

## Comment: 2004's fastest organic and biomolecular chemistry!

Caroline V. Potter,\* Janet Freshwater, Janet L. Dean, Adrian P. Kybett, Richard Kidd, Melanie James and Helen Saxton

Royal Society of Chemistry, Thomas Graham House, Cambridge, UK CB4 0WF.

E-mail: potterc@rsc.org

In January 2003, the Royal Society of Chemistry launched *Organic & Biomolecular Chemistry (OBC)* – a journal promising to provide high quality research from all aspects of synthetic, physical and biomolecular organic chemistry. The journal was set to build upon the foundations laid down by its predecessor publications (*J. Chem. Soc., Perkin Trans. 1* and *J. Chem. Soc., Perkin Trans. 2*) as well as complement the subject coverage already published in prestigious general chemistry journals such as *Chemical Communications* and *Chemical Society Reviews*. Nearly two years on, just how is the programme developing and what can the community expect to see from the Royal Society of Chemistry (RSC)?

### Times to publication

All RSC authors benefit from the fastest publication times in the business, thanks to fast and thorough peer review, dedicated editorial staff and technical innovation throughout the publication process. It has been these superior publication times, that have made *OBC* the ideal home for the most exciting work in the field, and set it apart from its competitors. Communications are typically published a whole week† faster than its closest competitor, at an impressive 47 days! Full papers are just as notable, at just 87 days to first publication on the web.

Not only is the publication process fast, it is carried out to the highest of standards. In October 2004, this was recognised by the Association of Learned and Professional Society Publishers (ALPSP), as it awarded *OBC* a Highly Commended Certificate in the category of Learned Journals. The judges recognised the journal's good use of typography and colour, to balance the academic content. The RSC has strived to develop tools to help authors with the publication

† Times to publication from receipt to electronic publication are the mean time in days for the period January–July 2004. Data are shown for all **Communications** published in *Organic & Biomolecular Chemistry* and *European Journal of Organic Chemistry* (issues 1–15, 2004), Letters published in *Organic Letters* [issues 1–15, 2004 (alternate letters from alternate issues)] and Short Communications published in *Tetrahedron Letters* [issues 1–29, 2004 (alternate communications from issues 1,5,9,13,17,21,25 and 29)]. Data are shown for **Papers** published in *Organic & Biomolecular Chemistry* and *European Journal of Organic Chemistry* (alternate papers from issues 1–15, 2004) and Papers published in *Journal of Organic Chemistry* [issues 1–15, 2004 (alternate papers from alternate issues)].

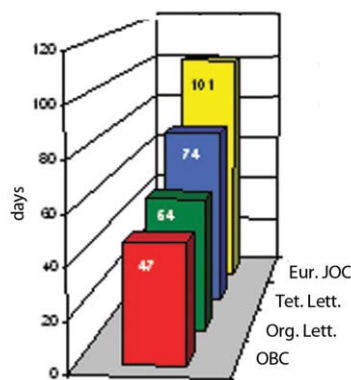


Fig. 1 Times to publication for Communications (web).

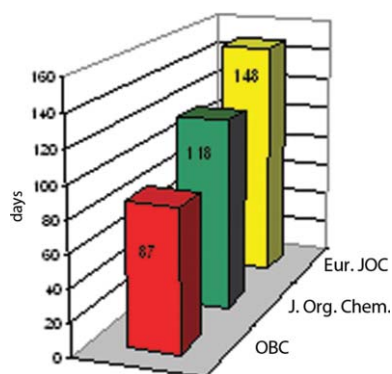


Fig. 2 Times to publication for Papers (web).

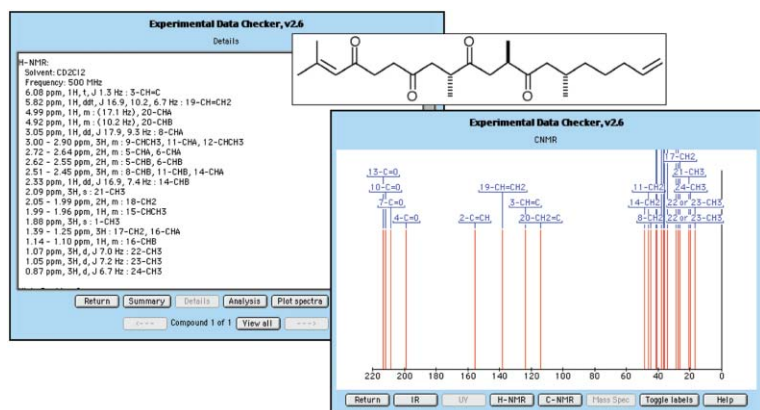
process. A recent collaboration with the Unilever Centre for Molecular Science Informatics (at the University of Cambridge, UK) has resulted in the launch of the Experimental Data Checker – a java applet which analyses experimental data. Its aim is to provide helpful information which an author can use to improve a paper, a referee can use to check a paper and a reader can use to analyse a paper. A detailed study of this has been published in *OBC*.<sup>1</sup>



Fig. 3 Dr. Caroline Potter and Mrs. Karen Harries-Rees receive ALPSP prizes.

