



# Swiss Science Concentrates

A CHIMIA Column

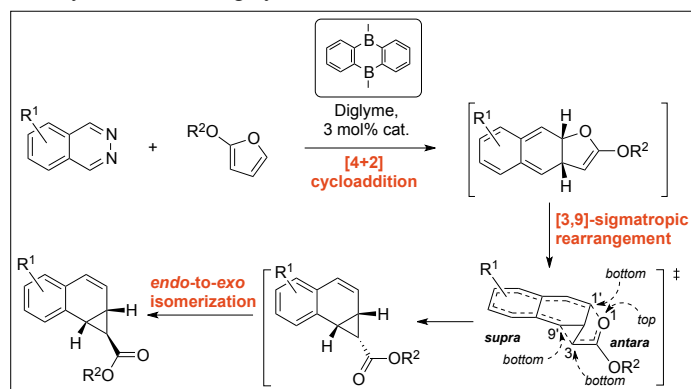
Short Abstracts of Interesting Recent Publications of Swiss Origin

## Domino Inverse Electron-Demand Diels–Alder / Cyclopropanation Reaction of Diazines Catalyzed by a Bidentate Lewis Acid

Simon N. Kessler, Markus Neuburger, and Hermann A. Wegner\*, *J. Am. Chem. Soc.* **2012**, *134*, 17885.

University of Basel

Catalytic domino reactions which form multiple bonds are a promising strategy to assemble complex architectures in an efficient and economic way. The paper by Wegner and co-workers relies on an inverse electron demand Diels-Alder reaction of diazines with furans, catalyzed by a bidentate Lewis acid. The [4+2] cycloaddition is followed by a cyclopropanation step, which proceeds in perfect diastereoselectivity. This new domino sequence thus presents an efficient way to install a cyclopropane moiety into fused ring systems.

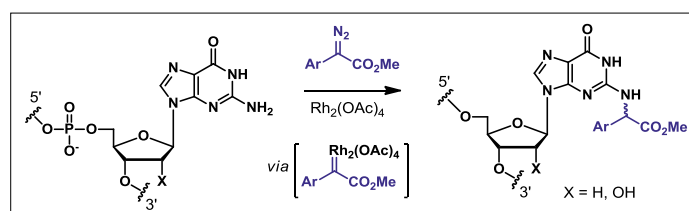


## Structure-Selective Catalytic Alkylation of DNA and RNA

Kiril Tishinov, Kristina Schmidt, Daniel Häussinger, and Dennis G. Gillingham\*, *Angew. Chem. Int. Ed.* **2012**, *51*, 12000.

University of Basel

The selective modification of nucleic acids is important for a better understanding of their functions and for potential applications in contexts other than molecular biology. In this paper the authors report on the use of di-rhodium carbenoids to alkylate selectively unpaired nucleobases such as those positioned in single strands, turn regions and overhangs of oligonucleotides. Importantly, the nucleic acids present in double-stranded sequences were not alkylated, thus providing a useful method for the structure-selective modification of DNA and RNA.

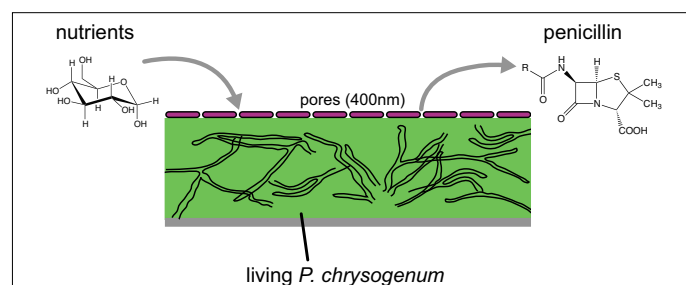


## Incorporation of Penicillin-Producing Fungi into Living Materials to Provide Chemically Active and Antibiotic-Releasing Surfaces

L. C. Gerber, F. M. Koehler, R. N. Grass, and W. J. Stark\*, *Angew. Chem.* **2012**, *124*, 11455.

ETH Zürich

Antimicrobial surfaces can play a major role to combat the spread of bacteria, e.g. in hospitals. However, most surface coatings that kill bacteria rely on the release of active ingredients, such as antibiotics, and will lose their activity once the reservoir is exhausted. The authors now present a surface that circumvents this problem. Penicillin-producing fungi were confined into a thin agar layer, sandwiched between a polymeric support and a nanoporous membrane. Substrates for the bio-synthesis of the antibiotic could access the fungi, and antibiotic was released into the surrounding medium through the porous membrane. The material produced at least 200 ng penicillin  $\text{ml}^{-1}\cdot\text{h}^{-1}$ , which was enough to kill the bacteria *S. carnosus*. Such 'living' materials could also become useful to integrate the synthesis of chemicals into functional materials.



## Chiral Cyclopentadienyl Ligands as Stereocontrolling Element in Asymmetric C–H Functionalization

B. Ye and N. Cramer, *Science* **2012**, *338*, 504.

EPFL

Cyclopentadienyl-derivatives (Cp), while widely exploited as ancillary ligands, have found little use as enantiopure ligands in piano-stool-catalyzed transformations. An ingenious ligand design, which addresses all the necessary control elements for efficient stereoinduction, is presented by Ye and Cramer. Bulky substituents in a  $C_2$ -symmetric Cp derivative shield one face of the complex, restricting the approach of a benzamide substrate to the opposite face. Additional substituents, perpendicular to the Cp plane, favor the coordination of a prochiral olefin into a single orientation. The resulting Rh(III)-catalyzed benzannulation, via a C–H activation step, proceeds with excellent enantioselectivities. Considering the versatility of piano-stool complexes in catalysis, this elegant Cp design promises to reinvigorate the field.

