

### Group project: Critical reading of a published organic chemistry paper

New science is communicated in many ways: at conferences, through seminar talks, over the web. The primary method, however, for years to come is the **journal**. A journal is a publication in which the articles are written by researchers in a particular discipline, discussing their latest research. Typically, journal articles are not solicited by the journal; instead authors submit **manuscripts** to the journal editor.

The organization of a journal consists of a chief editor (who sets the tone and style of the journal, and receives manuscripts from authors and forwards them to the appropriate associate editor), several associate editors (who guide manuscripts through cycles of revision, usually in their subdiscipline) and an editorial board (who are experts in various fields who help determine the direction and content of the journal). In addition, there are outside reviewers — researchers who study some of the same problems as the manuscript author, but who are not connected to the journal — who review the content of submitted manuscripts and recommend that the manuscript be accepted, revised or rejected.

Thus, by the time an issue of a journal is ready (typically, a new journal issue appears weekly to quarterly), the manuscript (called a **paper** once it is published) has been read and commented upon by many experts. In theory, this represents the best possible science.

Of course, papers are published with flaws, some intentional, some not. The intentional flaws include not exhaustively exploring every interpretation of an experimental result and not designing an experiment to test every set of conditions. Often, the result of the experiments that were done were so interesting that journal editors and reviewers give a pass on the flaws just so the results will reach a wider audience.

The journal I've chosen for this project is titled *Organic and Biomolecular Chemistry*, which is published by the Royal Society of Chemistry (United Kingdom). The reason for this choice is that the papers published are cutting-edge (though I've chosen ones from 2003), scientifically interesting and, more importantly, the journal has a strong web component. The papers (both articles and communications) are available at:

<http://www.rsc.org/Publishing/Journals/OB/Index.asp>

and you can access any of the chosen papers below by clicking on the "Browse Issues" link on the left side, then using the pull-down menus and the page numbers to arrive at the abstract. Once you've clicked on the abstract, the pdf of the paper itself is available, as well as a couple of other nice features.

In this project, you and two colleagues will select a published paper and read it thoroughly. Then, your team will lead a roundtable discussion with the rest of the class about the paper. The rest of the class, you can assume, will have read the abstract of the paper but nothing else about the topic.

*The project:*

- Choose one of the papers below (or you may choose another paper from the journal, but let me know before you go too deeply into it) and submit a sheet of paper with the paper reference and the names of the people on your team. This should be done by **Thursday, May 1**.
- All team members should read the full paper (not just the abstract) with an eye to leading the discussion on the following key points:
  - What problem were the authors of the paper working on? In other words, why was their topic interesting to chemists?
  - What did the authors do? A short summary is all that is required. If the paper topic involves a synthesis of a compound or compounds, how did the authors *identify* and *characterize* the product?
  - How does the paper tie in to topics we've covered this quarter (or previous quarters) in organic chemistry?
  - What did the authors believe to be key unsolved questions about their topic, even after they did the research? Did anyone ever undertake it? (This last question can be answered by one of the nice features on the OBC website.)
  - If there are any words or phrases in the abstract that are unfamiliar to the typical organic chemistry student, you should define and/or illustrate it.
- Prepare a one-page handout that includes the key points you will cover. Include a synthesis or scheme if it will help clarify what you will say. ***You cannot use any other visual presentation method*** (e.g., no Powerpoint, no overheads).
- Lead the ten-minute discussion on Tuesday evening, June 3. Answer questions from the other students to the best of your ability.

This project is worth 50 points.

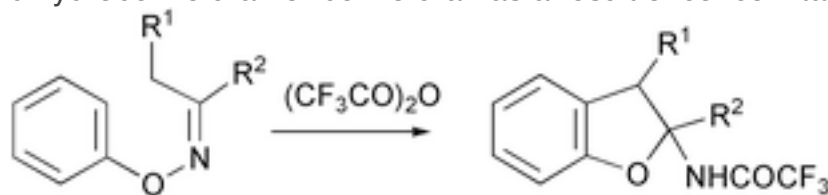
The abstracts:

1. *Org. Biomol. Chem.*, 2003, **1**, 254 - 256, DOI: 10.1039/b210059b

## Efficient [3,3]-sigmatropic rearrangement accelerated by a trifluoroacetyl group: synthesis of benzofurans under mild conditions

Okiko Miyata, Norihiko Takeda, Yoshiaki Morikami and Takeaki Naito

The [3,3]-sigmatropic rearrangement took place smoothly during the course of trifluoroacetylation of *O*-phenyloxime at below room temperature to give the dihydrobenzofuran or benzofuran as a result of concomitant cyclization.