### Impact

Publishing the best work in exceptionally fast times is in itself a great achievement, but *OBC* has also proven itself to be an excellent venue for authors to get their work noticed. The National Library of Medicine has chosen to fully index the journal in the Index Medicus/MEDLINE – the world's most comprehensive source of life sciences and biomedical bibliographic information. Coverage begins from volume 1, issue 1, recognising the quality and quantity of biological research contained within the journal, and its importance within the community. In addition, all chemical biology content published in the journal is also showcased free of charge (for a limited period) in the RSC's Chemical Biology Virtual Journal ([www.rsc.org/chembiol](http://www.rsc.org/chembiol)). *OBC* has also benefited from RSC initiatives to highlight and showcase the latest news and research developments in news supplements such as *Chemical Science*. A number of papers promoted in this way, have since gone on to be covered in publications such as *Science*

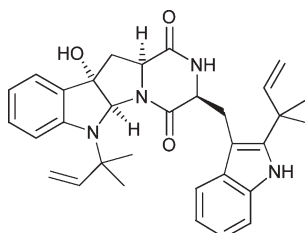


and *Nature*. 'To date I have published two papers in *Organic & Biomolecular Chemistry* and the process works great' says Brad Smith, professor of chemistry at the University of Notre Dame, Indiana, USA. 'The RSC is clearly working hard to promote the papers that appear in its journals.' The remit of *OBC* continues to be to bring together molecular design, synthesis, structure, function and reactivity in one journal. We have had many highlights and this article gives a selection of some of the best.

### Synthetic organic chemistry

Professor K. C. Nicolaou of the Scripps Research Institute and UCSD and Professor Ronald Evans of the Salk Institute reported the development of a high affinity FXR agonist. The authors screened a library containing 10000 small molecules for activity as FXR agonists. Several compounds which are

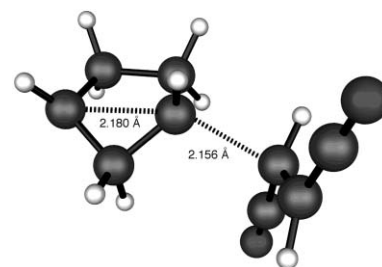
the most active FXR agonists so far reported were identified and optimized giving a detailed example of combinatorial chemistry applied to ligand discovery.<sup>87</sup> Professor Steven Ley and his colleagues in Cambridge published the first synthesis of (+)-okaramine C; one of the most biologically active members of the okaramine series. Members of this series of natural products are known to be potent insecticides and considerable synthetic effort worldwide has been invested in them in recent months.<sup>2</sup>



Okaramine C

### Physical organic chemistry

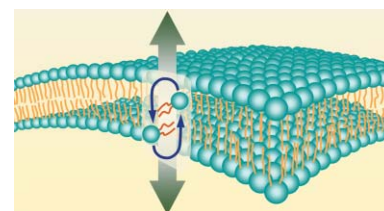
Professor Barry Carpenter from Cornell University, USA showed how computers are helping to solve the puzzle of unusual mechanisms and informing us of things we never knew we already knew! In his paper Professor Carpenter details how he has used existing data and state-of-the-art electronic structure calculations to provide a basis for understanding experimental results. Starting with the puzzling, but reasonably simple, example of the discrepancy between the isomerisation of cyclopropene and bicycle[2.1.0]pentane, Professor Carpenter has shown that although a difference between the energetics of the reactions is evident, this difference need not be due to a change in mechanism but due to unfavourable interactions which can account for all the large energy differences between, what at first glance would appear to be, two analogous reactions.<sup>3</sup>



Professor Ken Houk, UCLA, USA reports new developments in theoretical work on the mechanism of nitroso ene reactions. The proposed new stepwise mechanism conflicts with some previous speculation in the literature and corrects some specific errors. This has wider implications on nitroso ene reactions and on other similar ene reactions.<sup>68</sup>

### Chemical biology

Enzymes that initiate a flip-flop action in membrane lipids have been designed by Professor Bradley Smith and his research group at the University of Notre Dame, USA. These translocases may lead to advancements in the search for chemotherapeutic agents.<sup>4</sup>

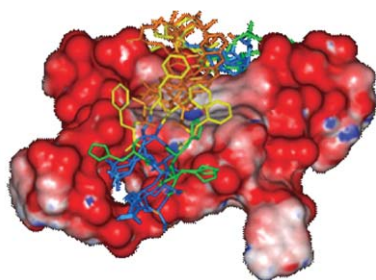


Professor François Diederich and his co-workers at ETH, Switzerland have undertaken fluorine scans of thrombin inhibitors to provide meaningful protein-ligand structure-activity relationships.



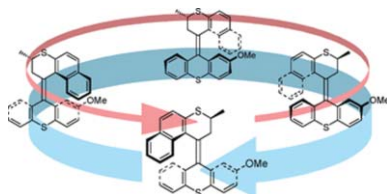
Professor Diederich says he is 'strongly convinced that a full understanding of the effects of fluorine on protein binding affinity and selectivity will greatly benefit future structure-based design and lead to optimisation in medicinal chemistry'.<sup>5</sup>

Shankar Balasubramanian and his colleagues at Cambridge and London Universities, UK, have demonstrated that combining classic DNA binding scaffolds with selected peptides can enhance their binding specificity towards G-quadruplexes. The Balasubramanian group investigated the selectivity of three tetrapeptides, each with some intrinsic specificity for quadruplex over double-stranded DNA, when attached to heterocyclic DNA-binding scaffolds.<sup>6</sup>



