SF KIRSCH GROUP

BERGISCHE UNIVERSITÄT WUPPERTAL

Fields of research - 2012

Complex molecules: Seeking simple methods for their synthesis and their post-synthetic modifications

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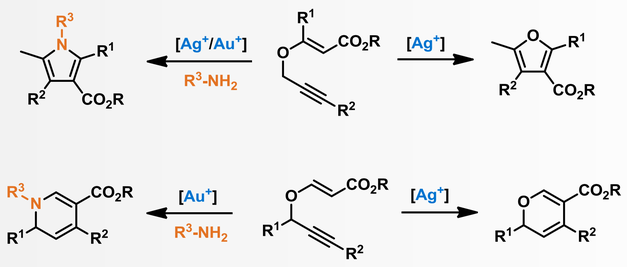
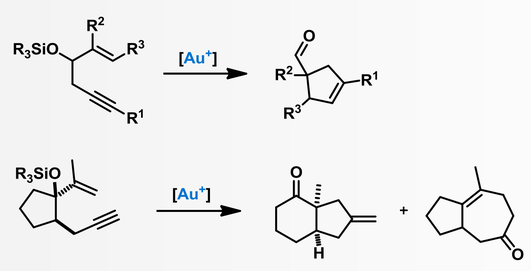
Methodology

Formation of hetero- and carbocycles via π-activation

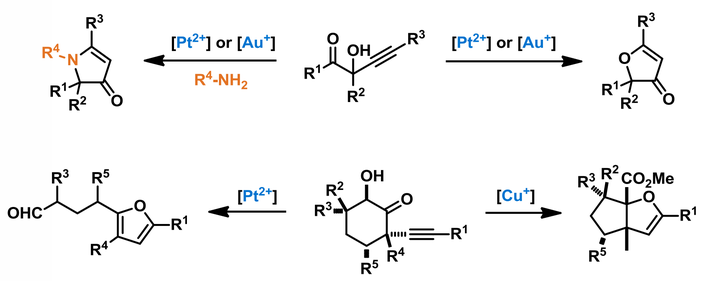
Transition-metal-induced cascade reactions of propargyl vinyl ethers involving sigmatropic rearrangement and cyclization steps offer access to a variety of highly substituted heterocycles.



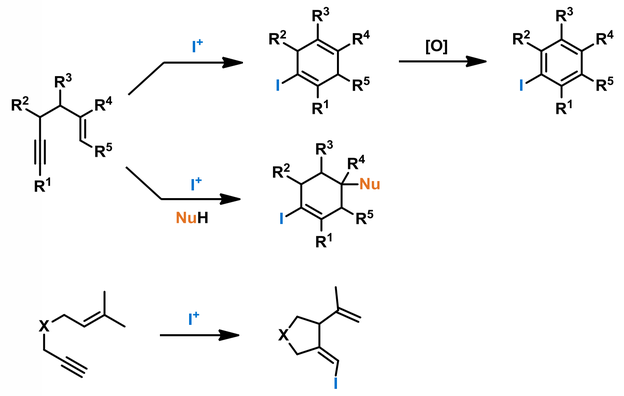
Applying similar strategies to siloxy enyne systems results in the formation of functionalized carbocycles.



Heterocyclization of α-alkynyl ketones combined with different rearrangement pathways give further evidence to the potential of cascade reactions in the generation of structural complexity.