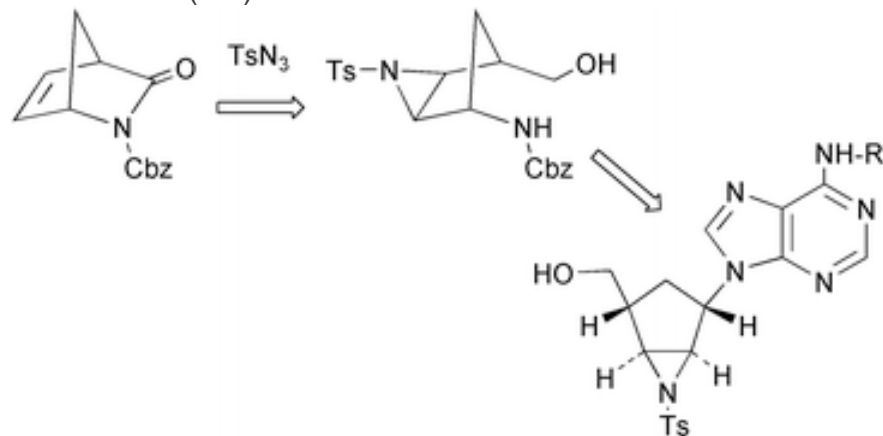


2. *Org. Biomol. Chem.*, 2003, **1**, 452 - 453, DOI: 10.1039/b210963h

## First synthesis of 2,3-epimino-carbocyclic nucleosides

Minoru Ishikura, Atsushi Murakami and Nobuya Katagiri

The preparation of 2,3-epimino-carbocyclic analogues of adenosine is reported. The reaction of *p*-tosyl azide with *N*-substituted 2-azabicyclo[2.2.1]hept-5-en-3-one (ABH) (**1a**) provided aziridine-fused ABH (**2**), which was converted to 2,3-epimino-carbocyclic nucleosides (**11**).



3. *Org. Biomol. Chem.*, 2003, 1, 457 - 459, DOI: 10.1039/b210497k

## Enhanced interactions in $\alpha,\beta$ -unsaturated carbonyls

Lisa D. Harris, James A. Platts and Nicholas C. O. Tomkinson

High level *ab initio* calculations on complexes of benzene with acrolein and ethene reveal that interactions to electron deficient acrolein are remarkably similar to those found in the benzene dimer.

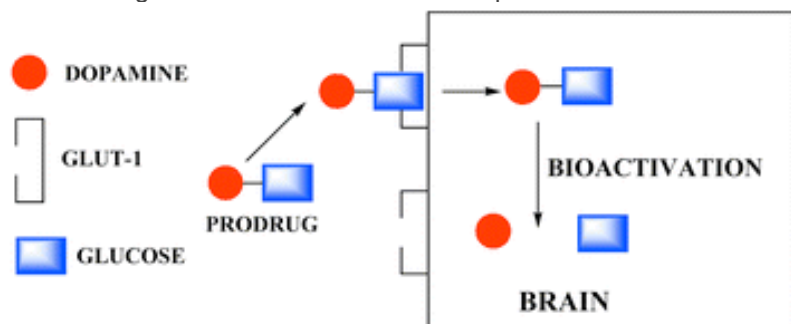


4. *Org. Biomol. Chem.*, 2003, 1, 767 - 771, DOI: 10.1039/b212066f

## Synthesis of glycosyl derivatives as dopamine prodrugs: interaction with glucose carrier GLUT-1

Caridad Fernández, Ofelia Nieto, José Angel Fontenla, Emilia Rivas, María L. de Ceballos and Alfonso Fernández-Mayoralas

Glucosyl dopamine (DA) derivatives may represent a new class of DA prodrugs that would interact with glucose transporter GLUT-1, present in the blood–brain barrier, and generate DA in the brain. Therefore, compounds bearing the sugar moiety linked to either the amino group or the catechol ring of DA through amide, ester, carbamate, peptide or glycosidic bonds were synthesized. The behavior of the compounds as prodrugs was monitored in different media and the affinity of the glycoconjugates for the glucose carrier GLUT-1 using human erythrocytes was also studied. Most of the compounds were markedly stable in buffer and plasma, and several compounds released DA when incubated with brain extracts and the rate was related to the bond linking DA with glucose. The new glucosyl conjugates substituted at the C-6 position of the sugar were more potent inhibitors of glucose transport when compared to C-1 and C-3 substituted derivatives. This work provides structure–activity information about the interaction of substituted glucose with the GLUT-1 transporter.