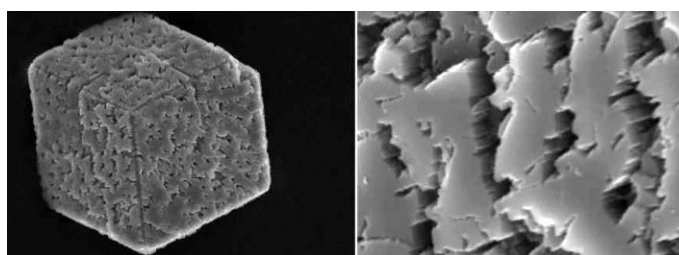
## Supramolecular organic chemistry

Our first two years have seen several papers on molecular motors including two papers from Professor Ben Feringa, University of Groningen, The Netherlands, on the subject of light-driven unidirectional rotary molecular motors.<sup>7,106</sup>



Research detailing work towards understanding the key factors governing specific mineralization phenomena was presented by Professor Hamilton and his colleagues from Yale University, USA and the Weizmann Institute of Science, Israel. This study looks at the unique properties of a gel in influencing the growth and morphology of crystals showing how the appearance of a calcite crystal changes dramatically over time.<sup>8</sup>

In an innovative paper Professor Michael Burkart, UCSD, USA and Dr James La Clair, Bionic Bros, Germany, reported a novel method to identify biological interactions using a simple CD. Using inkjet printing to attach molecules to the surface of a CD, proteins can be identified by their interaction with the laser light when

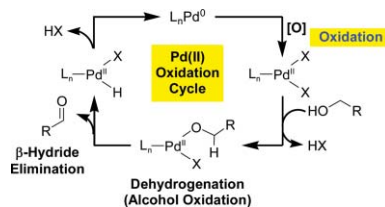


read by a CD player. Many sophisticated molecular recognition devices exist which use lasers to detect molecules. The real benefit of this advance lies in the fact that the CD player is a common and inexpensive electronic device. In the words of Michael Burkart "Initially our plan envisioned a system for the scientist to screen molecules without requiring a large research budget. Soon thereafter, we realized that this technology could bring molecular vision to anyone owning a computer with a CD player".<sup>114</sup>

*OBC* does not only publish communications and full papers. Review material in the form of Emerging Areas and Perspectives is also included.

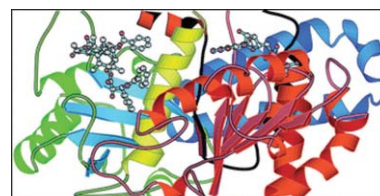
## Emerging Areas

*OBC's* Emerging Areas are personal accounts of new areas of research and we have published 14 to date.<sup>12-18,43,50,57,81,92,100,102</sup> The areas covered have been diverse. In her Emerging Area, Professor Anna Mapp, University of Michigan, USA discusses the many different approaches currently under investigation in the study of transcription to create artificial repressors and gene activators.<sup>92</sup> Professor Helen Blackwell, University of Wisconsin – Madison, USA, discussed microwave-assisted solid-phase organic reactions as the tool that could allow combinatorial chemistry to deliver on its promise—providing rapid access to large collections of diverse small molecules.<sup>43</sup> Professor Matthew Sigman, University of Utah, USA, covered palladium(II)-catalysed oxidations, a field that has recently reappeared at the forefront of organometallic catalysis.<sup>17</sup>



## Perspectives

In our Perspectives we have published short reviews on a range of topics.<sup>19-32,42,62,63,67,73,91,93,111,113</sup> Two Perspectives in the same issue covered two closely linked research areas in the fight against cancer: microtubules and epothilones. Professor Karl-Heinz Altmann from ETH, Switzerland, looked at the different structures of the epothilones and mapped out the progress to date in getting drugs based on them to the elusive clinical-trial stage.<sup>25</sup> Meanwhile, Professor Linda Amos at the Laboratory of Molecular Biology, Cambridge University, UK, covered the other side of this research taking a closer look at the different physical structures of microtubules, and how these structures are stabilised by the epothilone-based drugs such as Taxol.<sup>26</sup> In synthetic polymer chemistry, Professor Jeff Moore, University of Illinois at Urbana-Champaign, USA considered nucleation-elongation polymerization, a relatively unexplored avenue of this field offering some unique and interesting thermodynamic and kinetic attributes not found in the more classical mechanisms of polymer chemistry.<sup>19</sup> Professor Shunichi Fukuzumi, Osaka University, Japan gave us a new perspective of electron transfer chemistry, describing for fine control of electron transfer reactions including back electron transfer in the charge separated state of artificial photosynthetic compounds and its synthetic application.<sup>67</sup>