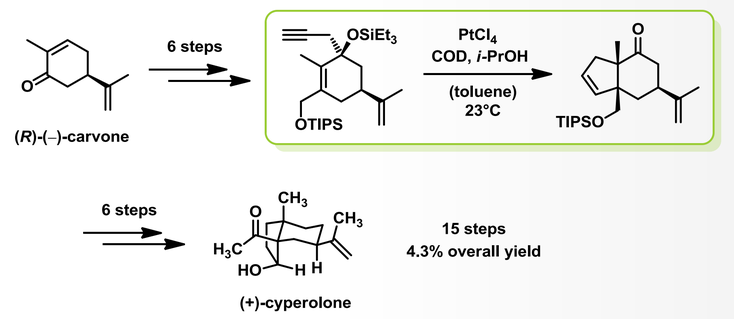


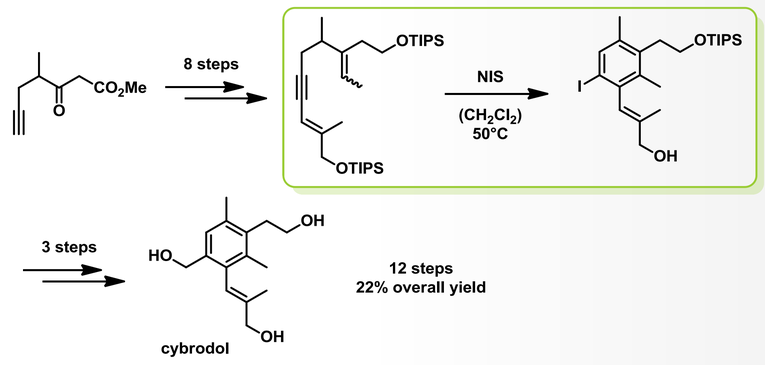
Aside from transition-metal catalysis, activation of alkynes towards carbocyclization can also be achieved by employing electrophilic iodine sources.



Application of carbocyclization reactions

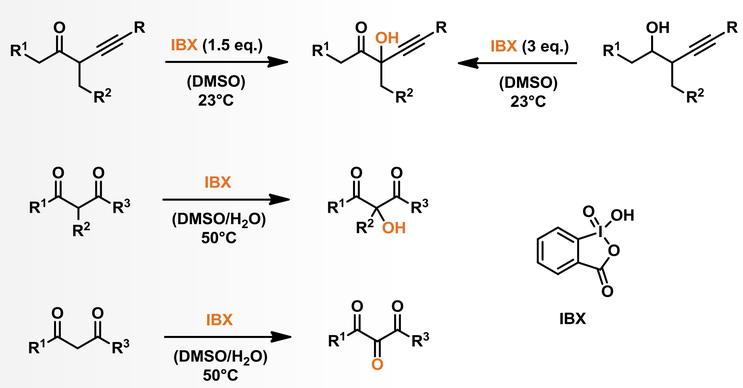
The methods for carbocyclyzation developed in our group could successfully be applied to the total synthesis of the natural products depicted below. Here, the complex skeletons of the final products are rapidly accessible by the cyclization keysteps.

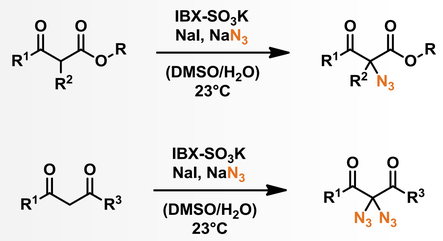




IBX-mediated group transfer reactions

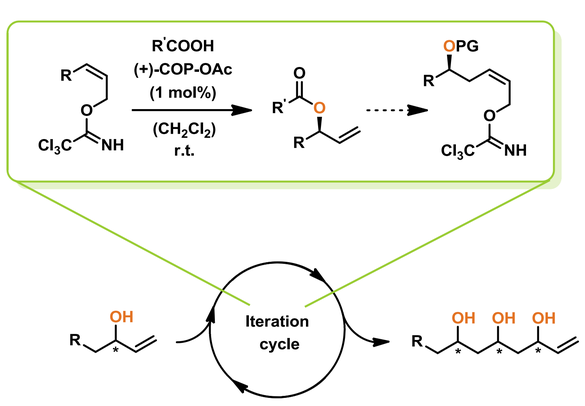
Our interest in hypervalent iodine reagents leads to the development of methods employing IBX and derivatives in group transfer reactions, enabling the facile introduction of hydroxy, keto, and azide functionalities at the α-position of a broad variety of ketones.

