UNIVERSITÉ DE NANTES
FACULTÉ DES SCIENCES ET TECHNIQUES

Chimie Et Interdisciplinarité Synthèse, Analyse, Modélisation
CEISAM
UMR CNRS 6230
UNIVERSITÉ DE NANTES

cnrs

Conférence – CEISAM – UMR CNRS 6230

Jeudi 12 Juin 2014
10h30 - Salle Marie Curie

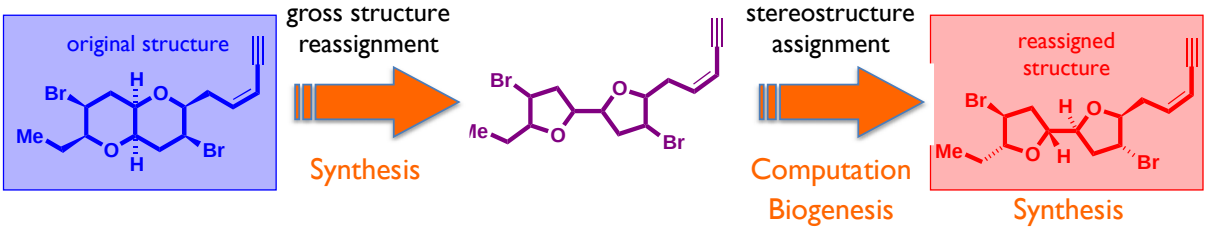
Jonathan BURTON

Department of Chemistry - University of Oxford.

"Adventures in Natural Products Chemistry: Methodology, Synthesis, Structure Determination"

In the first part of the 20th century, the structure determination of natural products was a laborious task that involved the degradation and derivatization of gram quantities of material to provide structure information, followed by total synthesis for structure confirmation. Nowadays, the structure determination of complex molecules, including natural products, is routinely achieved on milligram quantities of material using high-field NMR experiments and, where applicable, X-ray crystallographic analysis. Despite these powerful techniques, the structure assignment of complex natural products remains challenging and total synthesis still plays a role in structure confirmation and structure determination. More recently, the use of DFT methods to calculate the spectroscopic properties of organic molecules (particularly NMR chemical shifts) has emerged as a powerful additional tool for structure determination.

Recently, we reported the total synthesis of the originally proposed structure of a small halogenated marine natural product isolated from *Laurencia* species and proposed that the actual structure was a 2,2'-bifuranyl rather than a pyrano[3,2*b*]pyran.[1] On the basis of a reasonable biogenesis, coupled with DFT calculations of ^{13}C NMR chemical shifts (collaboration with Dr Jonathan Goodman (Cambridge) and Dr Robert Paton (Oxford)),[2] we predicted the stereostructure of elatenyne as one out of 32 possible diastereomers and confirmed this prediction by two independent total syntheses (collaboration with Prof. Deukjoon Kim (SNU)).[3] The power of this combined biogenetic/computational/synthetic approach for structure determination will be further exemplified with a number of other, structurally related, natural products.[4]



Acknowledgement
We thank the Royal Society, the EPSRC, and GlaxoSmithKline for funding.

References

1. Sheldrake, H. M.; Jamieson, C.; Burton, J. W. The changing faces of halogenated marine natural products: Total synthesis of the reported structures of elatenyne and an enyne from *Laurencia majuscula*. *Angew. Chem. Int. Ed.* **2006**, *45*, 7199-7202.
2. Smith, S. G.; Paton, R. S.; Burton, J. W.; Goodman, J. M. Stereostructure assignment of flexible five-membered rings by GIAO ^{13}C NMR calculations: Prediction of the stereochemistry of elatenyne. *J. Org. Chem.* **2008**, *73*, 4053-4062.
3. Dyson, B. S.; Burton, J. W.; Sohn, T. I.; Kim, B.; Bae, H.; Kim, D. Total synthesis and structure confirmation of elatenyne: success of computational methods for NMR prediction with highly flexible diastereomers. *J. Am. Chem. Soc.* **2012**, *134*, 11781-11790.
4. Shepherd, D. J.; Broadwith, P. A.; Dyson, B. S; Paton, R. S; Burton, J. W. Structure Reassignment of Laurefurenynes A and B by Computation and Total Synthesis. *Chem. Eur. J.*, **2013**, *19*, 12644-12648.

Contact CEISAM : fabrice.denes@univ-nantes.fr – 02 76 64 51 78