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Swiss Science Concentrates

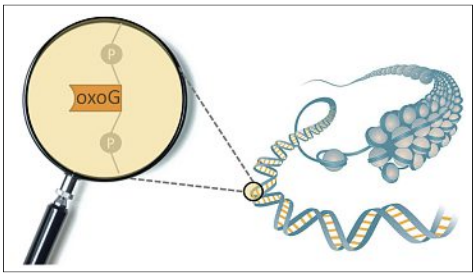
A CHIMIA Column

Short Abstracts of Interesting Recent Publications of Swiss Origin

Nucleotide-Resolution Genome-Wide Mapping of Oxidative DNA Damage by Click-Code-Seq

J. Wu, M. McKeague and S. J. Sturla*, *J. Am. Chem. Soc.* **2018**, *140*, 9783. ETH Zurich.

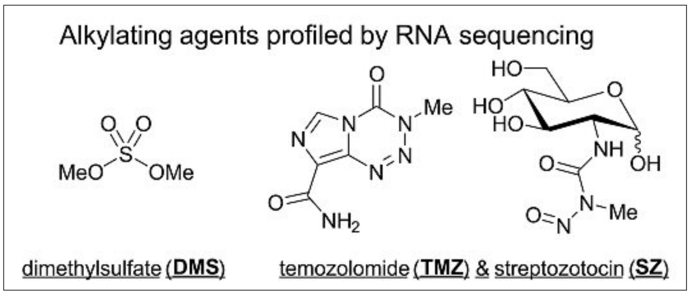
Next-generation sequencing is an efficient method for mapping whole genomes. However, this approach falls short when trying to sequence DNA damage. Wu, McKeague and Sturla developed a new method, 'Click-Code-Seq', which can be used to sequence 8-oxoG at single nucleotide resolution within whole genomes. Their approach utilizes repair enzymes that specifically replace the damaged site with an artificial nucleotide, followed by click chemistry to introduce a short oligonucleotide suitable for next-generation sequencing. Using this approach, distinct patterns of oxidative damage in a variety of different genomic elements have been discovered.



Profiling the Nucleobase and Structure Selectivity of DNA Alkylating Agents by RNA Sequencing

B. Sauter and D. Gillingham, *ChemBiochem.* **2018,** *19*, 1638. University of Basel

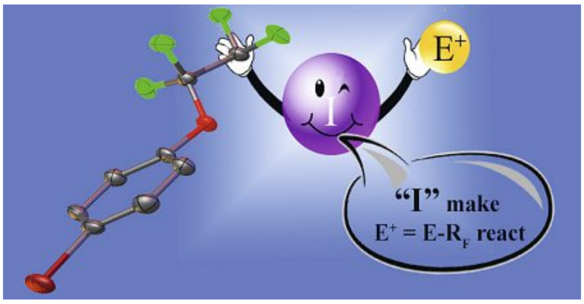
Alkylating agents and other molecules that covalently modify DNA are used in many front-line chemotherapies. Despite this significance, there is currently limited knowledge about their exact selectivity in cells and animals. Using an improved next-generation-sequencing approach, Sauter and Gillingham studied the chemoselectivity of various DNA methylating agents towards RNA; supposedly an off-target biomolecule. A general preference for guanine residues was confirmed, but some molecules exhibited altered reactivity due to RNA folding. Future research will be aimed at establishing the reactivity profile of other agents as well as improving the technique for higher sensitivity.



Unexpected Reactivity of Cyclic Perfluorinated Iodanes with Electrophiles

S. Gruber*, S. M. Ametamey, and R. Schibli, *Chem. Commun.* **2018**, *54*, 8999. ETH Zurich.

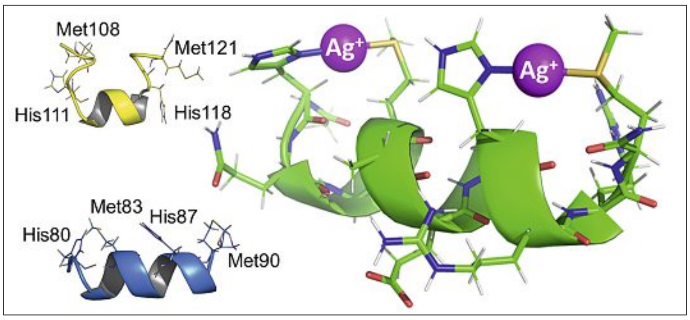
Stefan Gruber and co-workers discovered a new reactivity of hypervalent iodine compounds. Cyclic perfluorinated iodanes have been considered as electrophilic reagents for many years. Surprisingly, these compounds were found to also react with electrophiles (E^+ = Br, Cl, F, I) to give halofluorocarbons of the type $E–R_F$. This unexpected reactivity originates from reductive elimination of intermediate iodane(V) to afford the perfluorinated products. This novel transformation can be described as a type of umpolung reaction since it allows electrophiles to react with electrophilic reagents. The utility of this new transformation was demonstrated for radiosynthesis of a $[^{18}F]CF_3CF_2$–containing aryl ether using $[^{18}F]XeF_2$.



Unravelling Peptide Folding Trends and K_d Values of Unique Silver Efflux Protein SilE Sequences

V. Chabert, M. Hologne, O. Sénèque, O. Walker, and K. M. Fromm, *Chem. Comm.* **2018**, *54*, 10419. University of Fribourg

SilE is a unique protein of the bacterial silver efflux pump, whose role and structure is unclear. Peptides derived from the SilE sequence containing two or three binding sites for Ag^+ were found to be unstructured in absence of Ag^+. However, these same peptides adopt well-ordered α-helical structures upon Ag^+ binding. In contrast to previous studies, no cooperative effects were observed. These results suggest that SilE acts as a Ag^+ sponge during export.



Prepared by Morten O. Loehr, Aaron Johnson, Ashkan Karimi and Nathan W. Luedtke*

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