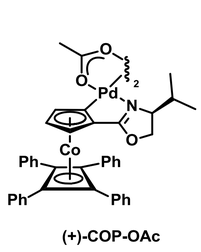


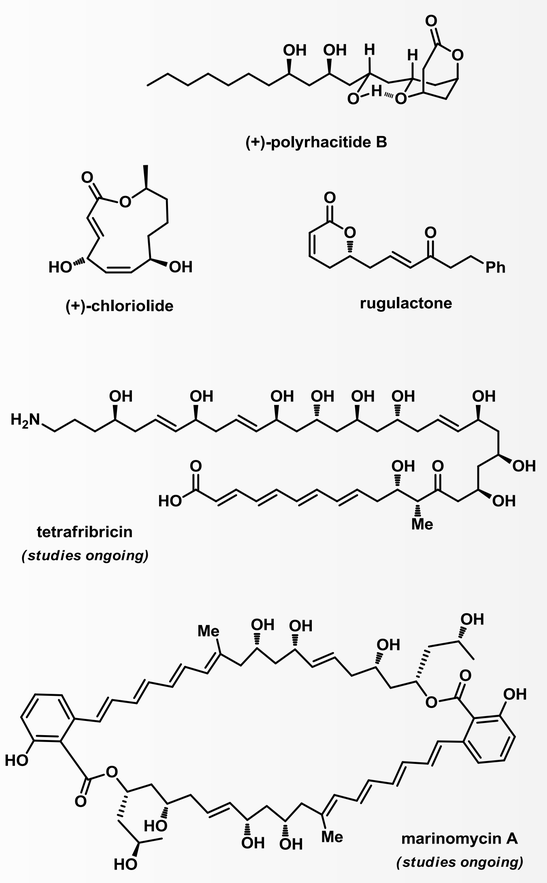


Iterative strategies for the formation of polyketide motives

Based on the asymmetric *Overman* esterification, we developed iterative methods to stereoselectively generate 1,3-polyols, which is closely connected to our ongoing focus on the total synthesis of polyketide natural products (past and current projects depicted on the right).







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Org. Biomol. Chem. **2012**,*10*, 8041–8047. *ChemBioChem* **2012**, *13*, 1439–1446. *Org. Lett.* **2012**, *14*, 1250–1253. *Chem. Eur. J.* **2012**, *18*, 1187–1193. *Synthesis* **2011**, 3592–3603. *Angew. Chem. Int. Ed.* **2011**, *50*, 9965–9968. *Beilstein J. Org. Chem.* **2011**, *7*, 847–859. *Synlett* **2011**, 1151–1153. *J. Org. Chem.* **2011**, *76*, 2145–2156. *Angew. Chem.* **2011**, *123*, 2693–2696; *Angew. Chem. Int. Ed.* **2011**, *50*, 2643–2645. *ChemCatChem* **2011**, *3*, 649–652. *Angew. Chem.* **2011**, *123*, 1562–1590; *Angew. Chem. Int. Ed.* **2011**, *50*, 1524–1552. *Angew. Chem. Int. Ed.* **2010**, *49*, 4661–4664. *Org. Biomol. Chem.* **2010**, *8*, 991–993. *Org. Lett.* **2009**, *11*, 5634–5637. *Chem. Eur. J.* **2009**, *15*, 10713–10716. *Synlett* **2009**, 2987–2991. *Tetrahedron* **2009**, *65*, 1880–1888. *J. Organomet. Chem.* **2009**, *694*, 510–514. *Targets in Heterocyclic Systems* **2009**, *13*, 57–91. *Org. Lett.* **2008**, *10*, 2605–2607. *Org. Lett.* **2008**, *10*, 1025–1028. *Angew. Chem.* **2008**, *120*, 5787–5789; *Angew. Chem. Int. Ed.* **2008**, *47*, 5703–5705. *Synthesis* **2008**, 3183–3204. *Chem. Eur. J.* **2008**, *14*, 3514–3522. *Chem. Commun.* **2007**, 4164–4166. *J. Org. Chem.* **2007**, *72*, 5435–5438. *Eur. J. Org. Chem.* **2007**, 3711–3717. *Eur. J. Org. Chem.* **2007**, 1636–1647. *Angew. Chem.* **2007**, *119*, 2360–2363; *Angew. Chem. Int. Ed.* **2007**, *46*, 2310–2313. *Angew. Chem.* **2006**, *118*, 6010–6013; *Angew. Chem. Int. Ed.* **2006**, *45*, 5878–5880. *Org. Lett.* **2006**, *8*, 4795–4797. *Org. Lett.* **2006**, *8*, 2151–2153. *Chem. Commun.* **2006**, 764–766. *Org. Biomol. Chem.* **2006**, 2076–2080. *J. Org. Chem.* **2005**, *70*, 10210–10212. *Org. Lett.* **2005**, *7*, 3925–3927.

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