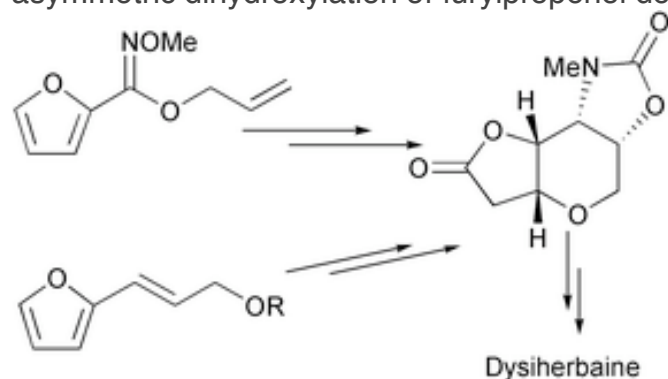


5. *Org. Biomol. Chem.*, 2003, 1, 772 - 774, DOI: 10.1039/b212556k

## A convenient route to the furopyran core of dysiherbaine

Okiko Miyata, Ryuichi Iba, Jun Hashimoto and Takeaki Naito

The bicyclic core, furo[3,2-*b*]pyran, of the dysiherbaines has been synthesized *via* two routes involving the imino 1,2-Wittig rearrangement of allyl furohydroximate and the asymmetric dihydroxylation of furylpropenol derivative.



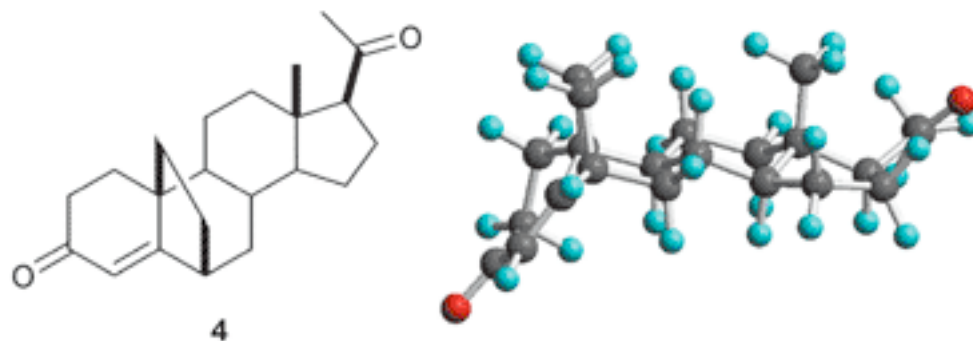
6. *Org. Biomol. Chem.*, 2003, 1, 939 - 943, DOI: 10.1039/b211974a

## 6,19-Carbon-bridged steroids. Synthesis of 6,19-methanoprogesterone

María Joselevich, Alberto A. Ghini and Gerardo Burton

6,19-Methanoprogesterone (4) was synthesized in nine steps from the readily available 3,20-diacetyloxy-5-bromo-6,19-oxidopregnane (5) in 14% overall yield. The additional carbon atom was introduced by reaction of a C-19 aldehyde with  $\text{Ph}_3\text{PCHOCH}_3$  under salt free conditions and subsequent hydrolysis to give the homologous aldehyde.

Intramolecular addition of the newly incorporated carbonyl (C-19a) to the olefinic C-6 in ring B was achieved by means of a Prins reaction with  $\text{TiCl}_4$  as Lewis acid.

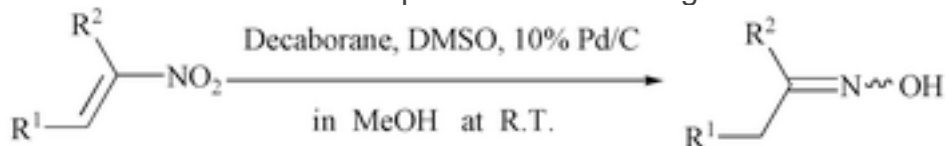


7. *Org. Biomol. Chem.*, 2003, 1, 1099 - 1100, DOI: 10.1039/b212746f

# Catalytic transfer hydrogenation of conjugated nitroalkenes using decaborane: synthesis of oximes

Seung Hwan Lee, Yong June Park and Cheol Min Yoon

$\alpha,\beta$ -Unsaturated nitroalkenes are readily reduced to the corresponding aldoximes and ketoximes in good yields, using a system of decaborane ( $B_{10}H_{14}$ ) and DMSO in methanol in the presence of 10% at room temperature under nitrogen.



$R^1$  = aliphatic or aromatics

$R^2$  = H or  $CH_3$

Pd/C  $R^1 = R^2 = (CH_2)_4$

8. *Org. Biomol. Chem.*, 2003, 1, 1151 - 1156, DOI: 10.1039/b212232d

# A novel approach of cycloaddition of difluorocarbene to $\alpha,\beta$ -unsaturated aldehydes and ketones: synthesis of *gem*-difluorocyclopropyl ketones and 2-fluorofurans

Wei Xu and Qing-Yun Chen

A series of *gem*-difluorocyclopropyl acetals and ketals are easily obtained in moderate yields from the [1+2] cycloaddition of difluorocarbene to 1,3-dioxolanes of  $\alpha,\beta$ -unsaturated aromatic aldehydes and ketones. Hydrolysis of these fluorinated compounds under acidic conditions either gives the corresponding *gem*-difluorocyclopropyl ketones or 1-aryl-2-fluorofuran derivatives through intramolecular carbonium rearrangement with simultaneous ring cleavage.