**Table 1** Further excellent organic chemistry and chemical biology articles from the RSC

<b>Synthetic organic</b>	
Renaissance of immobilized catalysts. New types of polymer-supported catalysts, ‘microencapsulated catalysts’, which enable environmentally benign and powerful high-throughput organic synthesis	33
Catalytic enantioselective allylation with chiral Lewis bases	34
Synthesis of novel chiral phosphinocyrhetryloxazoline ligands and their application in asymmetric catalysis	35
From central to planar chirality, the first example of atropenantioselective cycloetherification	36
Development of $\beta$ -keto-1,3-dithianes as versatile intermediates for organic synthesis	37
Tandem reactions, cascade sequences, and biomimetic strategies in total synthesis	38
Chiral base-mediated benzylic functionalisation of tricarbonylchromium(0) complexes of benzylamine derivatives	39
Combinatorial organic materials research (COMR): design, synthesis and screening of a 225-membered materials library of liquid crystalline fluorinated <i>p</i> -quaterphenyl	40
The use of enantiomerically pure ketene dithioacetal bis(sulfoxides) in highly diastereoselective intramolecular nitrono cycloadditions. Application in the total synthesis of the $\beta$ -amino acid (–)-cispentacin and the first asymmetric synthesis of <i>cis</i> -(3 <i>R</i> ,4 <i>R</i> )-4-amino-pyrrolidine-3-carboxylic acid	41
[2.2]Paracyclophane derivatives in asymmetric catalysis	42
Out of the oil bath and into the oven—microwave-assisted combinatorial chemistry heats up	43
The development and preparation of the 2,4-dimethoxybenzyl arylhydrazine (DMBAH) “latent” safety-catch linker: solid phase synthesis of ketopiperazines	44
Regioselective synthesis of [60]fullerene $\eta^5$ -indenide $R_3C_{60}^-$ and $\eta^5$ -cyclopentadienide $R_5C_{60}^-$ bearing different R groups	45
Highly diastereoselective 1,3-dipolar cycloaddition reactions of <i>trans</i> -2-methylene-1,3-dithiolane 1,3-dioxide with 3-oxidopyridinium and 3-oxidopyrylium betaines: a route to the tropane skeleton	46
Green oxidation with aqueous hydrogen peroxide	47
Formation of optically active chromanes by catalytic asymmetric tandem oxa-Michael addition–Friedel–Crafts alkylation reactions	48
A pincer auxiliary to force difficult lactamisations	49
The tethered aminohydroxylation (TA) reaction	50
Hydrophobic, low-loading and alkylated polystyrene-supported sulfonic acid for several organic reactions in water: remarkable effects of both the polymer structures and loading levels of sulfonic acids	51
SuperQuat <i>N</i> -acyl-5,5-dimethylloxazolidin-2-ones for the asymmetric synthesis of $\alpha$ -alkyl and $\beta$ -alkyl aldehydes	52
The Ireland–Claisen rearrangement as a probe for the diastereoselectivity of nucleophilic attack on a double bond adjacent to a stereogenic centre carrying a silyl group	53
Scope of the reductive aldol reaction: application to aromatic carbocycles and heterocycles	54
Polymer-assisted solution phase synthesis of the antihyperglycemic agent Rosiglitazone (Avandia <sup>®</sup> )	55
Atropisomers and near-atropisomers: achieving stereoselectivity by exploiting the conformational preferences of aromatic amides	56
Diversity-oriented synthesis; a challenge for synthetic chemists	57
The development of strategies and methods for the synthesis of biologically active compounds	58
Addition reactions of ROPHy/SOPHy oxime ethers: asymmetric synthesis of nitrogen containing compounds	59
<b>Physical organic</b>	
Assignment of absolute configuration of a chiral phenyl-substituted dihydrofuroangelicin	60
Structure–reactivity relationships in the inactivation of elastase by $\beta$ -sultams	61
Mechanistic aspects of transition metal catalysed 1,6-diene and 1,6-enyne cycloisomerisation reactions	62
A chemist’s view of the nitric oxide story	63
1,2-Chlorine atom migration in 3-chloro-2-butyl radicals: a computational study	64
The influence of hydrogen bonding interactions on the C–H bond activation step in class I ribonucleotide reductases	65
Kinetics and mechanism of the cyclization of $\omega$ -( <i>p</i> -nitrophenyl)-hydantoic acid amides: steric hindrance to proton transfer causes a $10^4$ -fold change in rate	66
New perspective of electron transfer chemistry	67
The mechanism and regioselectivity of the ene reactions of nitroso compounds: a theoretical study of reactivity, regioselectivity, and kinetic isotope effects establishes a stepwise path involving polarized diradical intermediates	68
High Bronsted $\beta_{nuc}$ values in $S_NAr$ displacement. An indicator of the SET pathway?	69
A theoretical (DFT, GIAO-NMR, NICS) study of the carbocations and oxidation dications from azulenes, homoazulene, benzazulenes, benzohomoazulenes, and the isomeric azulenoazulenes	70
The complexity of catalysis: origins of enantio- and diastereocontrol in sulfur ylide mediated epoxidation reactions	71
Mechanistic analogies amongst carbohydrate modifying enzymes	72
<b>Chemical biology</b>	
HIV-1 protease: mechanism and drug discovery	73
Enzymology of acyl chain macrocyclization in natural product biosynthesis	74
DNA recognition by the anthracycline antibiotic respinomycin D: NMR structure of the intercalation complex with d(AGACGTCT) <sub>2</sub>	75
Facilitated transport of sodium or potassium chloride across vesicle membranes using a ditopic salt-binding macrobicycle	76
Detection of a metallo- $\beta$ -lactamase (IMP-1) by fluorescent probes having dansyl and thiol groups	77
Peptides to peptidomimetics: towards the design and synthesis of bioavailable inhibitors of oligosaccharyl transferase	78
Polyhydroxyalkanoate (PHA) homeostasis: the role of the PHA synthase	79
Antisense oligonucleotides with oxetane-constrained cytidine enhance heteroduplex stability, and elicit satisfactory RNase H response as well as showing improved resistance to both <i>exo</i> and <i>endonucleases</i>	80
Metabolic engineering—a genetic toolbox for small molecule organic synthesis	81
Automated carbohydrate synthesis to drive chemical glycomics	82
Bicyclic nucleosides; stereoselective dihydroxylation and 2'-deoxygenation	83
Metallo-enzyme catalysis	84
Enzymatic optical resolution <i>via</i> acylation–hydrolysis on a solid support	85
A2-Rhodopsin: a new fluorophore isolated from photoreceptor outer segments	86
Discovery and optimization of non-steroidal FXR agonists from natural product-like libraries	86
Substituted tren-capped porphyrins: probing the influence of copper in synthetic models of cytochrome <i>c</i> oxidase	88
Oligonucleotides incorporating 8-aza-7-deazapurines: synthesis and base pairing of nucleosides with nitrogen-8 as a glycosylation position	89
Influence of saccharide size on the cellular immune response to glycopeptides	90
Reagents for (ir)reversible enzymatic acylations	91
Regulating transcription: a chemical perspective	92
Electrontransfer through DNA and metal-containing DNA	93

**Table 1** Further excellent organic chemistry and chemical biology articles from the RSC (*Continued*)

“The splice is right”: how protein splicing is opening new doors in protein science	94
Convergent synthesis and preliminary biological evaluations of the stilbenolignan ( $\pm$ )-aiphanol and various congeners	95
How can enzymes be so efficient?	96
Synthesis of potent CXCR4 inhibitors possessing low cytotoxicity and improved biostability based on T140 derivatives	97
Biomimetic studies on polyenes	98
Synthesis and evaluation of new potential HIV-1 non-nucleoside reverse transcriptase inhibitors. New analogues of MKC-442 containing Michael acceptors in the C-6 position	99
Chemical approaches to studying transcription	100
Enzymatic hydrogen atom abstraction from polyunsaturated fatty acids	101
Directed evolution of enzymes: new biocatalysts for asymmetric synthesis	102
The synthesis of peptides and proteins containing non-natural amino acids	103
Cyclopeptide alkaloids: chemistry and biology	104
<b>Supramolecular chemistry</b>	
Through-space interactions between face-to-face, center-to-edge oriented arenes: importance of polar- $\pi$ effects	105
A donor-acceptor substituted molecular motor: unidirectional rotation driven by visible light	106
Diazacoronand linked $\beta$ -cyclodextrin dimer complexes of Brilliant Yellow tetraanion and their sodium(i) analogues	107
Acetylenic scaffolding on solid support: poly(triacetylene)- derived oligomers by Sonogashira and Cadiot-Chodkiewicz-type cross-coupling reactions	108
Proton-sensitive fluorescent organogels	109
New strategies and building blocks for functionalised 9,10-bis(1,3-dithiol-2-ylidene)-9,10-dihydroanthracene derivatives, including pyrrolo-annelated derivatives and $\pi$ -extended systems with intramolecular charge-transfer	110
Challenges in the design of self replicating peptides	111
The aromatic sidechains of amino acids as neutral donor groups for alkali metal cations	112
Hydrophobic interactions and chemical reactivity	113
Molecular screening on a compact disc	114
Water soluble sapphyrins: potential fluorescent phosphate anion sensors	115
Oligonucleotide duplexes containing N <sup>8</sup> -glycosylated 8-aza-7-deazaguanine and self-assembly of 8-aza-7-deazapurines on the nucleoside and the oligomeric level	116
Medicinal chemistry in academia: molecular recognition with biological receptors	117
<b>Natural products</b>	
Diterpenoids	118
Marine natural products	119
Natural sesquiterpenoids	120
Quinoline, quinazoline and acridone alkaloids	121
A total synthesis of ( $\pm$ )-phomactin A	122
Total synthesis of (+)-phorboxazole A, a potent cytostatic agent from the sponge <i>Phorbas</i> sp.	123
Synthesis of (-)-Gloeosporone, a fungal autoinhibitor of spore germination using a $\pi$ -allyltricarboxyliron lactone complex as a templating architecture for 1,7-diol construction	124
The tethered Biginelli condensation in natural product synthesis	125
Natural products active against African trypanosomes: a step towards new drugs	126
Chemistry of heterocyclic compounds, oxazoles: synthesis, reactions, and spectroscopy, part A	127

## References

- 1 S. E. Adams, J. M. Goodman, R. J. Kidd, A. D. McNaught, P. Murray-Rust, F. R. Norton, J. A. Townsend and C. A. Waudby, *Org. Biomol. Chem.*, 2004, **2**, 3067.
- 2 P. R. Hewitt, E. Cleator and S. V. Ley, *Org. Biomol. Chem.*, 2004, **2**, 2415.
- 3 B. K. Carpenter, *Org. Biomol. Chem.*, 2004, **2**, 103.
- 4 Y. Sasaki, R. Shukla and B. D. Smith, *Org. Biomol. Chem.*, 2004, **2**, 214.
- 5 J. Olsen, P. Seiler, B. Wagner, H. Fischer, T. Tschopp, U. Obst-Sander, D. W. Banner, M. Kansy, K. Müller and F. Diederich, *Org. Biomol. Chem.*, 2004, **2**, 1339.
- 6 S. Ladame, J. A. Schouten, J. Stuart, J. Roldan, S. Neidle and S. Balasubramanian, *Org. Biomol. Chem.*, 2004, **2**, 2925.
- 7 R. A. van Delden, M. K. J ter Wiel, H. de Jong, A. Meetsma and B. L. Feringa, *Org. Biomol. Chem.*, 2004, **2**, 1531.
- 8 L. A. Estroff, L. Addadi, S. Weiner and A. D. Hamilton, *Org. Biomol. Chem.*, 2004, **2**, 137.
- 9 P. Wipf, B. Joo, T. Nguyen and J. S. Lazo, *Org. Biomol. Chem.*, 2004, **2**, 2173.
- 10 C. Dose and O. Seitz, *Org. Biomol. Chem.*, 2004, **2**, 59.
- 11 T. Ooi, T. Miura, K. Ohmatsu, A. Saito and K. Maruoka, *Org. Biomol. Chem.*, 2004, **2**, 3312.
- 12 N. Khidekel and L. C. Hsieh-Wilson, *Org. Biomol. Chem.*, 2004, **2**, 1.
- 13 J. Wengel, *Org. Biomol. Chem.*, 2004, **2**, 277.
- 14 H. Miyabe and T. Naito, *Org. Biomol. Chem.*, 2004, **2**, 1267.
- 15 C. Jacob, A. L. Holme and F. H. Fry, *Org. Biomol. Chem.*, 2004, **2**, 1953.
- 16 B. Plietker and M. Niggemann, *Org. Biomol. Chem.*, 2004, **2**, 2403.
- 17 M. S. Sigman and M. J. Schultz, *Org. Biomol. Chem.*, 2004, **2**, 2551.
- 18 S. K. Silverman, *Org. Biomol. Chem.*, 2004, **2**, 2701.
- 19 J. S. Moore, *Org. Biomol. Chem.*, 2003, **1**, 3471.
- 20 A. H. Hoveyda, *Org. Biomol. Chem.*, 2004, **2**, 8.
- 21 H. Imahori, *Org. Biomol. Chem.*, 2004, **2**, 1425.
- 22 M. Nahmany and A. Melman, *Org. Biomol. Chem.*, 2004, **2**, 1563.
- 23 M. Inoue, *Org. Biomol. Chem.*, 2004, **2**, 1811.
- 24 O. A. Kent and A. M. MacMillan, *Org. Biomol. Chem.*, 2004, **2**, 1957.
- 25 K.-H. Altmann, *Org. Biomol. Chem.*, 2004, **2**, 2137.
- 26 L. A. Amos, *Org. Biomol. Chem.*, 2004, **2**, 2153.
- 27 V. L. Y. Yip and S. G. Withers, *Org. Biomol. Chem.*, 2004, **2**, 2707.
- 28 L. C. Palmer and J. Rebek, Jr., *Org. Biomol. Chem.*, 2004, **2**, 3051.
- 29 H. Cooke, *Org. Biomol. Chem.*, 2004, **2**, 3179.
- 30 P. Murray-Rust, H. S. Rzepa, S. M. Tyrrell and Y. Zhang, *Org. Biomol. Chem.*, 2004, **2**, 3192.
- 31 A. Bender and R. C. Glen, *Org. Biomol. Chem.*, 2004, **2**, 3204.
- 32 A. Mulder, J. Huskens and D. N. Reinhoudt, *Org. Biomol. Chem.*, 2004, **2**, 3409.
- 33 S. Kobayashi and R. Akiyama, *Chem. Commun.*, 2003, 449.
- 34 S. E. Denmark and J. Fu, *Chem. Commun.*, 2003, 167.
- 35 C. Bolm, L. Xiao and M. Kesselgruber, *Org. Biomol. Chem.*, 2003, **1**, 145.
- 36 G. Islas-Gonzalez, M. Bois-Choussy and J. Zhu, *Org. Biomol. Chem.*, 2003, **1**, 30.
- 37 M. J. Gaunt, H. F. Sneddon, P. R. Hewitt, P. Orsini, D. F. Hook and S. V. Ley, *Org. Biomol. Chem.*, 2003, **1**, 15.
- 38 K. C. Nicolaou, T. Montagnon and S. A. Snyder, *Chem. Commun.*, 2003, 551.
- 39 S. E. Gibson and M. H. Smith, *Org. Biomol. Chem.*, 2003, **1**, 676.
- 40 O. Deeg and P. Bäuerle, *Org. Biomol. Chem.*, 2003, **1**, 1609.
- 41 V. K. Aggarwal, S. Roseblade and R. Alexander, *Org. Biomol. Chem.*, 2003, **1**, 684.

- 42 S. E. Gibson and J. D. Knight, *Org. Biomol. Chem.*, 2003, **1**, 1256.
- 43 H. E. Blackwell, *Org. Biomol. Chem.*, 2003, **1**, 1251.
- 44 F. Berst, A. B. Holmes and M. Ladlow, *Org. Biomol. Chem.*, 2003, **1**, 1711.
- 45 M. Toganoh, K. Suzuki, R. Udagawa, A. Hirai, M. Sawamura and E. Nakamura, *Org. Biomol. Chem.*, 2003, **1**, 2604.
- 46 V. K. Aggarwal, R. S. Grainger, G. K. Newton, P. L. Spargo, A. D. Hobson and H. Adams, *Org. Biomol. Chem.*, 2003, **1**, 1884.
- 47 R. Noyori, M. Aoki and K. Sato, *Chem. Commun.*, 2003, 1977.
- 48 H. L. van Lingen, W. Zhuang, T. Hansen, F. P. J. T. Rutjes and K. A. Jørgensen, *Org. Biomol. Chem.*, 2003, **1**, 1953.
- 49 H. Bieräugel, H. E. Schoemaker, H. Hiemstra and J. H. van Maarseveen, *Org. Biomol. Chem.*, 2003, **1**, 1830.
- 50 T. J. Donohoe, P. D. Johnson and R. J. Pye, *Org. Biomol. Chem.*, 2003, **1**, 2025.
- 51 S. Iimura, K. Manabe and S. Kobayashi, *Org. Biomol. Chem.*, 2003, **1**, 2416.
- 52 S. D. Bull, S. G. Davies, R. L. Nicholson, H. J. Sanganeer and A. D. Smith, *Org. Biomol. Chem.*, 2003, **1**, 2886.
- 53 M. S. Betson and I. Fleming, *Org. Biomol. Chem.*, 2003, **1**, 4005.
- 54 T. J. Donohoe, D. House and K. W. Ace, *Org. Biomol. Chem.*, 2003, **1**, 3749.
- 55 X. Li, C. Abell, B. H. Warrington and M. Ladlow, *Org. Biomol. Chem.*, 2003, **1**, 4392.
- 56 J. Clayden, *Chem. Commun.*, 2004, 127.
- 57 D. R. Spring, *Org. Biomol. Chem.*, 2003, **1**, 3867.
- 58 A. Nelson, *New J. Chem.*, 2004, **28**, 771.
- 59 C. J. Moody, *Chem. Commun.*, 2004, 1341.
- 60 G. Pescitelli, N. Berova, T. L. Xiao, R. V. Rozhkov, R. C. Larock and D. W. Armstrong, *Org. Biomol. Chem.*, 2003, **1**, 186.
- 61 P. S. Hinchliffe, J. Matthew Wood, A. M. Davis, R. P. Austin, R. P. Beckett and M. I. Page, *Org. Biomol. Chem.*, 2003, **1**, 67.
- 62 G. C. Lloyd-Jones, *Org. Biomol. Chem.*, 2003, **1**, 215.
- 63 D. Lyn H. Williams, *Org. Biomol. Chem.*, 2003, **1**, 441.
- 64 B. Neumann and H. Zipse, *Org. Biomol. Chem.*, 2003, **1**, 168.
- 65 H. Zipse, *Org. Biomol. Chem.*, 2003, **1**, 692.
- 66 V. T. Angelova, A. J. Kirby, A. H. Koedjikov and I. G. Pojarlieff, *Org. Biomol. Chem.*, 2003, **1**, 859.
- 67 S. Fukuzumi, *Org. Biomol. Chem.*, 2003, **1**, 609.
- 68 A. G. Leach and K. N. Houk, *Org. Biomol. Chem.*, 2003, **1**, 1389.
- 69 F. Terrier, M. Mokhtari, R. Goumont, J.-C. Hallé and E. Buncel, *Org. Biomol. Chem.*, 2003, **1**, 1757.
- 70 T. Okazaki and K. K. Laali, *Org. Biomol. Chem.*, 2003, **1**, 3078.
- 71 V. K. Aggarwal and J. Richardson, *Chem. Commun.*, 2003, 2644.
- 72 L. L. Lairson and S. G. Withers, *Chem. Commun.*, 2004, 2243.
- 73 A. Brik and C.-H. Wong, *Org. Biomol. Chem.*, 2003, **1**, 5.
- 74 R. M. Kohli and C. T. Walsh, *Chem. Commun.*, 2003, 297.
- 75 M. S. Searle, A. J. Maynard and H. E. L. Williams, *Org. Biomol. Chem.*, 2003, **1**, 60.
- 76 A. V. Koulov, J. M. Mahoney and B. D. Smith, *Org. Biomol. Chem.*, 2003, **1**, 27.
- 77 H. Kurosaki, H. Yasuzawa, Y. Yamaguchi, W. Jin, Y. Arakawa and M. Goto, *Org. Biomol. Chem.*, 2003, **1**, 17.
- 78 E. Weerapana and B. Imperiali, *Org. Biomol. Chem.*, 2003, **1**, 93.
- 79 J. Stubbe and J. Tian, *Nat. Prod. Rep.*, 2003, **20**, 445.
- 80 P. I. Pradeepkumar, N. V. Amirkhanov and J. Chattopadhyaya, *Org. Biomol. Chem.*, 2003, **1**, 81.
- 81 M. D. Burkart, *Org. Biomol. Chem.*, 2003, **1**, 1.
- 82 P. H. Seeberger, *Chem. Commun.*, 2003, 1115.
- 83 J. Ravn, M. Freitag and P. Nielsen, *Org. Biomol. Chem.*, 2003, **1**, 811.
- 84 R. J. P. Williams, *Chem. Commun.*, 2003, 1109.
- 85 R. V. Ulijn, N. Bisek and S. L. Flitsch, *Org. Biomol. Chem.*, 2003, **1**, 621.
- 86 N. Fishkin, Y.-P. Jang, Y. Itagaki, J. R. Sparrow and K. Nakanishi, *Org. Biomol. Chem.*, 2003, **1**, 1101.
- 87 K. C. Nicolaou, R. M. Evans, A. J. Roecker, R. Hughes, M. Downes and J. A. Pfefferkorn, *Org. Biomol. Chem.*, 2003, **1**, 908.
- 88 A. Didier, M. L'Her and B. Boitrel, *Org. Biomol. Chem.*, 2003, **1**, 1274.
- 89 J. He and F. Seela, *Org. Biomol. Chem.*, 2003, **1**, 1873.
- 90 M. Mogemark, T. P. Cirrito, P. Sjölin, E. R. Unanue and J. Kihlberg, *Org. Biomol. Chem.*, 2003, **1**, 2063.
- 91 U. Hanefeld, *Org. Biomol. Chem.*, 2003, **1**, 2405.
- 92 A. K. Mapp, *Org. Biomol. Chem.*, 2003, **1**, 2217.
- 93 T. Carell, C. Behrens and J. Gierlich, *Org. Biomol. Chem.*, 2003, **1**, 2221.
- 94 E. C. Schwartz, T. W. Muir and A. B. Tyszkiewicz, *Chem. Commun.*, 2003, 2087.
- 95 M. G. Banwell, A. Bezos, S. Chand, G. Dannhardt, W. Kiefer, U. Nowe, C. R. Parish, G. Paul Savage and H. Ulbrich, *Org. Biomol. Chem.*, 2003, **1**, 2427.
- 96 D. H. Williams, E. Stephens and M. Zhou, *Chem. Commun.*, 2003, 1973.
- 97 H. Tamamura, K. Hiramatsu, S. Kusano, S. Terakubo, N. Yamamoto, J. O. Trent, Z. Wang, S. C. Peiper, H. Nakashima, A. Otaka and N. Fujii, *Org. Biomol. Chem.*, 2003, **1**, 3656.
- 98 J. E. Moses, J. E. Baldwin, S. Brückner, S. J. Eade and R. M. Adlington, *Org. Biomol. Chem.*, 2003, **1**, 3670.
- 99 L. Petersen, C. H. Jessen, E. B. Pedersen and C. Nielsen, *Org. Biomol. Chem.*, 2003, **1**, 3541.
- 100 R. V. Weatherman, *Org. Biomol. Chem.*, 2003, **1**, 3257.
- 101 C. M. McGinley and W. A. van der Donk, *Chem. Commun.*, 2003, 2843.
- 102 M. Alexeeva, R. Carr and N. J. Turner, *Org. Biomol. Chem.*, 2003, **1**, 4133.
- 103 D. R. W. Hodgson and J. M. Sanderson, *Chem. Soc. Rev.*, 2004, **33**, 422.
- 104 M. M. Joullié and D. J. Richard, *Chem. Commun.*, 2004, 2011.
- 105 F. Cozzi, R. Annunziata, M. Benaglia, M. Cinquini, L. Raimondi, K. K. Baldrige and J. S. Siegel, *Org. Biomol. Chem.*, 2003, **1**, 157.
- 106 R. A. van Delden, N. Koumura, A. Schoevaars, A. Meetsma and B. L. Feringa, *Org. Biomol. Chem.*, 2003, **1**, 33.
- 107 L. C. West, O. Wyness, B. L. May, P. Clements, S. F. Lincoln and C. J. Easton, *Org. Biomol. Chem.*, 2003, **1**, 887.
- 108 N. F. Utesch and F. Diederich, *Org. Biomol. Chem.*, 2003, **1**, 237.
- 109 K. Sugiyasu, N. Fujita, M. Takeuchi, S. Yamada and S. Shinkai, *Org. Biomol. Chem.*, 2003, **1**, 895.
- 110 C. A. Christensen, M. R. Bryce, A. S. Batsanov and J. Becher, *Org. Biomol. Chem.*, 2003, **1**, 511.
- 111 X. Li and J. Chmielewski, *Org. Biomol. Chem.*, 2003, **1**, 901.
- 112 G. W. Gokel, *Chem. Commun.*, 2003, 2847.
- 113 S. Otto and J. B. F. N. Engberts, *Org. Biomol. Chem.*, 2003, **1**, 2809.
- 114 J. J. La Clair and M. D. Burkart, *Org. Biomol. Chem.*, 2003, **1**, 3244.
- 115 J. L. Sessler, J. M. Davis, V. Král, T. Kimbrough and V. Lynch, *Org. Biomol. Chem.*, 2003, **1**, 4113.
- 116 F. Seela and R. Kröschel, *Org. Biomol. Chem.*, 2003, **1**, 3900.
- 117 F. Hof and F. Diederich, *Chem. Commun.*, 2004, 484.
- 118 J. R. Hanson, *Nat. Prod. Rep.*, 1983, 70.
- 119 J. W. Blunt, B. R. Copp, M. H. G. Munro, P. T. Northcote and M. R. Prinsep, *Nat. Prod. Rep.*, 2003, **20**, 1.
- 120 B. M. Fraga, *Nat. Prod. Rep.*, 2003, **20**, 392.
- 121 J. P. Michael, *Nat. Prod. Rep.*, 2003, **20**, 476.
- 122 C. M. Diaper, W. P. D. Goldring and G. Pattenden, *Org. Biomol. Chem.*, 2003, **1**, 3949.
- 123 G. Pattenden, M. A. González, P. B. Little, D. S. Millan, A. T. Plowright, J. A. Tornos and T. Ye, *Org. Biomol. Chem.*, 2003, **1**, 4173.
- 124 S. V. Ley, E. Cleator, J. Harter and C. J. Hollowood, *Org. Biomol. Chem.*, 2003, **1**, 3263.
- 125 Z. D. Aron and L. E. Overman, *Chem. Commun.*, 2004, 253.
- 126 S. Hoet, F. Opperdoes, R. Brun and J. Quetin-Leclercq, *Nat. Prod. Rep.*, 2004, **21**, 353.
- 127 V. Snieckus, *Nat. Prod. Rep.*, 2004, **21**, E9.