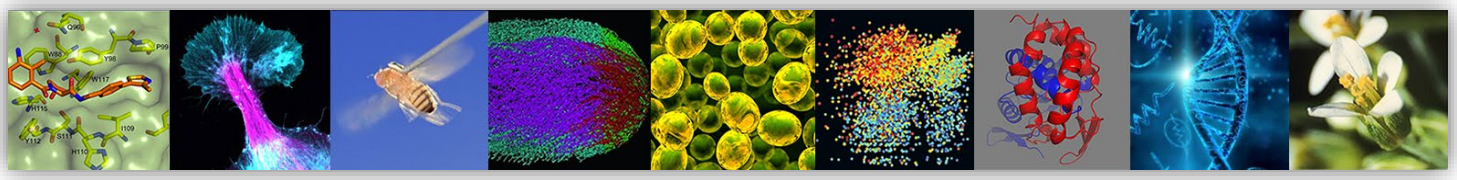

The Department of Molecular, Cellular and Developmental Biology and Chemistry Seminar Series Presents

Roland K. O. Sigel

Professor of Bioinorganic Chemistry
University of Zürich

"From RNA G4s to group II intron and theta ribozymes – a tale of metal ions at the core of structure and function"

The research of the Sigel Lab lies in the wide field of Biological Inorganic Chemistry reaching into biochemistry, structural biology and biophysics. At the core are the manifold aspects of metal ion binding to large nucleic acids and their crucial involvement in folding, structural and catalytic processes. We investigate the interaction and role of metal ions by a broad combination of tools, including biochemical methods, NMR, and single molecule fluorescence spectroscopy (smFRET). Molecules of interest are mostly catalytic and regulatory RNAs, i.e. ribozymes, riboswitches and G-quadruplexes (G4). RNA G4 are proposed to play crucial regulatory roles in gene replication, translation and expression. We explore the structure and dynamics of RNA G4s and their interactions with metal ions and metal complexes by NMR and crystallography. Riboswitches are highly conserved sequences in the untranslated regions (UTR) of bacterial mRNAs, crucial for regulation of specific metabolite concentrations. