis and biological evaluation of new penta- and heptacyclic indolo- and quinolinocarbazole ring systems obtained *via* Pd<sup>0</sup> catalysed reductive *N*-heteroannulation

Marie Laronze-Cochard, Fabien Cochard, Etienne Daras, Amélie Lansiaux, Bertrand Brassart, Enguerran Vanquelf, Elise Prost, Jean-Marc Nuzillard, Brigitte Baldeyrou, Jean-François Goosens, Olivier Lozach, Laurent Meijer, Jean-François Riou, Eric Henon\* and Janos Sapi\*

Several biologically active (CNS, cancer) polycyclic carbazoles have been prepared by Pd/C–H<sub>2</sub>-assisted *N*-heteroannulation, as the key-step.

4637

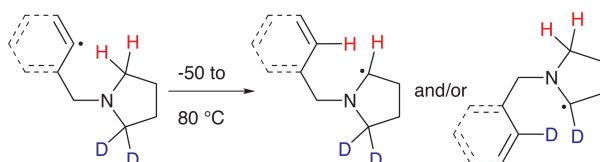


### What is the conformation of physiologically-active dinucleoside polyphosphates in solution? Conformational analysis of free dinucleoside polyphosphates by NMR and molecular dynamics simulations

Noa Stern, Dan Thomas Major, Hugo Emilio Gottlieb, Daniel Weizman and Bilha Fischer\*

Natural dinucleotides at physiological pH exist mostly in a stacked, rather than extended, conformation, in several interconverting stacking modes which do not alter the standard conformation of the nucleotide moieties.

4653

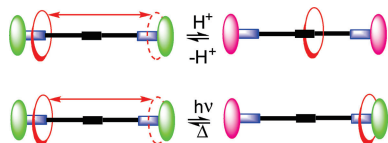


### Synthetic use of the primary kinetic isotope effect in hydrogen atom transfer: generation of $\alpha$ -aminoalkyl radicals

Mark E. Wood,\* Sabine Bissiriou, Christopher Lowe, Andrew M. Norrish, Katell Sénéchal, Kim M. Windeatt, Simon J. Coles and Michael B. Hursthouse

Systematic studies illustrate the extent to which deuterium can be used to prevent intramolecular hydrogen atom transfer in the generation of  $\alpha$ -aminoalkyl radicals in a pyrrolidine ring.

4666

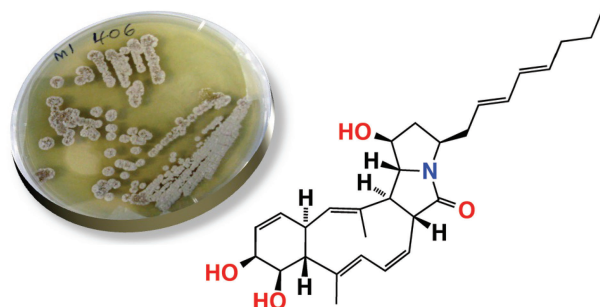


### Controlling Ring Translation of Rotaxanes

Antje Vetter and Werner Abraham\*

Protons and photons are able to stop the wheel translation in acridane rotaxanes by conversion into the corresponding acridinium rotaxanes.

4682



### Heronamides A–C, new polyketide macrolactams from an Australian marine-derived *Streptomyces* sp. A biosynthetic case for synchronized tandem electrocyclization

Ritesh Raju, Andrew M. Piggott, Melissa M. Conte and Robert J. Capon\*

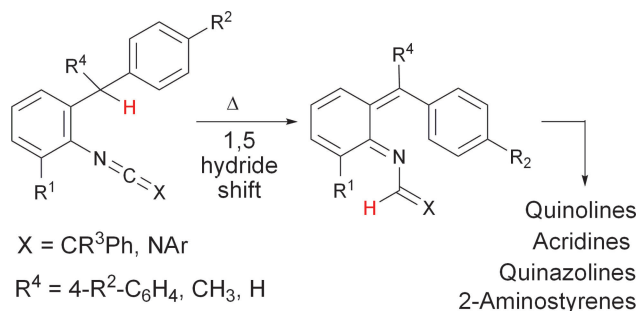
A *Streptomyces* sp. isolated from sediment collected off Heron Island, Australia, afforded three new polyketide macrolactams, heronamides A–C. Heronamide C elicits a dramatic and reversible effect on mammalian cell morphology.

4690

**Domino reactions initiated by intramolecular hydride transfers from tri(di)arylmethane fragments to ketenimine and carbodiimide functions**

Mateo Alajarin,\* Baltasar Bonillo, Maria-Mar Ortin, Pilar Sanchez-Andrada, Angel Vidal\* and Raul-Angel Orenes

Ketenimines and carbodiimides bearing tri(di)arylmethane substructures experience tandem [1,5]-H (or Ar) shift/6 $\pi$ -ERC sequences. The H shifts are qualified as hydride transfers.

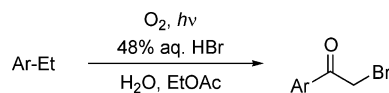


4701

**Direct synthesis of  $\alpha$ -bromoketones from alkylarenes by aerobic visible light photooxidation**

Norihiro Tada, Kazunori Ban, Shin-ichi Hirashima, Tsuyoshi Miura and Akichika Itoh\*

The direct synthesis of  $\alpha$ -bromoketones from alkylarenes by aerobic photooxidation with hydrobromic acid is reported.

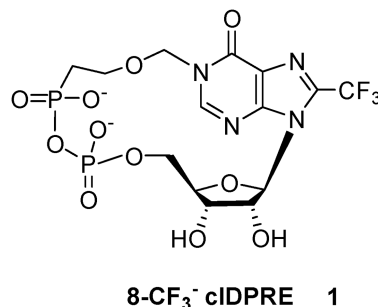


4705

**Trifluoromethylated cyclic-ADP-ribose mimic: synthesis of 8-trifluoromethyl-*N*<sup>1</sup>-[(5'-*O*-phosphorylethoxy)methyl]-5'-*O*-phosphorylinosine-5',5''-cyclic pyrophosphate (8-CF<sub>3</sub>-cIDPRE) and its calcium release activity in T cells**

Min Dong, Tanja Kirchberger, Xiangchen Huang, Zhen Jun Yang, Liang Ren Zhang, Andreas H. Guse\* and Li He Zhang\*

A convenient reagent and protection strategy are reported for the synthesis of cell membrane-permeant trifluoromethylated cyclic-ADP-ribose agonist, 8-CF<sub>3</sub>-cIDPRE **1**.

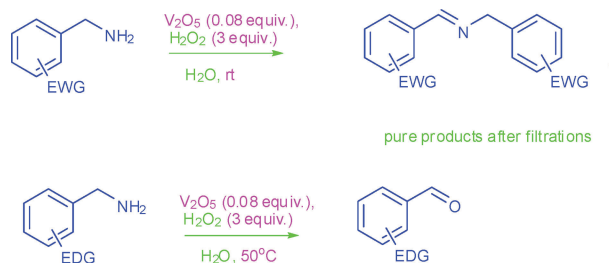


4716

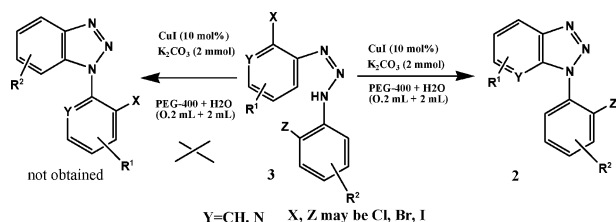
**Convenient and clean synthesis of imines from primary benzylamines**

Guobiao Chu and Chunbao Li\*

Clean oxidation of primary benzylamines has been successfully achieved, using H<sub>2</sub>O<sub>2</sub> in water at room temperature catalyzed by V<sub>2</sub>O<sub>5</sub>. The products were obtained in good to quantitative yields.



4720

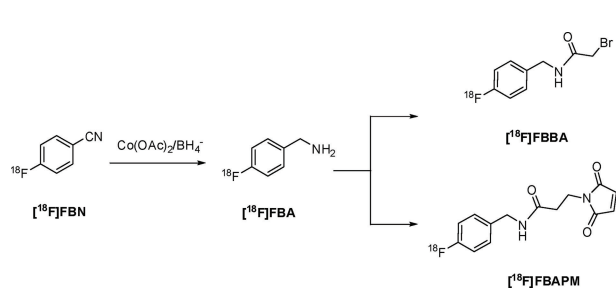


### A ligand-free copper (I) catalysed intramolecular N-arylation of diazoaminobenzenes in PEG-water: an expeditious protocol towards regiospecific 1-aryl benzotriazoles

Chhanda Mukhopadhyay,\* Pradip Kumar Tapaswi and Ray J. Butcher

Regiospecific 1-aryl benzo and pyridotriazoles have been synthesized by the application of ligand-free copper(I) catalysed intramolecular N-arylation reaction.

4730

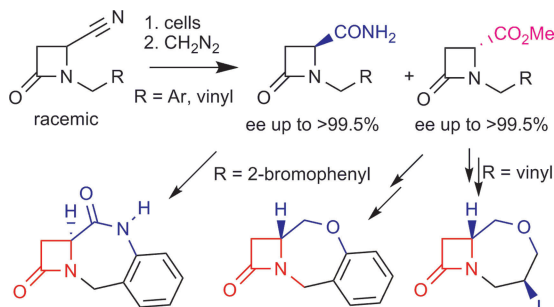


### Synthesis and application of 4-[<sup>18</sup>F]fluorobenzylamine: A versatile building block for the preparation of PET radiotracers

Ingrid Koslowsky, John Mercer and Frank Wuest\*

A novel synthesis of 4-[<sup>18</sup>F]fluorobenzylamine ([<sup>18</sup>F]FBA) by means of transition metal-assisted sodium borohydride reduction of 4-[<sup>18</sup>F]fluorobenzonitrile ([<sup>18</sup>F]FBN) is described.

4736

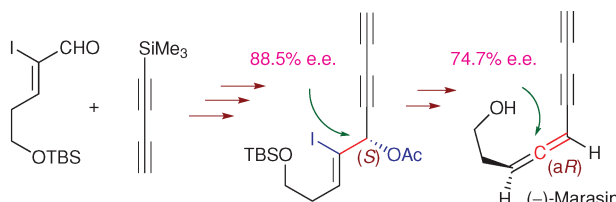


### Highly efficient and enantioselective biotransformations of β-lactam carbonitriles and carboxamides and their synthetic applications

Dong-Hui Leng, De-Xian Wang, Zhi-Tang Huang and Mei-Xiang Wang\*

Biotransformations of nitriles and amides provide a highly efficient and enantioselective approach to enantioenriched β-lactam compounds, which are useful intermediates in the synthesis of fused heterocycles

4744



### An enantioselective total synthesis of natural antibiotic marasin

Yan Zhang and Yikang Wu\*

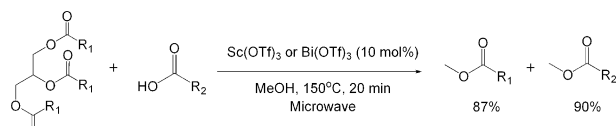
An enantioselective synthesis of the natural antibiotic marasin has been achieved, with the chiral allenic axis derived from a stereogenic center at the allylic position *via* an *i*-PrMgBr-mediated elimination reaction. Results of constructing the key chiral allene-diyne arrangement using different protocols are also reported.

4753

**Efficient conversion of triacylglycerols and fatty acids to biodiesel in a microwave reactor using metal triflate catalysts**

Aaron M. Socha and Jason K. Sello\*

The Lewis acidic metals scandium and bismuth triflate catalyze conversion of naturally occurring fatty acids and their glyceryl triesters to methyl esters in > 90% yield upon microwave heating.

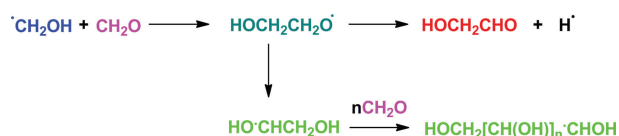


4757

**Radical routes to interstellar glycolaldehyde. The possibility of stereoselectivity in gas-phase polymerization reactions involving  $\text{CH}_2\text{O}$  and  $\text{CH}_2\text{OH}$**

Tianfang Wang and John H. Bowie\*

Reaction of  $\cdot\text{CH}_2\text{OH}$  with  $\text{CH}_2\text{O}$  may form (i)  $\text{HOCH}_2\text{CHO}$  (glycolaldehyde) and  $\text{H}^\cdot$ , and (ii)  $\text{HOCH}_2\cdot\text{CHOH}$ . Reaction between  $\text{HOCH}_2\cdot\text{CHOH}$  and  $\text{CH}_2\text{O}$  may yield polymer  $\text{HOCH}_2[\text{CH}(\text{OH})]_n\cdot\text{CHOH}$ .

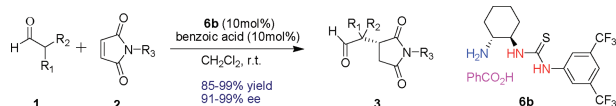


4767

**A highly efficient asymmetric Michael addition of  $\alpha,\alpha$ -disubstituted aldehydes to maleimides catalyzed by primary amine thiourea salt**

Feng Yu, Zhichao Jin, Huicai Huang, Tingting Ye, Xinmiao Liang\* and Jinxing Ye\*

The Michael addition of  $\alpha,\alpha$ -disubstituted aldehydes to maleimides catalyzed by a simple bifunctional primary amine thiourea catalyst/benzoic acid system was successfully developed to generate quaternary carbon centers in high yields (up to 99%) with excellent enantioselectivities (91–99%).



# Organic & Biomolecular Chemistry

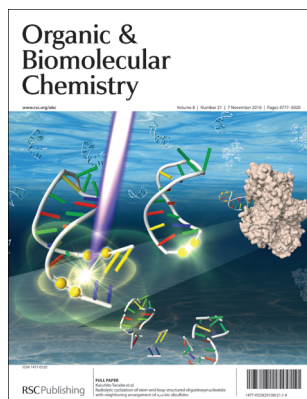
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## IN THIS ISSUE

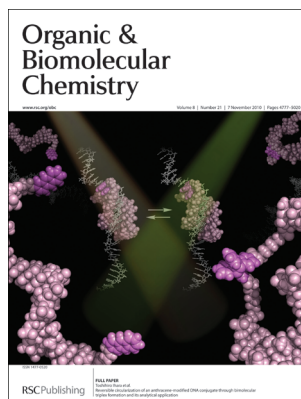
ISSN 1477-0520 CODEN OBCRAK 8(21) 4777–5020 (2010)



### Cover

See Kazuhito Tanabe *et al.*, pp. 4837–4842.  
X-Ray irradiation of an aqueous solution of modified oligodeoxynucleotides with a pair of disulfides at both ends causes efficient cyclization via an intramolecular exchange reaction.

Image reproduced by permission of Kazuhito Tanabe from *Org. Biomol. Chem.*, 2010, **8**, 4837.



### Inside cover

See Toshihiro Ihara *et al.*, pp. 4843–4848.  
The oligonucleotide conjugate was reversibly circularized through photodimerization of the anthracenes attached on both ends. This process would be potentially useful as a probe reaction with high specificity and sensitivity.

Image reproduced by permission of Toshihiro Ihara from *Org. Biomol. Chem.*, 2010, **8**, 4843.

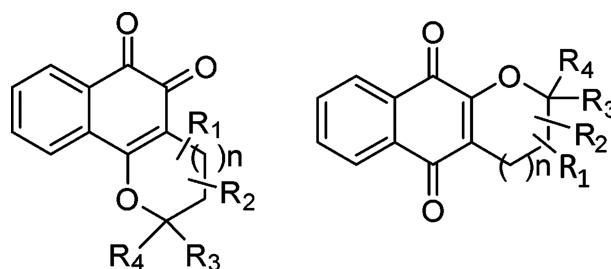
## PERSPECTIVE

4793

### Strategies for the synthesis of bioactive pyran naphthoquinones

Vitor Francisco Ferreira,\* Sabrina Baptista Ferreira and Fernando de Carvalho da Silva

Strategies for the synthesis of bioactive pyran naphthoquinones.



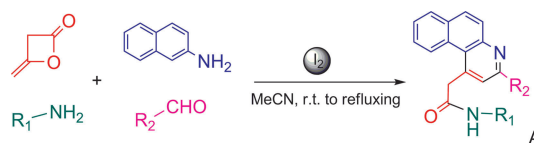
## COMMUNICATIONS

4803

### A domino synthesis of benzoquinolinamide in the presence of iodine

Li-Yan Zeng and Chun Cai\*

Iodine catalyzed domino reaction of diketene, amine, aromatic aldehyde and naphthalenamine for the synthesis of benzoquinolinamides in one-pot.



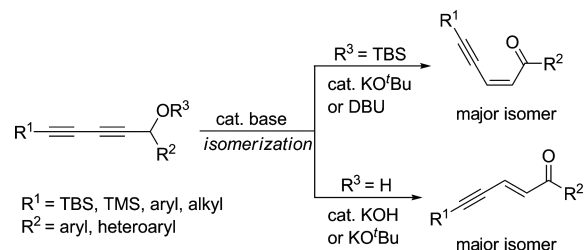


4806

### Stereoselective synthesis of enynones *via* base-catalyzed isomerization of 1,5-disubstituted-2,4-pentadiynyl silyl ethers or their alcohol derivatives

Jingjin Chen, Guoqin Fan and Yuanhong Liu\*

Base-catalyzed stereoselective synthesis of enynones from 1,5-disubstituted-2,4-pentadiynyl silyl ethers or their alcohol derivatives has been developed.

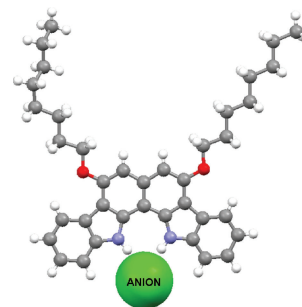


4811

### A new building block for anion supramolecular chemistry. Study of carbazolocarbazole as anion receptor

David Curiel,\* Miriam Más-Montoya, Guzmán Sánchez, Raúl A. Orenes, Pedro Molina and Alberto Tárraga

Carbazolo[1,2-*a*]carbazole has been evaluated as an anion receptor in DMF. Anion binding studies have been contrasted by several experimental techniques.

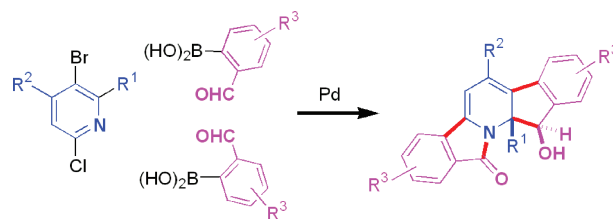


4815

### Synthesis of new pentacyclic chromophores through a highly regio- and diastereoselective cascade process

Zein el abidine Chamas, Olivier Dietz, Emmanuel Aubert, Yves Fort and Victor Mamane\*

Four bonds and two stereocenters with *trans* relationship are produced during a cascade process leading to pentacyclic chromophores.

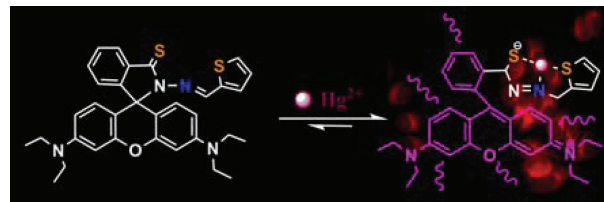


4819

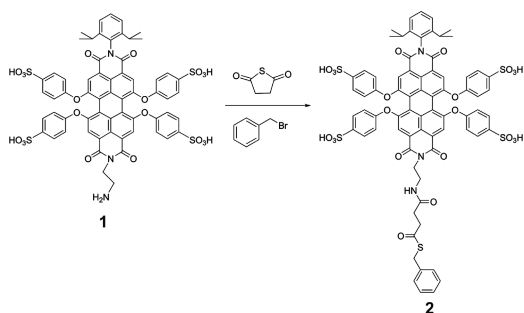
### A thiophen-thioxorhodamine conjugate fluorescent probe for detecting mercury in aqueous media and living cells

Yi Zhou, Xue-Yan You, Yuan Fang, Ju-Ying Li, Ke Liu and Cheng Yao\*

A ratiometric fluorescent  $Hg^{2+}$  sensor **RB-S2** which featured the high affinity of  $Hg^{2+}$  to sulfur-containing rhodamine and dual-responsive in both aqueous media and living cells was developed.



4823

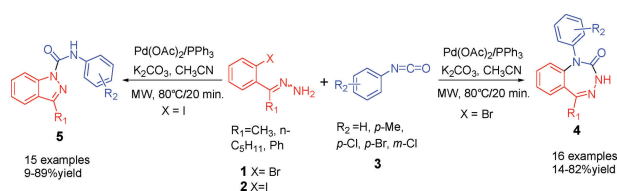


### Site-specific incorporation of perylene into an N-terminally modified light-harvesting complex II

Kalina Peneva, Kristina Gundlach, Andreas Herrmann, Harald Paulsen and Klaus Müllen\*

Employing the utility of the native chemical ligation, site-specific attachment of an ultrastable perylene dye to a derivative of the major light-harvesting complex (LHCII) was demonstrated.

4827

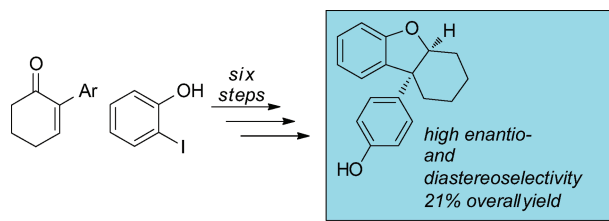


### Facile synthesis of 1,3,4-benzotriazepines and 1-arylamide-1H-indazoles via palladium-catalyzed cyclization of aryl isocyanates and aryl hydrazones under microwave irradiation

Chune Dong,\* Lingli Xie, Xiaohong Mou, Yashan Zhong and Wei Su

A strategy involving palladium-catalyzed cyclization of halophenyl hydrazones and aryl isocyanates provides convenient synthesis of 1,3,4-benzotriazepines (**4**) or 1-arylamide-1H-indazoles (**5**) in one step under microwave irradiation.

4831

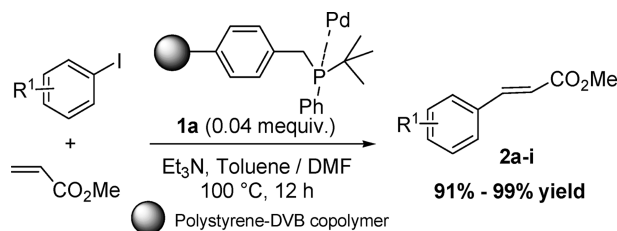


### Asymmetric synthesis of a tricyclic benzofuran motif: a privileged core structure in biologically active molecules

Henrik Sundén and Roger Olsson\*

An efficient synthetic strategy for the asymmetric synthesis of a hexahydrodibenzofuran core structure, with a quaternary stereogenic center.

4834

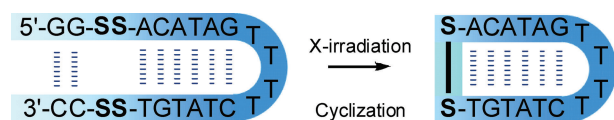


### Reusable polystyrene-supported Pd catalyst for Mizoroki–Heck reactions with extremely low amounts of supported Pd

Carine Diebold, Stéphane Schweizer, Jean-Michel Becht\* and Claude Le Drian\*

Heck reactions of aryl iodides using extremely low amounts of supported Pd (0.04 mequiv.) are reported. The catalyst can be reused successfully up to three times.

4837

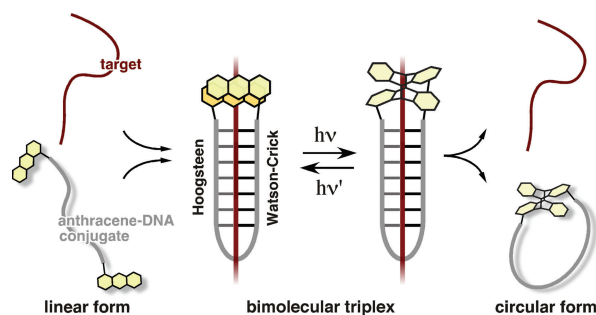


### Radiolytic cyclization of stem-and-loop structured oligodeoxynucleotide with neighboring arrangement of $\alpha,\omega$ -bis-disulfides

Kazuhiro Tanabe,\* Eiji Matsumoto, Takeo Ito and Sei-ichi Nishimoto\*

Modified oligodeoxynucleotides bearing a pair of disulfides that form a stem-and-loop structure underwent efficient cyclization upon X-ray irradiation.

4843

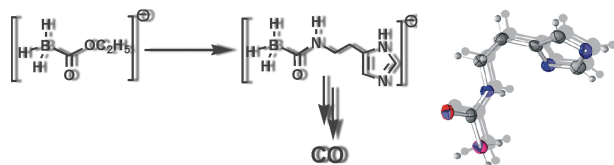


### Reversible circularization of an anthracene-modified DNA conjugate through bimolecular triplex formation and its analytical application

Pelin Arslan, Akinori Jyo and Toshihiro Ihara\*

The conformation of anthracene–DNA conjugate was topologically locked as the circular form by photoreaction. The sequence selectivity of the reaction was higher than that of the duplex system with similar thermal stability.

4849

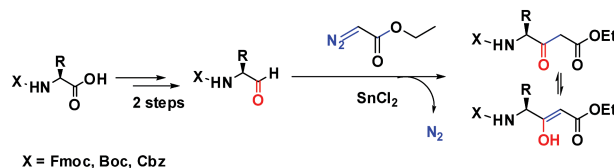


### Syntheses, structural characterization and CO releasing properties of boranocarbonate $[H_3BCO_2H]^-$ derivatives

Tamil Selvi Pitchumony, Bernhard Spingler, Roberto Motterlini and Roger Alberto\*

Boranocarbonates, derivatives of boranocarbonate  $[H_3BCO_2H]^-$  release CO in water at a slower rate than the parent, opening thereby new opportunities for biological applications.

4855



### Tin(II) chloride assisted synthesis of N-protected $\gamma$ -amino $\beta$ -keto esters through semipinacol rearrangement

Anupam Bandyopadhyay, Neha Agrawal, Sachitanand M. Mali, Sandip V. Jadhav and Hosahudya N. Gopi\*

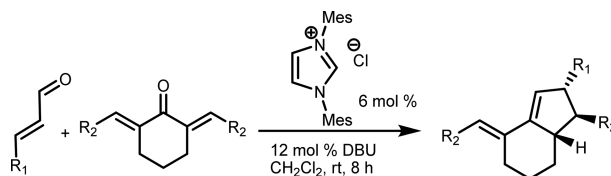
Facile and efficient synthesis of N-protected  $\gamma$ -amino  $\beta$ -keto esters through semipinacol rearrangement

4861

### NHC-catalysed annulation of enals to tethered dienones: efficient synthesis of bicyclic dienes

Vijay Nair,\* Sreekumar Vellalath, Beneesh P. Babu, Vimal Varghese, Rony Rajan Paul and Eringathodi Suresh

Homoenolates generated from  $\alpha,\beta$ -unsaturated aldehydes using NHC catalysis underwent facile addition to dibenzylidene cyclohexanone to afford bicyclic cyclopentenones as single diastereomers.

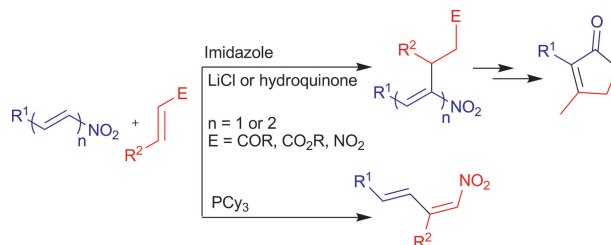


4867

### Rauhut–Currier type homo- and heterocouplings involving nitroalkenes and nitrodienes

Pramod Shanbhag, Pradeep R. Nareddy, Mamta Dadwal, Shaikh M. Mobin and Irishi N. N. Namboothiri\*

Amine and phosphine mediated dimerization of nitroalkenes and amine mediated coupling of nitroalkenes with other activated alkenes under mild conditions lead to synthetically useful products.

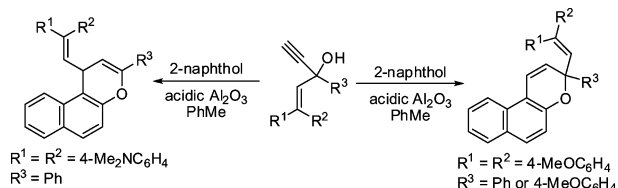


4874

### The influence of a 1,1-diarylvinyl moiety on the photochromism of naphthopyrans

Christopher D. Gabbutt, B. Mark Heron,\* Colin Kilner and Suresh B. Kolla

Photochromic (1,1-diarylvinyl) substituted naphthopyrans have been prepared from the condensation of triaryl enynols with naphthols.  $\lambda_{\text{max}}$  of the derived photomerocyanines is bathochromically shifted.

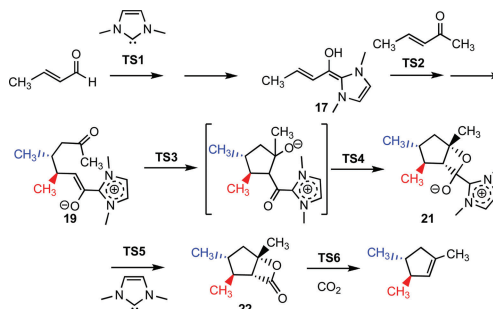


4884

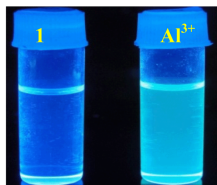
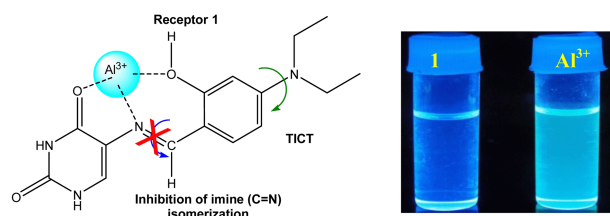
### Understanding the mechanism of stereoselective synthesis of cyclopentenones *via* N-heterocyclic carbene catalyzed reactions of enals with enones

Luis R. Domingo,\* Ramón J. Zaragoza and Manuel Arnó

The nucleophilic attack of the Breslow intermediate **17** to enones is responsible for the *trans* stereoselectivity experimentally observed.



4892

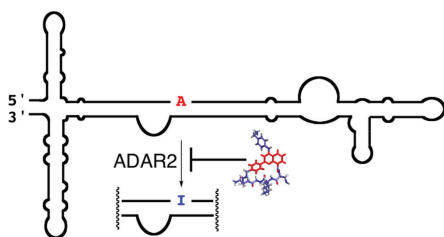


### Pyrimidine based highly sensitive fluorescent receptor for $\text{Al}^{3+}$ showing dual signalling mechanism

K. K. Upadhyay\* and Ajit Kumar

A pyrimidine based fluorescent probe (receptor 1) detected  $\text{Al}^{3+}$  selectively in DMSO as well as in aqueous media with its lowest detection limit of the order of  $10^{-10}$  M and  $10^{-9}$  M respectively. Receptor 1 is the first ever example where a single molecular probe is able to show imine (C=N) isomerization inhibition along with twisted intramolecular charge transfer (TICT) in combinatorial fashion.

4898

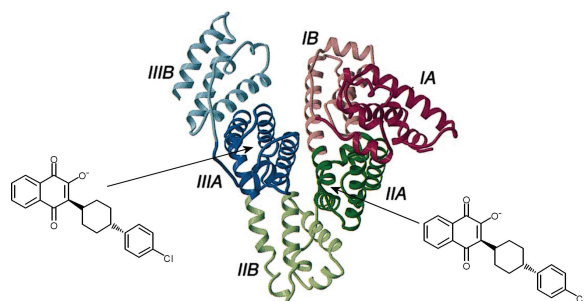


### Selective inhibition of ADAR2-catalyzed editing of the serotonin 2c receptor pre-mRNA by a helix-threading peptide

Nicole T. Schirle, Rena A. Goodman, Malathy Krishnamurthy and Peter A. Beal\*

A first example of substrate-selective inhibition of editing by an RNA-binding small molecule, which sets the stage for the development of new reagents capable of controlling gene function through manipulation of mRNA editing

4905

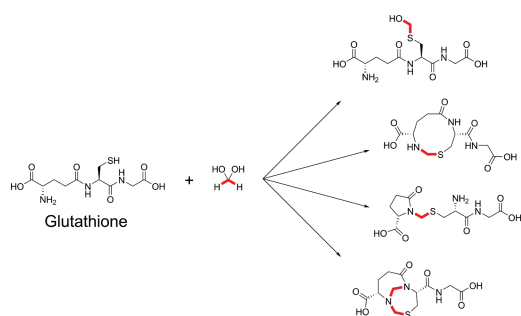


### Combination of chiroptical, absorption and fluorescence spectroscopic methods reveals multiple, hydrophobicity-driven human serum albumin binding of the antimalarial atovaquone and related hydroxynaphthoquinone compounds

Ferenc Zsila\* and Ilona Fitos

Induced circular dichroism spectra indicated the serum albumin binding of two atovaquone molecules with equally high affinity.

4915

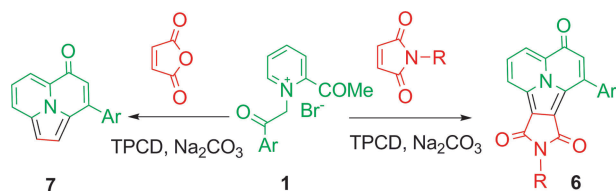


### Studies on the reaction of glutathione and formaldehyde using NMR

Richard J. Hopkinson, Philippa S. Barlow, Christopher J. Schofield\* and Timothy D. W. Claridge\*

The reaction of glutathione and formaldehyde is shown to produce a number of products, including two new cyclic adducts.

4921

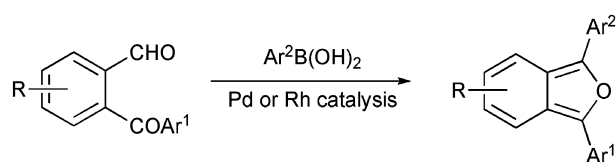


### Synthesis of 1,2-annulated and 1,2-unsubstituted pyrrolo[2,1,5-*de*]quinolizin-5-ones (cycl[3.3.2]azin-5-ones) *via* [3+2] cycloadditions of 1-oxoquinolizinium ylides with cyclic alkenes

Yun Liu, Hua-You Hu, Yan Zhang, Hong-Wen Hu and Jian-Hua Xu\*

1,2-Annulated and 1,2-unsubstituted pyrrolo[2,1,5-*de*]quinolizin-5-ones have been synthesized by one pot tandem reactions of 2-acetyl-*N*-phenacylpyridinium bromides with electron-deficient cyclic alkenes.

4927



### Regiospecific synthesis of functionalised 1,3-diarylisobenzofurans *via* palladium- and rhodium-catalysed reaction of boronic acids with *o*-acylbenzaldehydes under thermal or microwave activation

Jérôme Jacq, Bernard Bessières, Cathy Einhorn and Jacques Einhorn\*

Variously substituted 1,3-diarylisobenzofurans have been regiospecifically prepared *via* palladium- and rhodium-catalysed reaction of functionalised boronic acids onto *o*-acylbenzaldehydes, using classical or microwave heating.

4934

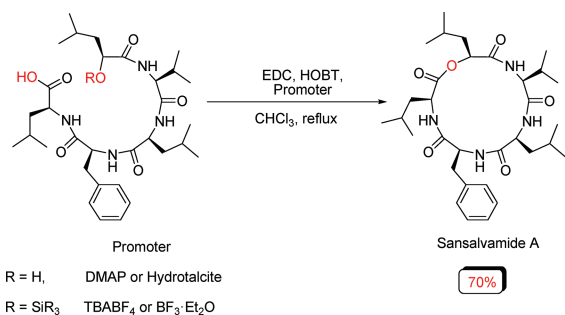


### Radical formation of amino acid precursors in interstellar regions? Ser, Cys and Asp

Daniel J. Knowles, Tianfang Wang and John H. Bowie\*

Theoretical calculations indicate that favourable reactions between  $\text{NH}_2\cdot\text{CHCN}$  and  $\text{R}\cdot$  ( $\text{R} = \text{CH}_2\text{OH}$ ,  $\text{CH}_2\text{SH}$  and  $\text{CH}_2\text{CN}$ ) should produce the Ser, Cys and Asp precursors  $\text{NH}_2\text{CH}(\text{R})\text{CN}$

4940



### Highly efficient macrolactonization of $\omega$ -hydroxy acids using benzotriazole esters: synthesis of Sansalvamide A

José Antonio Morales-Serna, Ericka Sánchez, Ricardo Velázquez, Jorge Bernal, Eréndira García-Ríos, Rubén Gaviño, Guillermo Negrón-Silva and Jorge Cárdenas\*

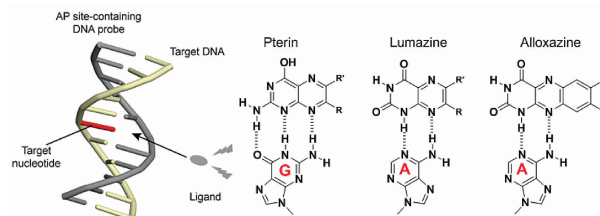
A facile and mild macrolactonization reaction of  $\omega$ -hydroxy acids in the presence of EDC/HOBT was developed. The reactions were performed under basic, neutral and acidic conditions.

4949

### Effect of substituents of alloxazine derivatives on the selectivity and affinity for adenine in AP-site-containing DNA duplexes

Burki Rajendar, Arivazhagan Rajendran, Zhiqiang Ye, Eriko Kanai, Yusuke Sato, Seiichi Nishizawa, Marek Sikorski and Norio Teramae\*

Alloxazine can bind to adenine selectively, whereas its methylated ligand, lumichrome, selectively binds to thymine over A, C and G opposite an AP site in DNA duplexes. Such changes in the base-selectivity and binding affinities are discussed.

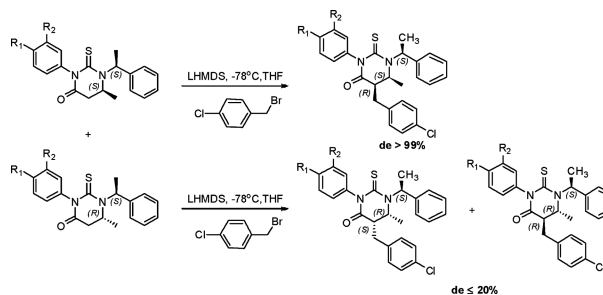


4960

### Diastereoselective syntheses of 3-aryl-5-(aryllalkyl)-6-methyl-1-(1-phenylethyl)-thioxotetrahydropyrimidin-4(1H)-ones: A stereochemical perspective from *endo* and *exocyclic* chiral centres

Varun Kumar, Pallegogu Raghavaiah, Shaikh M. Mobin and Vipin A. Nair\*

The orientations of the exocyclic and endocyclic groups dictate the stereochemical outcome of the reaction.

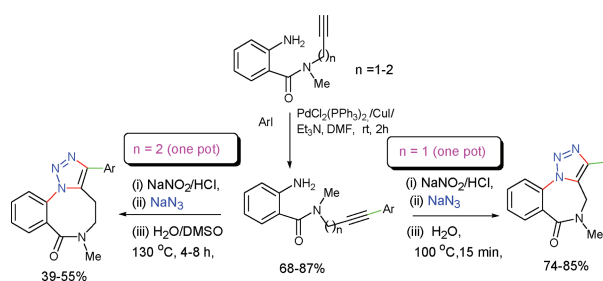


4971

### An expedient and facile route for the general synthesis of 3-aryl substituted 1,2,3-triazolo[1,5-*a*][1,4]benzodiazepin-6-ones and 1,2,3-triazolo[1,5-*a*][1,5]benzodiazocin-7-ones

Chinmay Chowdhury,\* Anup Kumar Sasmal and Basudeb Achari

An efficient route for the general synthesis of 3-aryl substituted 1,2,3-triazolo[1,5-*a*][1,4]benzodiazepin-6-ones and 1,2,3-triazolo[1,5-*a*][1,5]benzodiazocin-7-ones was developed.

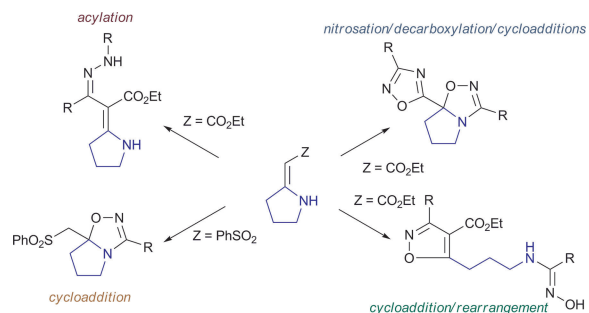


4978

### Reaction of heterocyclic enamines with nitrile oxide and nitrilimine precursors

Cevher Altuğ, Yasar Dürüst, Mark C. Elliott,\* Benson M. Kariuki, Tillique Rorstad and Mark Zaal

Alkylidenepyrrrolidines react with nitrile oxide and nitrilimine precursors to give a range of heterocyclic products.

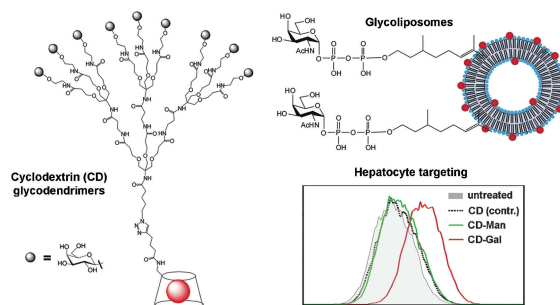


4987

### Design, synthesis and biological evaluation of carbohydrate-functionalized cyclodextrins and liposomes for hepatocyte-specific targeting

Gonçalo J. L. Bernardes, Raghavendra Kikkeri, Maha Magliano, Paola Laurino, Mayeul Collot, Sung You Hong, Bernd Lepenies and Peter H. Seeberger\*

Targeting glycan-binding receptors is an attractive strategy for cell-specific drug and gene delivery. In this study, we designed, synthesised and evaluated novel carbohydrate-functionalized  $\beta$ CDs and liposomes for hepatocyte-specific delivery.

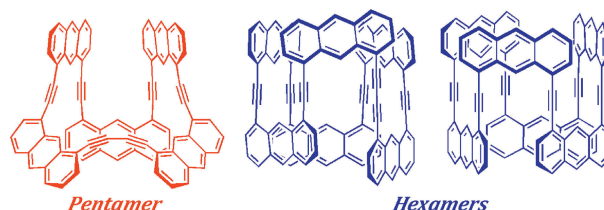


4997

### Chemistry of anthracene–acetylene oligomers. XVII. Synthesis, structure, and dynamic behavior of 1,8-anthrylene pentamers and hexamers with acetylene linkers

Shinji Toyota,\* Takahiro Kawakami, Risa Shinnishi, Rie Sugiki, Shinya Suzuki and Tetsuo Iwanaga

Anthrylene pentamers and hexamers with acetylene linkers were synthesized by cyclization with coupling reactions. The structure and the dynamic behavior of the macrocyclic oligomers were investigated.

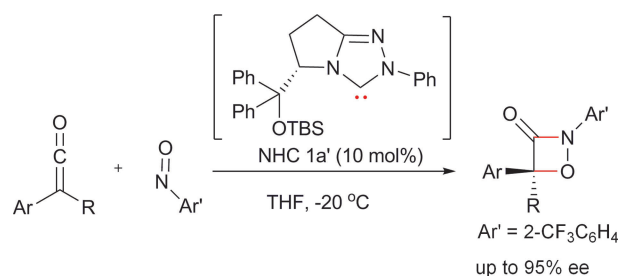


5007

### Enantioselective formal [2+2] cycloaddition of ketenes with nitroso compounds catalyzed by N-heterocyclic carbenes

Tong Wang, Xue-Liang Huang and Song Ye\*

Chiral N-heterocyclic carbenes were found to be efficient catalysts for the formal [2+2] cycloaddition reaction of alkyl(aryl)ketenes and nitroso compounds to give the corresponding 1,2-oxazetidin-3-ones in moderate to good yields with high enantioselectivities.

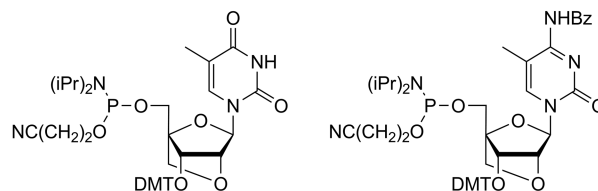


5012

### LNA 5'-phosphoramidites for 5'→3'-oligonucleotide synthesis

Andreas Stahl Madsen,\* T. Santhosh Kumar and Jesper Wengel

Efficient synthesis of LNA thymine and LNA 5-methylcytosine 5'-phosphoramidites, allowing incorporation into oligonucleotides synthesized in the 5'→3' direction. Key steps include regioselective enzymatic benzoylation of the 5'-hydroxy group of unprotected LNA thymine, and subsequent quantitative 4,4'-dimethoxytritylation of the 3'-hydroxy group of the O5'-benzoylated LNA thymine nucleoside.





# Organic & Biomolecular Chemistry

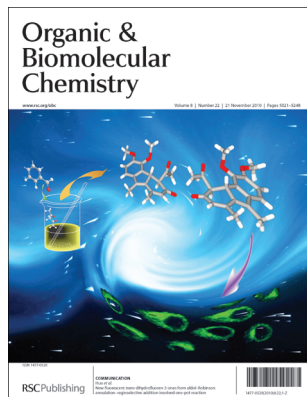
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## IN THIS ISSUE

ISSN 1477-0520 CODEN OBCRAK 8(22) 5021–5248 (2010)



### Cover

See Xianzhang Bu *et al.*,  
pp. 5048–5052.

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Biomolecular Chemistry*, 2010, **8**,  
5048.

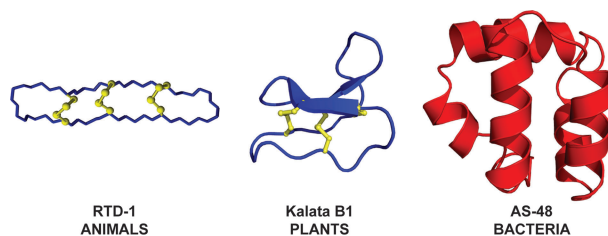
## PERSPECTIVE

5035

### Naturally occurring circular proteins: distribution, biosynthesis and evolution

Laura Cascales and David J Craik\*

This review explores the common links between ribosomally-synthesized, ultra-stable, cyclic peptides in bacteria, fungi, plants and animals.



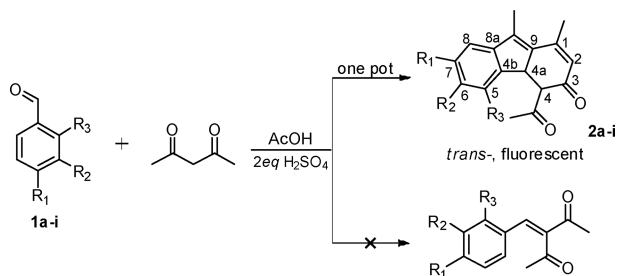
## COMMUNICATIONS

5048

### New fluorescent *trans*-dihydrofluoren-3-ones from aldol–Robinson annulation–regioselective addition involved one-pot reaction

Yingpeng Huo, Xu Qiu, Weiyan Shao, Jianing Huang, Yanjun Yu, Yinglin Zuo, Linkun An, Jun Du and Xianzhang Bu\*

An unexpected discovery of new fluorescent *trans*-dihydrofluoren-3-ones from one pot regioselective reactions of benzaldehydes and acetylacetone is described.

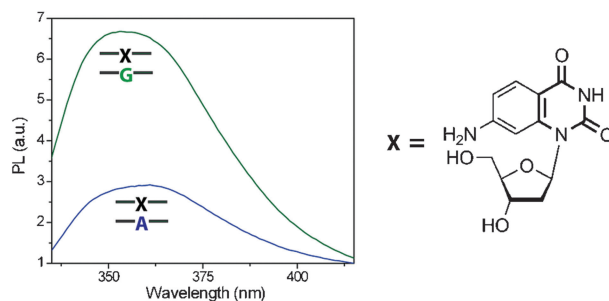


5053

### Fluorescent nucleoside analogue displays enhanced emission upon pairing with guanine

Yun Xie, Tucker Maxson and Yitzhak Tor\*

A fluorescent nucleobase analogue, 7-aminoquinazoline-2,4-(1*H*,3*H*)-dione, is incorporated into a DNA oligonucleotide and senses mismatched pairing by displaying G-specific fluorescence enhancement.

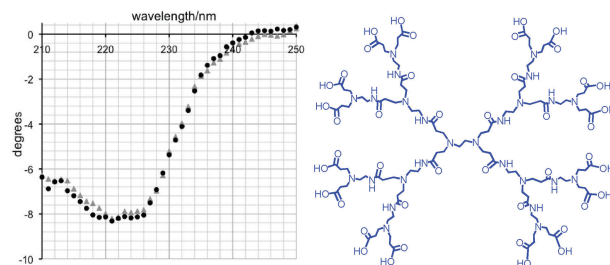


5056

### Investigating possible changes in protein structure during dendrimer-protein binding

F. Chiba, G. Mann and L. J. Twyman\*

The mechanism of dendrimer-protein binding is probed using CD spectroscopy. The results demonstrated that dendrimer/protein binding was *not* accompanied by changes in the protein's structure.

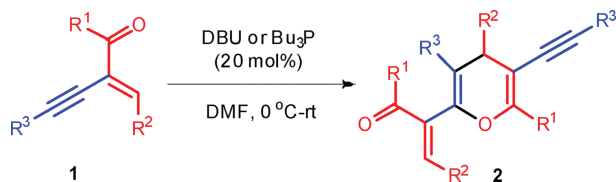


5059

### Organocatalytic hetero [4+2] cycloaddition reactions of 2-(1-alkynyl)-2-alkene-1-ones: metal-free access to highly substituted 4*H*-pyrans

Xiuzhao Yu, Zhongyan Cao and Junliang Zhang\*

Highly substituted 4*H*-pyrans can be smoothly synthesized from readily available 2-(1-alkynyl)-2-alkene-1-ones by an unexpected DBU or Bu<sub>3</sub>P-catalyzed hetero-[4+2] cycloaddition reaction, in which the enone moieties act as the heterodienes and the electron-deficient alkyne moieties act as the heterodienophiles.



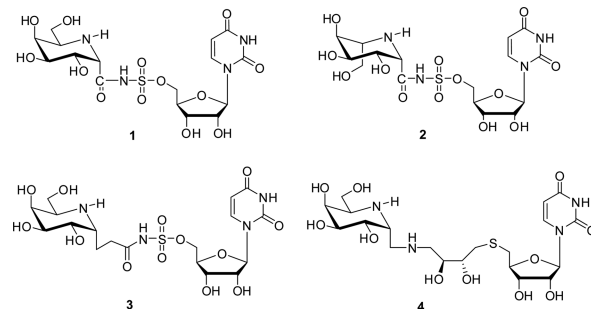
## PAPERS

5062

### Concise syntheses of selective inhibitors against $\alpha$ -1,3-galactosyltransferase

Guo-Liang Zhang, Li-He Zhang and Xin-Shan Ye\*

Selective inhibitors of iminosugar-based UDP-Gal mimetics against  $\alpha$ -1,3-galactosyltransferase were designed and synthesized.

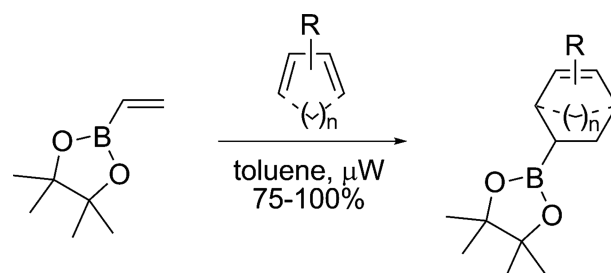


5069

### A facile microwave-assisted Diels–Alder reaction of vinylboronates

Ariel M. Sarotti, Pablo L. Pisano and Silvina C. Pellegrinet\*

This is the first example of microwave-assisted Diels–Alder reaction of boron-substituted dienophiles. Subsequent *in situ* oxidation of the cycloadducts with alkaline hydrogen peroxide afforded the alcohols efficiently.

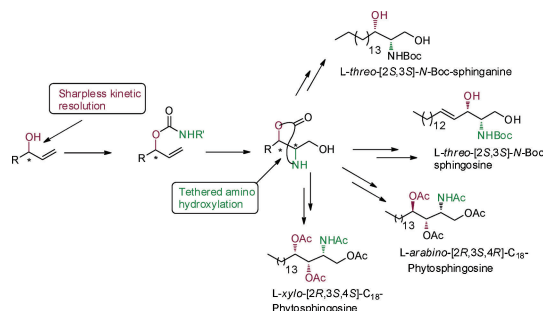


5074

### A general and concise asymmetric synthesis of sphingosine, safingol and phytosphingosines *via* tethered aminohydroxylation

Pradeep Kumar,\* Abhishek Dubey and Vedavati G. Puranik

A novel, practical and efficient enantioselective synthesis of sphingoid bases, *L*-threo-[2*S*,3*S*]-sphinganine (safingol), *L*-threo-[2*S*,3*S*]-sphingosine, *L*-arabino-[2*R*,3*S*,4*R*] and *L*-xylo-[2*R*,3*S*,4*S*]-C<sub>18</sub>-phytosphingosine is described. The synthetic strategy features the Sharpless kinetic resolution and tethered aminohydroxylation as the key steps.

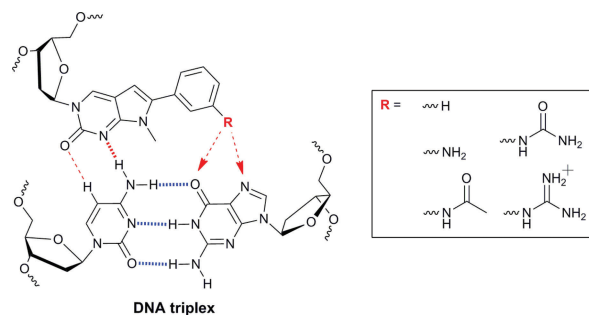


5087

### CG base pair recognition within DNA triple helices by modified *N*-methylpyrrolo-dC nucleosides

Simon R. Gerrard, Mastoura M. Edrees, Imenne Bouamaied, Keith R. Fox and Tom Brown\*

Enhanced triplex-mediated recognition of the CG base pair in DNA with new analogues of the non-natural bicyclic nucleoside, *N*-methylpyrrolo-dC.

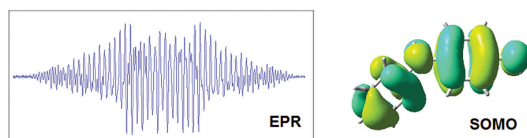
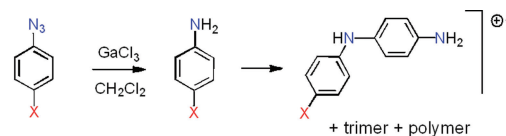


5097

### EPR and ENDOR spectroscopic study of the reactions of aromatic azides with gallium trichloride

Giorgio Bencivenni, Riccardo Cesari, Daniele Nanni, Hassane El Mkami and John C. Walton\*

Brilliant blue-green species from GaCl<sub>3</sub> promoted reactions of aromatic azides were studied by product analysis, EPR and ENDOR spectroscopy.

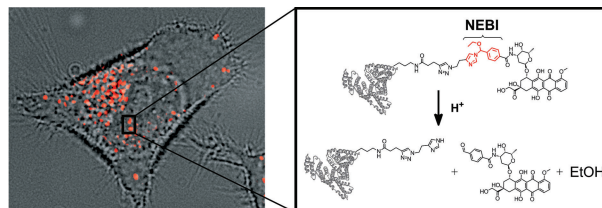


5105

**pH-Sensitive, *N*-ethoxybenzylimidazole (NEBI) bifunctional crosslinkers enable triggered release of therapeutics from drug delivery carriers**

Alice Luong, Tawny Issarapanichkit, Seong Deok Kong, Rina Fong and Jerry Yang\*

A drug conjugate comprising a pH-sensitive linker exhibits improved uptake and toxicity in cancer cells compared to free drug alone.

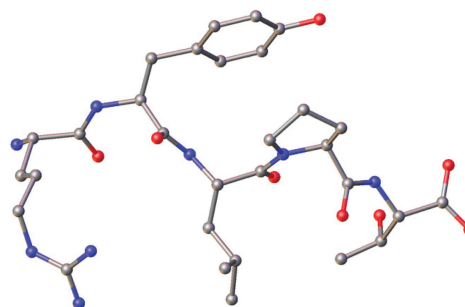


5110

**Crystal structure of the insect neuropeptide proctolin**

Judith A. K. Howard, Dmitry S. Yufit, Olga V. Chetina,\* Simon J. Teat, Silvia C. Capelli and Philip Pattison

The crystal structure of the neuropeptide proctolin (Arg-Tyr-Leu-Pro-Thr) is reported revealing the solid-state conformation of its molecules and their association in the crystal.

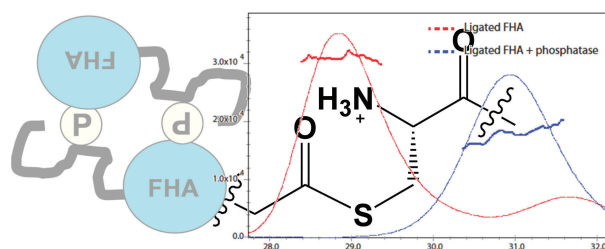


5113

**Access to phosphoproteins and glycoproteins through semi-synthesis, Native Chemical Ligation and *N*→*S* acyl transfer**

Jinit Masania, Jiejun Li, Stephen J. Smerdon and Derek Macmillan\*

Phosphoproteins and glycoproteins can be assembled through Native Chemical Ligation using thioesters prepared by *N*→*S* acyl transfer.

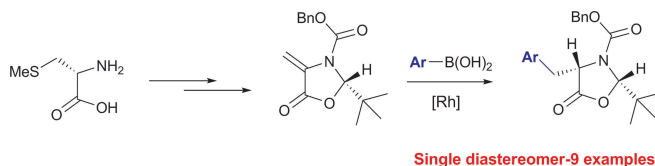


5120

**Rhodium-catalysed conjugate addition of arylboronic acids to enantiopure dehydroamino acid derivatives**

Jonathan D. Hargrave, Gerwyn Bish, Gabriele Kociok Köhn and Christopher G. Frost\*

The rhodium-catalysed conjugate addition of arylboronic acids to an enantiopure acceptor derived from (*R*)-*S*-methionine proceeds under substrate control to provide a range of functionalised phenylalanine derivatives with excellent stereocontrol *via* a highly diastereoselective protonation.



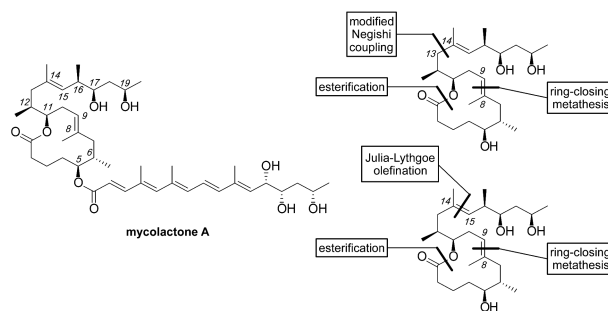


5159

### Synthetic studies on the mycolactone core

Kwang-Seuk Ko, Matthew D. Alexander, Shaun D. Fontaine, James E. Biggs-Houck, James J. La Clair and Michael D. Burkart\*

Two approaches are presented for the synthesis of the macrolide core of the mycolactone polyketides. The first intertwines RCM with a two-step Julia olefination protocol, while the second intercepts the optimized routes of Kishi, thereby providing formal access to the mycolactones.

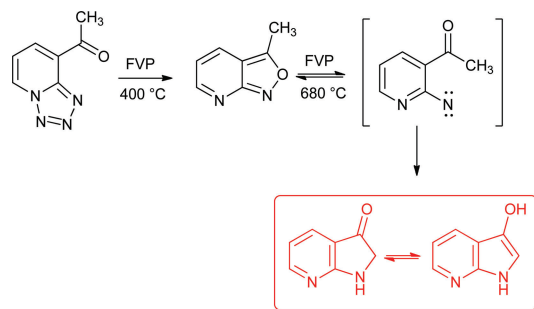


5166

### 3-Hydroxypyrrrolo[2,3-*b*]pyridine and related compounds – indoxyl analogues with fused electron deficient rings

Alexander P. Gaywood and Hamish McNab\*

Flash vacuum pyrolysis of 4-acetyltetrazolo[1,5-*a*]pyridine at 400 °C provides 3-methylisoxazolo[3,4-*b*]pyridine. At higher temperatures, an unstable heteroindoxyl is obtained whose chemistry is discussed.

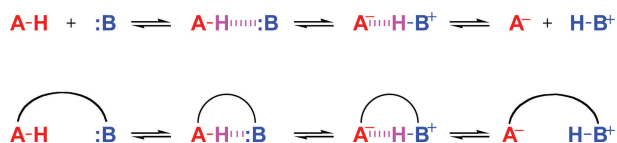


5174

### A computational analysis of intramolecularity in proton transfer reactions

Rafik Karaman\* and Robert Pascal\*

A theoretical investigation was aimed at understanding the efficiency of intramolecular vs. intermolecular proton transfers taking into account hydrogen bonding.

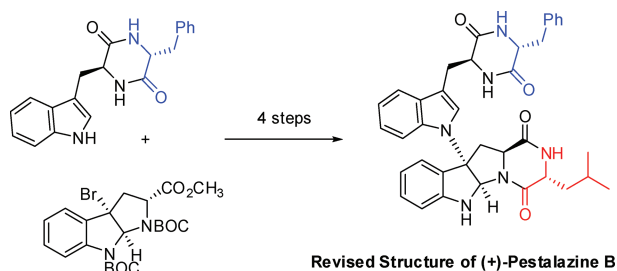


5179

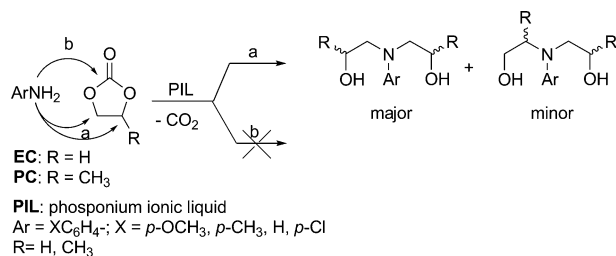
### Concise total synthesis and structural revision of (+)-pestalazine B

Carlos Pérez-Balado and Ángel R. de Lera\*

A short and versatile synthesis of (+)-pestalazine B allowed the structural revision of the initial proposed structure, in which the D-Phe and D-Leu residues are exchanged.



5187

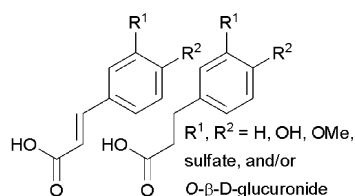


### The reaction of primary aromatic amines with alkylene carbonates for the selective synthesis of bis-*N*-(2-hydroxy)alkylanilines: the catalytic effect of phosphonium-based ionic liquids

Maurizio Selva,\* Massimo Fabris, Vittorio Lucchini, Alvise Perosa and Marco Noè

Phosphonium-based Ionic Liquids (PILs) efficiently catalyzed the reaction of primary aromatic amines with alkylene carbonates to produce bis-*N*-(2-hydroxy)alkylanilines.

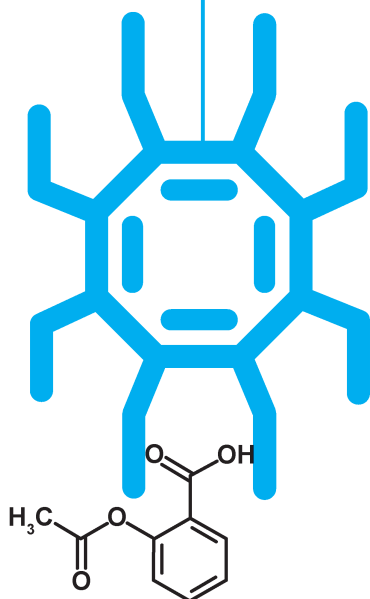
5199



### First synthesis, characterization, and evidence for the presence of hydroxycinnamic acid sulfate and glucuronide conjugates in human biological fluids as a result of coffee consumption

R. Fumeaux, C. Menozzi-Smarrito, A. Stalmach, C. Munari, K. Kraehenbuehl, H. Steiling, A. Crozier, G. Williamson and D. Barron\*

A set of 24 potential human metabolites of coffee polyphenols has been chemically prepared and used as analytical standards for unequivocal identifications in human biological fluids. The analytical standards included glucuronide conjugates and sulfate esters of caffeic, ferulic, isoferulic, *m*-coumaric and *p*-coumaric acids as well as their dihydro derivatives.



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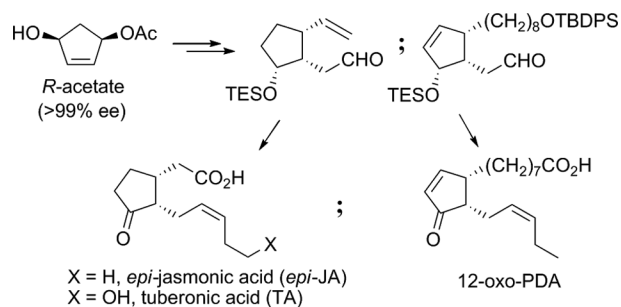
[www.chemspider.com](http://www.chemspider.com)

5212

### Stereoselective synthesis of *epi*-jasmonic acid, tuberonic acid, and 12-oxo-PDA

Hisato Nonaka, Narihito Ogawa, Noriaki Maeda, Yong-Gang Wang and Yuichi Kobayashi\*

The above aldehydes were designed as non-enolizable key intermediates for stereoselective synthesis of the title compounds.

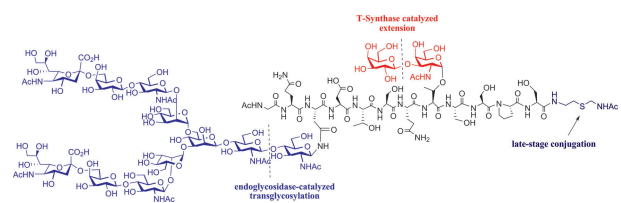


5224

### Expedient chemoenzymatic synthesis of CD52 glycopeptide antigens

Wei Huang, Xinyu Zhang, Tongzhong Ju, Richard D. Cummings and Lai-Xi Wang\*

Facile synthesis of CD52 glycoforms carrying both N- and O-glycans was achieved by a convergent chemoenzymatic approach.

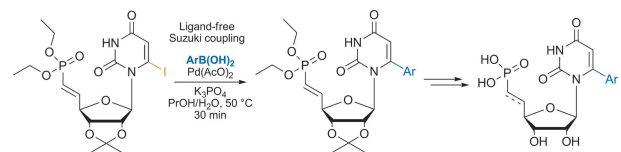


5234

### Synthesis of C-6-substituted uridine phosphonates through aerobic ligand-free Suzuki–Miyaura cross-coupling

Radim Nencka, Davy Sinnaeve, Izet Karalic, José C. Martins and Serge Van Calenbergh\*

We present an efficient protocol for the construction of C-6-(hetero)aryl-substituted uridine phosphonate analogues utilizing an aerobic, ligand-free Suzuki–Miyaura cross-coupling.





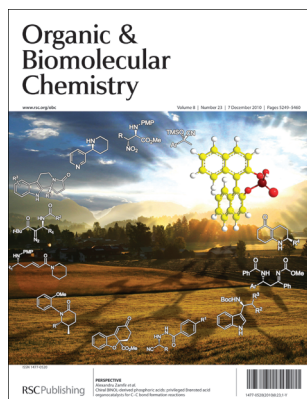
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## IN THIS ISSUE

ISSN 1477-0520 CODEN OBCRAK 8(23) 5249–5460 (2010)



### Cover

See Alexandru Zamfir *et al.*,  
pp. 5262–5276.

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*Organic & Biomolecular  
Chemistry*, 2010, **8**, 5262.

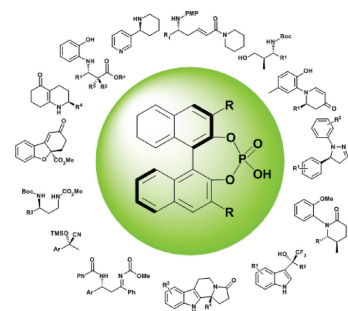
## PERSPECTIVE

5262

### Chiral BINOL-derived phosphoric acids: privileged Brønsted acid organocatalysts for C–C bond formation reactions

Alexandru Zamfir, Sebastian Schenker, Matthias Freund  
and Svetlana B. Tsogoeva\*

Chiral BINOL-derived phosphoric acids are powerful Brønsted acid catalysts in many enantioselective processes. The most successful transformations carried out with chiral BINOL-phosphates include C–C bond formation reactions, which are summarized in this review article.



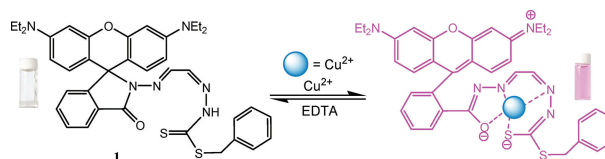
## COMMUNICATIONS

5277

### Highly sensitive and selective colorimetric and off-on fluorescent probe for Cu<sup>2+</sup> based on rhodamine derivative

Chunwei Yu, Jun Zhang, Rui Wang and Lingxin Chen\*

A new probe for Cu<sup>2+</sup> based on the Cu<sup>2+</sup>-induced reversible ring-opening mechanism of the rhodamine spirolactam was described.

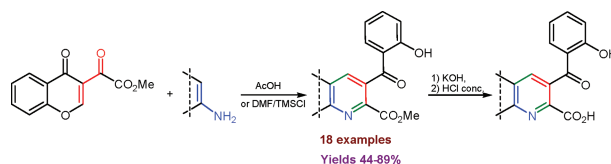


5280

### 3-Methoxyalychromone—a novel versatile reagent for the regioselective purine isostere synthesis

Satenik Mkrtchyan, Viktor O. Iaroshenko,\* Sergii Dudkin, Ashot Gevorgyan, Marcelo Vilches-Herrera, Gagik Ghazaryan, Dmitriy M. Volochnyuk, Dmytro Ostrovskiy, Zeeshan Ahmed, Alexander Villinger, Vyacheslav Ya. Sosnovskikh and Peter Langer\*

The first synthesis of 3-methoxyalychromone was described. The regioselective reaction with aminoheterocycles provided a set of heteroannulated pyridines.



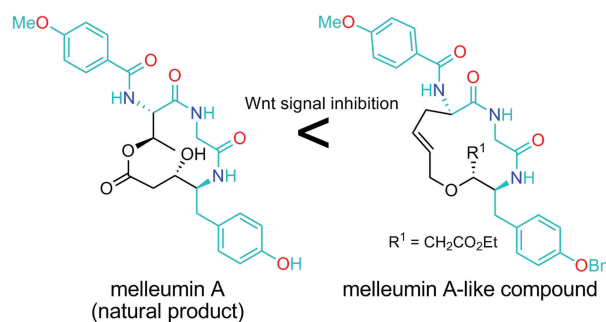
## PAPERS

5285

### Total synthesis and evaluation of Wnt signal inhibition of melleumin A and B, and their derivatives

Midori A. Arai,\* Shuwa Hanazawa, Yujiro Uchino, Xiaofan Li and Masami Ishibashi\*

The total synthesis of melleumin A, a novel cyclic depsipeptide isolated from the myxomycete *Physarum melleum*, 3-*epi*-melleumin A and designed melleumin A-like compounds was achieved. Comparison of the Wnt signal inhibitory activity of synthesized melleumin derivatives led to further investigation of the structural conformation of the active molecules.

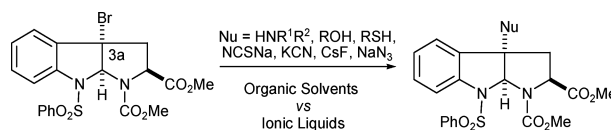


5294

### Facile nucleophilic substitution at the C3a tertiary carbon of the 3a-bromohexahydropyrrolo[2,3-*b*]indole scaffold

Isabel Villanueva-Margalef, David E. Thurston and Giovanna Zinzalla\*

The synthesis of 3a-substituted hexahydropyrrolo[2,3-*b*]indole derivatives *via* nucleophilic substitution at the C3a position is reported using both conventional organic solvents and ionic liquids.

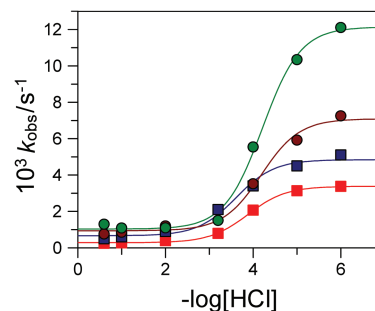


5304

### Butanolysis of 4-methylbenzenediazonium ions in binary n-BuOH/H<sub>2</sub>O mixtures and in n-BuOH/SDS/H<sub>2</sub>O reverse micelles. Effects of solvent composition, acidity and temperature on the switch between heterolytic and homolytic dediazoniation mechanisms

Alejandra Fernández-Alonso, M<sup>a</sup> José Pastoriza Gallego and Carlos Bravo-Díaz\*

Heterolytic and homolytic dediazoniation mechanisms can be modulated in solvolytic dediazoniations allowing determination of relevant thermodynamic parameters.

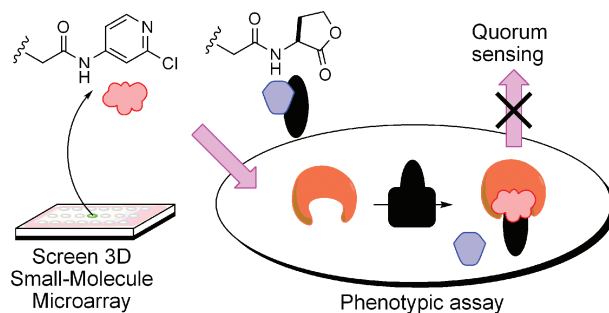


5313

### Discovery of a quorum sensing modulator pharmacophore by 3D small-molecule microarray screening

David M. Marsden, Rebecca L. Nicholson, Mette E. Skindersoe, Warren R. J. D. Galloway, Hannah F. Sore, Michael Givskov, George P. C. Salmond, Mark Ladlow, Martin Welch and David R. Spring\*

A 3D microarray platform was used to discover the biologically active chloro-pyridine pharmacophore, which was found to be able to inhibit N acyl-homoserine-lactone (AHL) mediated quorum sensing phenotypes in *Serratia* and *Pseudomonas aeruginosa*.

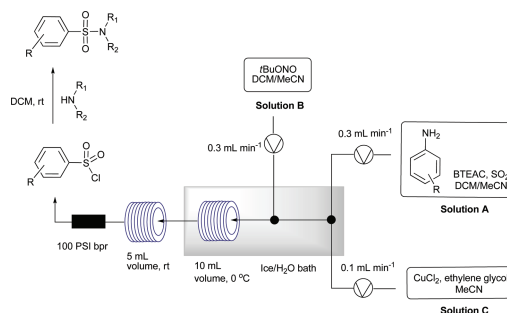


5324

### Preparation of arylsulfonyl chlorides by chlorosulfonylation of *in situ* generated diazonium salts using a continuous flow reactor

Laia Malet-Sanz,\* Julia Madrzak, Steven V. Ley and Ian R. Baxendale

First homogeneous and acid free method for the synthesis of sulfonyl chlorides from anilines, amenable to flow, safe and scalable.

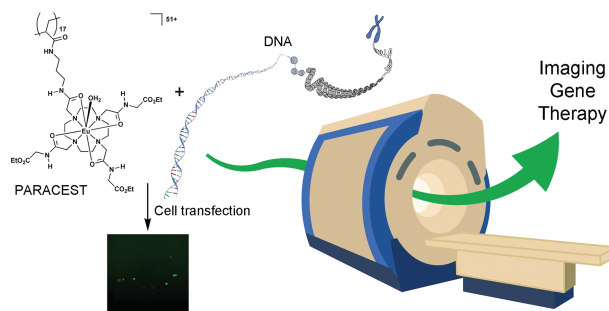


5333

### Polymeric PARACEST MRI contrast agents as potential reporters for gene therapy

Yunkou Wu, Christiane E. Carney, Michael Denton, Elaine Hart, Piyu Zhao, Daniel N. Streblov, A. Dean Sherry and Mark Woods\*

Polymeric MR agents suggest a radical new approach gene therapy; the agent could both mediate transfection and report location and transfection by MRI.

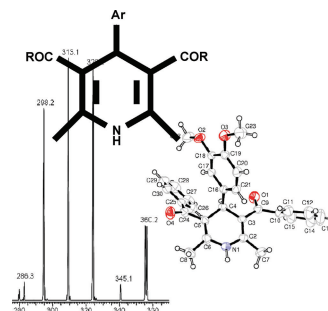


5339

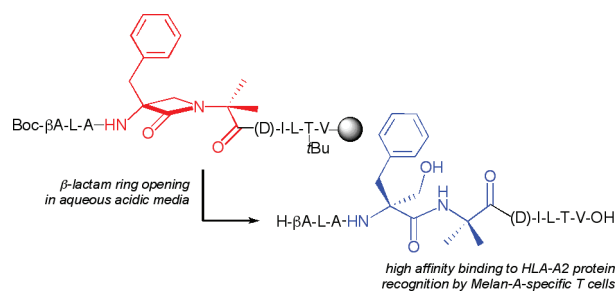
### Synthesis, structural and conformational properties, and gas phase reactivity of 1,4-dihydropyridine ester and ketone derivatives

Gianluca Giorgi,\* Mauro F. A. Adamo, Fabio Ponticelli and Antonio Ventura

A series of 4-aryl-2,6-dimethyl-1,4-dihydropyridines has been synthesized. Their structural and conformational properties have been studied by X-ray crystallography and nuclear magnetic resonance. The gas phase ion chemistry of their protonated and deprotonated species have been investigated by electrospray and CID-MS<sup>n</sup>.



5345

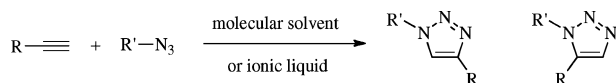


### Design, synthesis and evaluation of $\beta$ -lactam antigenic peptide hybrids; unusual opening of the $\beta$ -lactam ring in acidic media

M. Tarbe, I. Azcune, E. Balentová, J. J. Miles, E. E. Edwards, K. M. Miles, P. Do, B. M. Baker, A. K. Sewell, J. M. Aizpurua, C. Douat-Casassus\* and S. Quideau\*

An unusual  $\beta$ -lactam ring opening occurred during aqueous TFA-mediated release of  $\beta$ -lactam-peptide hybrids from solid support, leading to the formation of a pseudopeptide that expresses a high HLA-A2 binding affinity and stimulates Melan-A-specific T cells.

5354

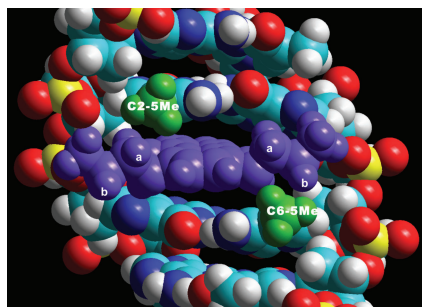


### The effects of ionic liquids on azide-alkyne cycloaddition reactions

Stephen R. D. George, Gavin L. Edwards and Jason B. Harper\*

Ionic liquids increase the regioselectivity whilst effects on activation parameters are intermediate between coordinating and non-coordinating salts. The presence of small amounts of water grossly affects activation parameters.

5359

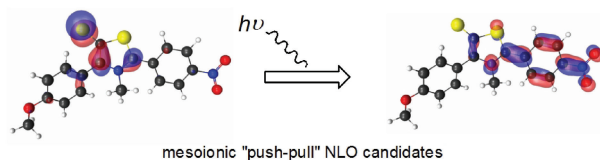


### DNA binding by pixantrone

Najia Adnan, Damian P. Buck, Benny J. Evison, Suzanne M. Cutts,\* Don R. Phillips and J. Grant Collins\*

The anticancer drug pixantrone intercalates at the 5'-<sup>5</sup>MeCpG sites of the octanucleotide  $d(A^{5Me}CGAT^{5Me}CGT)_2$  from the major groove, with the methyl groups not presenting a steric barrier to intercalation.

5367



### Push-pull 1,3-thiazolium-5-thiolates. Formation via concerted and stepwise pathways, and theoretical evaluation of NLO properties

David Cantillo,\* Martín Ávalos, Reyes Babiano, Pedro Cintas, José L. Jiménez, Mark E. Light, Juan C. Palacios and Valentín Rodríguez

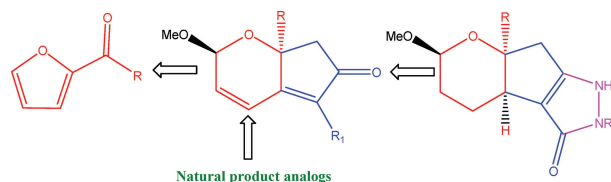
Mesoionic rings possessing a 1,3-thiazolium-5-thiolate unit show promising perspectives in non-linear optics. Full synthetic studies combined with DFT calculations also provide a plausible mechanistic picture.

5375

### Tandem Achmatowicz-Knoevenagel protocol: diastereoselective synthesis and anticancer evaluation of cyclopenta[b]pyrane derivatives

Taleb H. Al-Tel,\* Mohammad H. Semreen and Wolfgang Voelter

Tandem synthesis and biological evaluation of novel cyclopenta[b]pyrane derivatives.

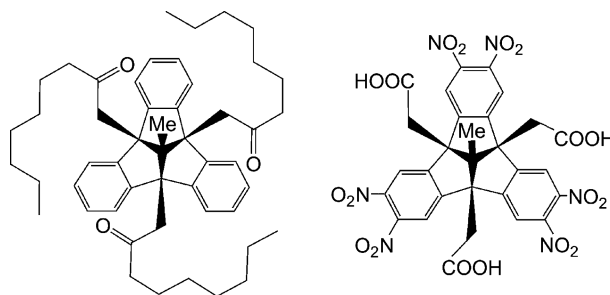


5383

### New $C_{3v}$ -symmetrical tribenzotriquinacenes bearing extended and oxy-functionalised alkyl groups at their benzhydrylic bridgeheads

Ehsan U. Mughal and Dietmar Kuck\*

The convex surface of the bowl-shaped tribenzotriquinacene framework has been furnished with various higher, mostly oxy-functionalised alkyl groups to increase the suitability of TBTQ derivatives for extension of their aromatic periphery.

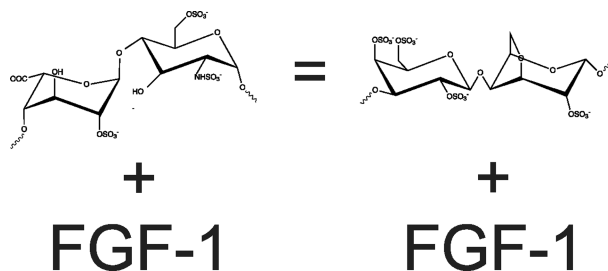


5390

### Comparable stabilisation, structural changes and activities can be induced in FGF by a variety of HS and non-GAG analogues: implications for sequence-activity relationships

Timothy R. Rudd, Katarzyna A. Uniewicz, Alessandro Ori, Scott E. Guimond, Mark A. Skidmore, Davide Gaudesi, Ruoyan Xu, Jeremy E. Turnbull, Marco Guerrini, Giangiacomo Torri, Giuliano Siligardi, Mark C. Wilkinson, David G. Fernig and Edwin A. Yates\*

Appropriate characteristics for FGF binding and activity are provided by various HS structures and non-GAG analogues.

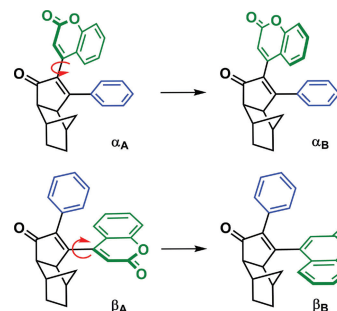


5398

### Atropisomerisation in sterically hindered $\alpha,\beta$ -disubstituted cyclopentenones derived from an intermolecular cobalt(0)-mediated Pauson–Khand reaction

Benjamin E. Moulton, Jason M. Lynam, Anne-Kathrin Duhme-Klair, Wenxu Zheng, Zhenyang Lin\* and Ian J. S. Fairlamb\*

For the first time, sterically hindered  $\alpha,\beta$ -(2,3)-disubstituted cyclopentenones, formed by a Pauson–Khand reaction, are shown to exhibit atropisomerisation. The energetic barrier to atropisomer interconversion is dependent on the relative position of the coumarin moiety.

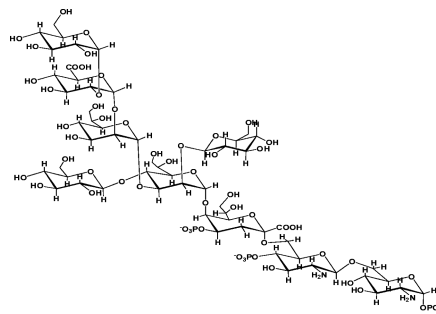


5404

### Structural characterization of the core region from the lipopolysaccharide of the haloalkaliphilic bacterium *Halomonas alkaliantarctica* strain CRSS

Giuseppina Pieretti, Sara Carillo, Barbara Nicolaus, Annarita Poli, Rosa Lanzetta, Michelangelo Parrilli and Maria Michela Corsaro\*

We described the core oligosaccharide structure from the LPS of the haloalkaliphile *Halomonas alkaliantarctica*, obtained after alkaline hydrolysis of the LPS, HPAEC purification, NMR spectroscopy and mass spectrometry analysis.

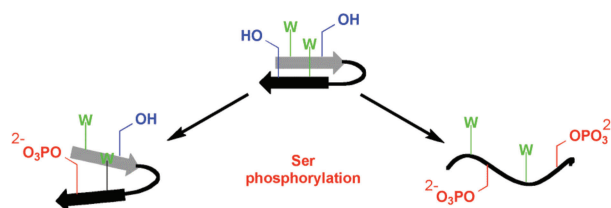


5411

### Positional effects of phosphoserine on $\beta$ -hairpin stability

Alexander J. Riemen and Marcey L. Waters\*

Phosphorylation of a  $\beta$ -hairpin demonstrates the ability of this covalent modification to alter structure in a position-dependent manner, providing insight potential mechanisms by which protein phosphorylation influences structure and function.

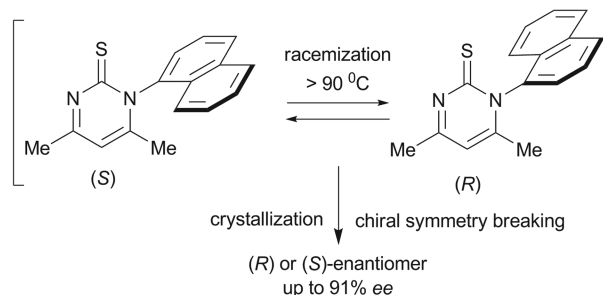


5418

### Generation and amplification of optical activity of axially chiral *N*-(1-naphthyl)-2(*1H*)-pyrimidinethione by crystallization

Masami Sakamoto,\* Fumitoshi Yagishita, Masaru Ando, Yuich Sasahara, Norifumi Kamataki, Mai Ohta, Takashi Mino, Yoshio Kasashima and Tsutomu Fujita

The crystallization of racemic axially chiral pyrimidinethione at high temperature led to the chiral breaking of symmetry up to 91% ee.

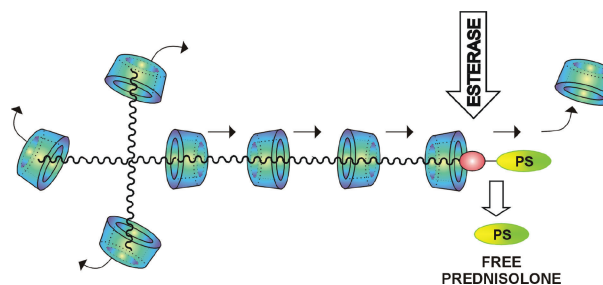


5423

### Prednisolone- $\alpha$ -cyclodextrin-star PEG polypseudorotaxanes with controlled drug delivery properties

Eliška Bílková, Miloš Sedlák,\* Bohuslav Dvořák, Karel Ventura, Petr Knotek and Ludvík Beneš

The synthesized polypseudorotaxanes were characterized by 2D NOESY NMR spectra, powder X-ray diffraction patterns, and STM. The rate of release of prednisolone from the carrier can be controlled by: character of the linker between polymeric carrier and prednisolone, molecular mass of PEG, and the kinetics of the dethreading of  $\alpha$ -CD units.

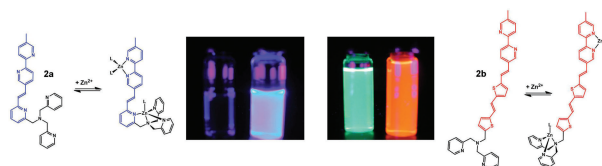


5431

### Electronic structural dependence of the photophysical properties of fluorescent heteroditopic ligands – implications in designing molecular fluorescent indicators

Ali H. Younes, Lu Zhang, Ronald J. Clark, Michael W. Davidson\* and Lei Zhu\*

This investigation reveals the rationale and limitations of engineering a heteroditopic fluorescent indicator for zinc ion.

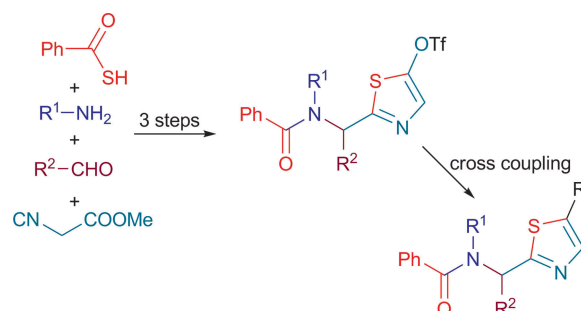


5442

### A straightforward approach towards 5-substituted thiazolylpeptides via the thio-Ugi-reaction

Uli Kazmaier\* and Andrea Persch

Activated thiazoles can easily be obtained by Ugi reactions using thioacids and subsequent cyclisations of the *endo* thiopeptides formed with triflic anhydride.

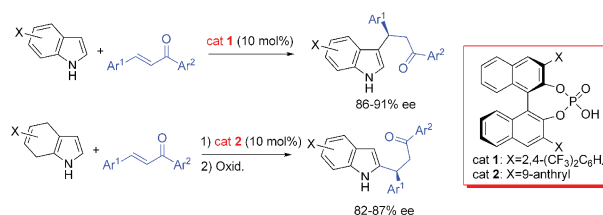


5448

### Chiral Brønsted acid catalyzed asymmetric Friedel–Crafts alkylation reaction of indoles with $\alpha,\beta$ -unsaturated ketones: short access to optically active 2- and 3-substituted indole derivatives

Tsubasa Sakamoto, Junji Itoh, Keiji Mori and Takahiko Akiyama\*

Phosphoric acid catalyzed enantioselective Friedel–Crafts alkylation of indole with  $\alpha,\beta$ -unsaturated ketones.

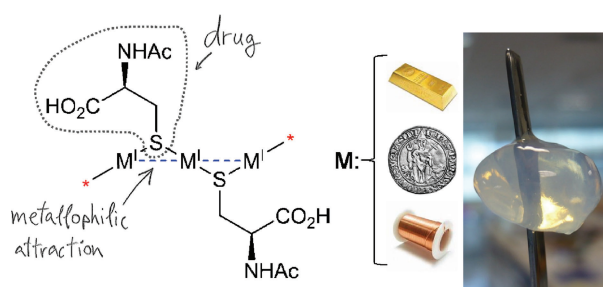


5455

### Converting drugs into gelators: supramolecular hydrogels from *N*-acetyl-L-cysteine and coinage-metal salts

Pablo Casuso, Pedro Carrasco, Iraida Loinaz, Hans J. Grande and Ibon Odriozola\*

A thiol-containing small drug such as *N*-acetyl-L-cysteine is easily transformed into a potent hydrogelator by the simple addition of a gold, silver or copper salt.



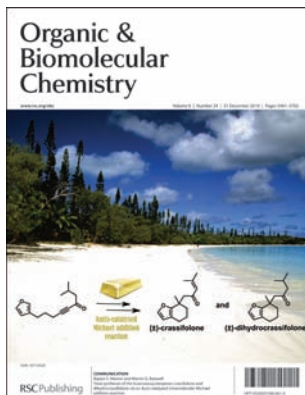
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## IN THIS ISSUE

ISSN 1477-0520 CODEN OBCRAK 8(24) 5461–5702 (2010)



### Cover

See Rajeev S. Menon and Martin G. Banwell, pp. 5483–5485.

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### Inside cover

See Robert H. Cichewicz *et al.*, pp. 5486–5489.

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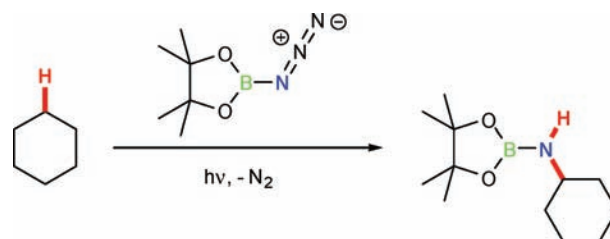
## EMERGING AREA

5477

### Borylnitrenes: electrophilic reactive intermediates with high reactivity towards C–H bonds

Holger F. Bettinger\* and Matthias Filthaus

Photochemically generated borylnitrenes insert efficiently into C–H bonds under matrix isolation conditions, in solution, and in the gas phase.



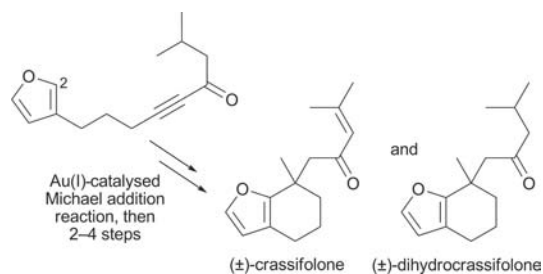
## COMMUNICATIONS

5483

### Total syntheses of the furanosesquiterpenes crassifolone and dihydrocrassifolone via an Au(I)-catalysed intramolecular Michael addition reaction

Rajeev S. Menon and Martin G. Banwell\*

A highly efficient Au(I)-catalysed intramolecular Michael addition reaction has been used to assemble the bicyclic framework associated with the furanosesquiterpenoid natural products crassifolone and dihydrocrassifolone.



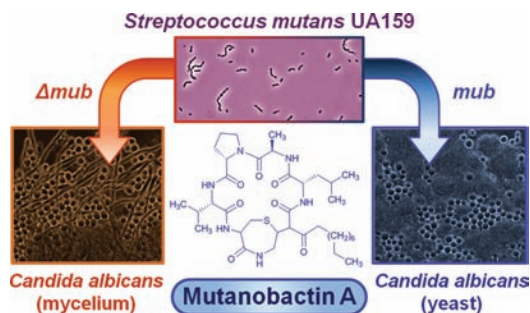


5486

**Mutanobactin A from the human oral pathogen *Streptococcus mutans* is a cross-kingdom regulator of the yeast-mycelium transition**

P. Matthew Joyner, Jinman Liu, Zhijun Zhang, Justin Merritt, Fengxia Qi and Robert H. Cichewicz\*

Mutanobactin A from *Streptococcus mutans* enables intracellular stress response pathways, as well as directs inter-kingdom interactions with eukaryotic microbes.



5490

**Diels–Alder cycloaddition of *o*-quinonedimethides and alkylidene-5*H*-furan-2-ones: new and rapid access to lambertellol cores and arthrinone derivatives**

Romain Blanc, Virginie Héran, Raphaël Rahmani, Laurent Commeiras\* and Jean-Luc Parrain\*

An efficient synthesis of deoxy-lambertellols was reported through a highly chemo- and diastereoselective DA cycloaddition. Such transformation with  $\delta$ -substituted  $\gamma$ -alkylidenebutenolides, to prepare new analogues of these tricyclic spirolactones, was also studied.



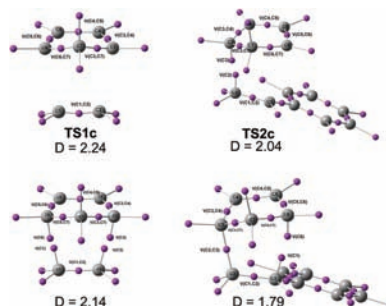
## PAPERS

5495

**Understanding the mechanism of non-polar Diels–Alder reactions. A comparative ELF analysis of concerted and stepwise diradical mechanisms**

Luis R. Domingo,\* Eduardo Chamorro and Patricia Pérez

ELF analysis for the one-step pathways of the non-polar Diels–Alder reaction between Cp and ethylene or styrene suggests that these reactions take place through *pseudo-diradical* species.

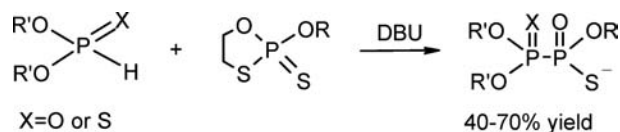


5505

**Stereoselective formation of a P–P bond in the reaction of 2-alkoxy-2-thio-1,3,2-oxathiaphospholanes with *O,O*-dialkyl *H*-phosphonates and *H*-thiophosphonates**

Damian Błaziak, Piotr Guga, Agata Jagiełło, Dariusz Korczyński, Anna Maciaszek, Anna Nowicka, Aleksandra Pietkiewicz and Wojciech J. Stec\*

Organohypophosphates containing a P–P bond are obtained under mild conditions in a highly stereoselective reaction of 2-alkoxy-2-thio-1,3,2-oxathiaphospholanes with *O,O*-dialkyl *H*-phosphonates or *H*-thiophosphonates ( $R' = \text{Me}$  or  $\text{Et}$ ).

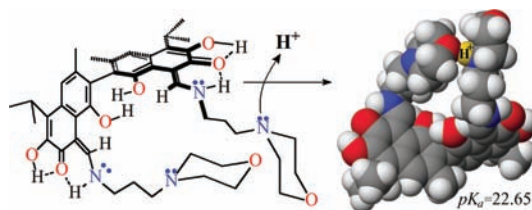


5511

### The influence of protonation on molecular structure and physico-chemical properties of gossypol Schiff bases

Piotr Przybylski,\* Krystian Pyta, Justyna Czupryniak, Barbara Wicher, Maria Gdaniec, Tadeusz Ossowski and Bogumił Brzezinski

Tautomeric form changes during stepwise protonation of gossypol Schiff bases were studied by ESI MS, FT-IR,  $^1\text{H}$  NMR, X-ray, potentiometric methods and PM5 calculations.

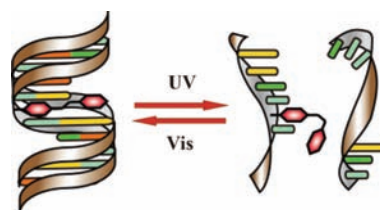


5519

### Construction of photoresponsive RNA for photoswitching RNA hybridization

Hiroshi Ito, Xingguo Liang,\* Hidenori Nishioka and Hiroyuki Asanuma\*

Photoresponsive RNA was constructed by introducing an azobenzene and RNA/RNA hybridization was efficiently regulated by the *trans*-*cis* photoisomerization.

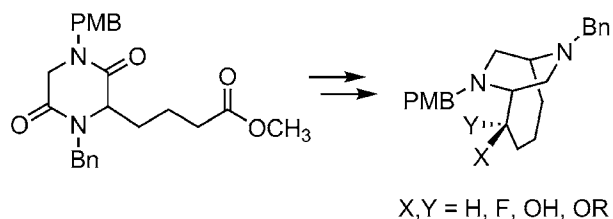


5525

### Synthesis and biological evaluation of conformationally restricted $\sigma_1$ receptor ligands with 7,9-diazabicyclo[4.2.2]decane scaffold

Sunil K. Sunnam, Dirk Schepmann, Elisabeth Rack, Roland Fröhlich, Katharina Korpis, Patrick J. Bednarski and Bernhard Wünsch\*

Piperazine derivatives with a four-membered bridge show a considerably different chemical and pharmacological behaviour compared with the corresponding analogues with a three-membered bridge.

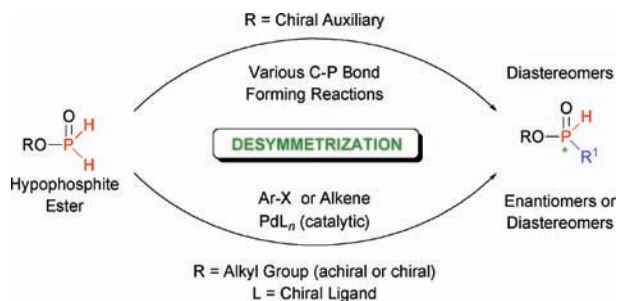


5541

### Strategies for the asymmetric synthesis of *H*-phosphinate esters

Karla Bravo-Altamirano, Laëtitia Coudray, Eric L. Deal and Jean-Luc Montchamp\*

Strategies are explored for the desymmetrization of hypophosphite esters through a variety of reactions, using either a chiral catalyst or a chiral auxiliary.

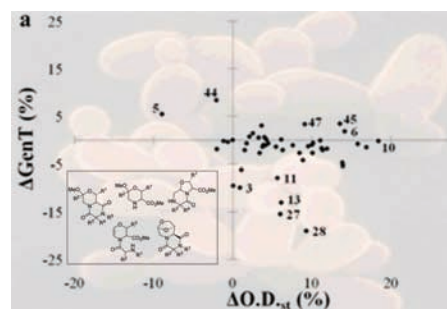


5552

### Chemical genetics approach to identify new small molecule modulators of cell growth by phenotypic screening of *Saccharomyces cerevisiae* strains with a library of morpholine-derived compounds

Andrea Trabocchi,\* Irene Stefanini, Manfredi Morvillo, Leonardo Ciofi, Duccio Cavalieri\* and Antonio Guarna

The screening of yeast deletants strains with a pool of morpholine-derived compounds towards cell growth rate identified two small molecules able to produce phenotypic effects on yeast cells.

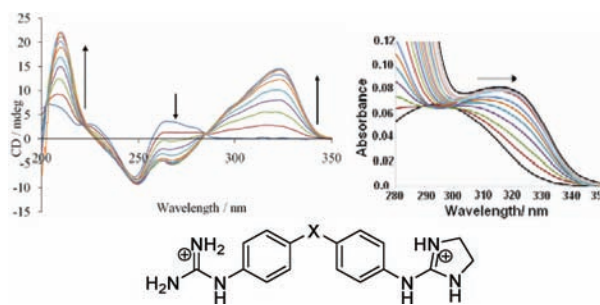


5558

### Understanding the DNA binding of novel non-symmetrical guanidinium/2-aminoimidazolium derivatives

Padraic S. Nagle, Susan J. Quinn, John M. Kelly, Daniel H. O'Donovan, Amir R. Khan, Fernando Rodriguez, Binh Nguyen, W. David Wilson and Isabel Rozas\*

The DNA binding of asymmetric guanidinium/2-aminoimidazolium has been explored using different biophysical techniques such as SPR, UV-titrations, CD, LD and ITC.

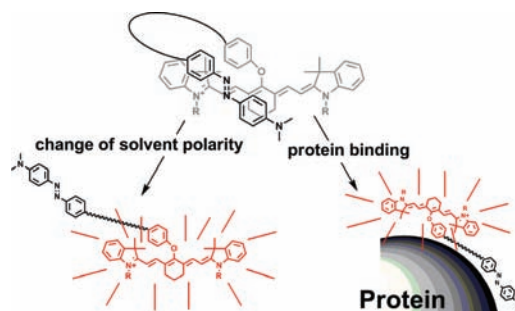


5568

### Modulation of intramolecular heterodimer-induced fluorescence quenching of tricarbocyanine dye for the development of fluorescent sensor

Tomoya Hirano,\* Jun Akiyama, Shuichi Mori and Hiroyuki Kagechika\*

To modulate the fluorescence of sensors, fluorescence quenching by intramolecular heterodimer formation was applied. The conjugated compounds of tricarbocyanine and dabcyI showed fluorescence enhancement in response to change of solvent polarity or protein binding.

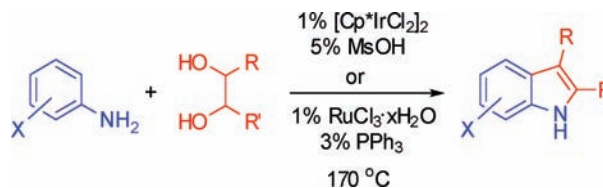


5576

### Iridium- and ruthenium-catalysed synthesis of 2,3-disubstituted indoles from anilines and vicinal diols

Matyas Tursky, Linda L. R. Lorentz-Petersen, Lasse B. Olsen and Robert Madsen\*

Anilines are condensed with 1,2-diols to give 2,3-disubstituted indoles with water and hydrogen gas as the only stoichiometric byproducts. The heterocyclisation is achieved under neat conditions with either an iridium or a ruthenium catalyst. For unsymmetric diols excellent regioselectivity is obtained for the indole isomer with a large substituent in the 2-position.

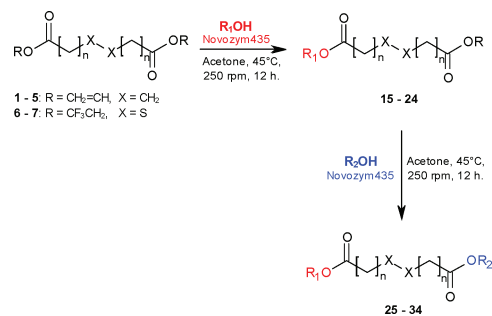


5583

### Exploiting enzymatic regioselectivity: a facile methodology for the synthesis of polyhydroxylated hybrid compounds

Pietro Magrone, Francesco Cavallo, Walter Panzeri, Daniele Passarella and Sergio Riva\*

A general two-step access to polyhydroxylated conjugated compounds based on enzymatic regioselective acylations is described.

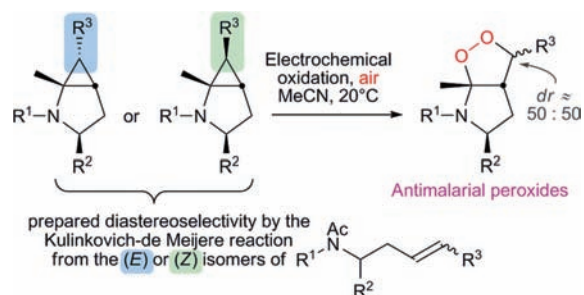


5591

### Aminocyclopropanes as precursors of endoperoxides with antimalarial activity

Claire Madelaine, Olivier Buriez,\* Benoît Crousse, Isabelle Florent, Philippe Grellier, Pascal Retailleau and Yvan Six\*

Several bicyclic aminocyclopropanes were synthesised diastereoselectively using the Kulinkovich–de Meijere reaction, and then converted into novel moderately active antimalarial  $\alpha$ -amino endoperoxides.

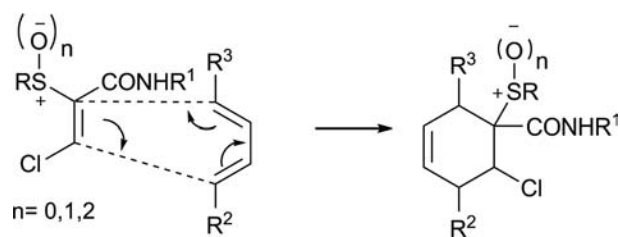


5602

### The influence of reaction conditions on the Diels–Alder cycloadditions of 2-thio-3-chloroacrylamides; investigation of thermal, catalytic and microwave conditions

Marie Kissane, Denis Lynch, Jay Chopra, Simon E. Lawrence and Anita R. Maguire\*

The Diels–Alder cycloadditions of cyclopentadiene and 2,3-dimethyl-1,3-butadiene to a range of 2-thio-3-chloroacrylamides under thermal, catalytic and microwave conditions is described.

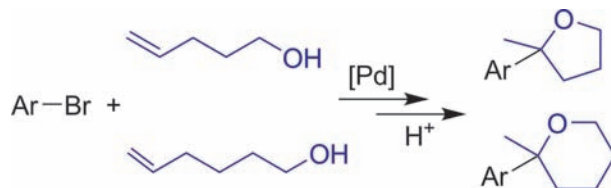


5614

### Synthesis of oxygen heterocycles by regioselective Heck reaction

Matthew McConville, Jiwu Ruan, John Blacker and Jianliang Xiao\*

Regioselective Heck arylation of unsaturated alcohols followed by acid-mediated cyclisation affords 2,2-disubstituted tetrahydrofurans and tetrahydropyrans in a convenient one-pot fashion.

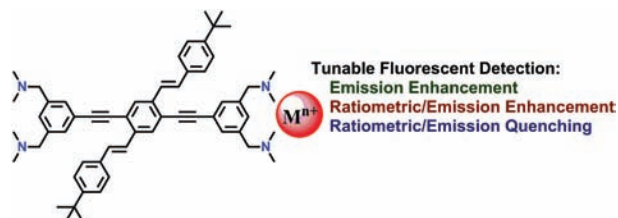


5620

### Metal ion detection by luminescent 1,3-bis(dimethylaminomethyl) phenyl receptor-modified chromophores and cruciforms

Anshuman Mangalum, Robert J. Gilliard Jr., Jessica M. Hanley, Austa Marie Parker and Rhett C. Smith\*

Both emission enhancement (turn-on) and ratiometric fluorescence detection of  $\text{Cu}^{2+}$  and  $\text{Zn}^{2+}$  ions have been achieved in THF.

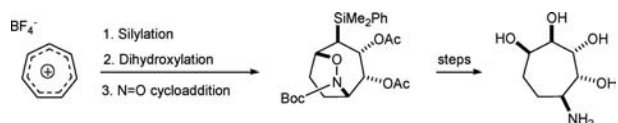


5628

### Desymmetrization of 7-dimethylphenylsilylcycloheptatriene. Towards the synthesis of new aminocycloheptitols

Emeline Girard, Valérie Desvergnès, Céline Tarnus and Yannick Landais\*

A straightforward access to aminoheptitols by desymmetrization of 7-dimethylphenylsilylcycloheptatriene through consecutive dihydroxylation and acyl-nitroso cycloaddition was developed.

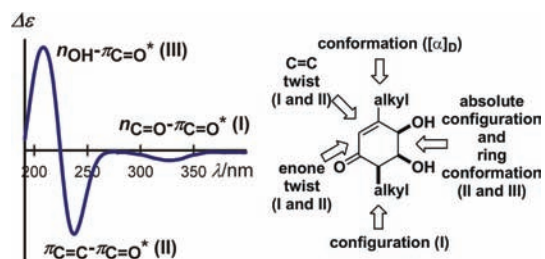


5635

### Circular dichroism, optical rotation and absolute configuration of 2-cyclohexenone-*cis*-diol type phenol metabolites: redefining the role of substituents and 2-cyclohexenone conformation in electronic circular dichroism spectra

Marcin Kwit,\* Jacek Gawronski, Derek R. Boyd,\* Narain D. Sharma and Magdalena Kaik

New model for prediction of optical activity (ECD and OR) of chiral 2-cyclohexenones is presented.

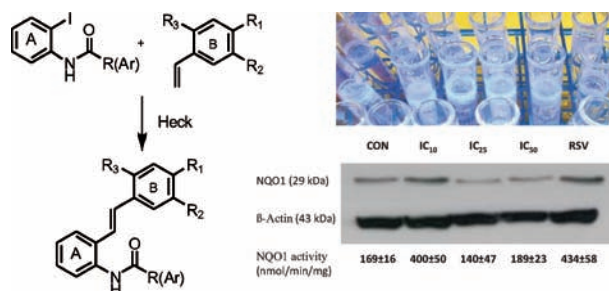


5646

### Challenges associated with the synthesis of unusual *o*-carboxamido stilbenes by the Heck protocol: Intriguing substituent effects, their toxicological and chemopreventive implications

Chin Hui Kee, Azhar Ariffin, Khalijah Awang, Koichi Takeya, Hiroshi Morita, Salmaan Inayat Hussain, Kok Meng Chan, Pauline J. Wood, Michael D. Threadgill, Chuan Gee Lim, SeikWeng Ng, Jean Frédéric F. Weber and Noel F. Thomas\*

Unprecedented *o*-carboxamido stilbenes were synthesized and evaluated for biological activity in HT29, HepG2, Jurkat, P388 cell lines and NQO1.



5661

### Synthesis and structure of azole-fused indeno[2,1-*c*]quinolines and their anti-mycobacterial properties

R. S. Upadhyaya, P. D. Shinde, A. Y. Sayyed, S. A. Kadam, A. N. Bawane, A. Poddar, O. Plashkevych, A. Földesi and J. Chattopadhyaya\*

Design, synthesis and anti-mycobacterial activity of fused tetrazole-, triazole- and dihydroimidazole-indeno[2,1-*c*]quinolines with detailed spectroscopic analysis of the ring closure reaction involving the C2 substituent and quinoline nitrogen.

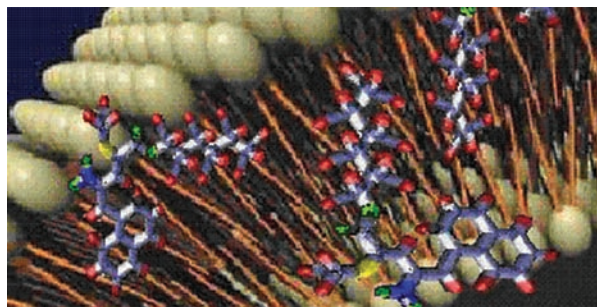


5674

### Strategies for improving the water solubility of new antitumour nitronaphthylbutadiene derivatives

Antonella Fontana,\* Maurizio Viale, Susanna Guernelli, Carla Gasbarri, Egon Rizzato, Massimo Maccagno, Giovanni Petrillo, Cinzia Aiello, Silvano Ferrini and Domenico Spinelli\*

The antitumour activity of hexyl and methyl esters was comparable and fully preserved, or in some cases also enhanced, when entrapped into liposomal carriers.

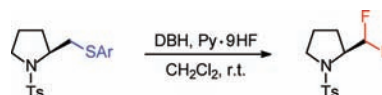


5682

### Oxidative desulfurization–fluorination of thioethers. Application for the synthesis of fluorinated nitrogen containing building blocks

Verena Hugenberg, Roland Fröhlich and Günter Haufe\*

The stepwise introduction of fluorine substituents by succeeding fluoro-Pummerer rearrangement(s) and desulfurization–fluorination reaction leads to proline-based useful fluoromethylated *N*-heterocycles.



5692

### Cobalt-catalyzed intramolecular *C–N* and *C–O* cross-coupling reactions: synthesis of benzimidazoles and benzoxazoles

Prasenjit Saha, Md Ashif Ali, Pokhraj Ghosh and Tharmalingam Punniyamurthy\*

The synthesis of substituted benzimidazoles and benzoxazoles is described from benzamides and benzamides using cobalt(II)-1,10-phenanthroline by intramolecular cyclization at moderate temperature.

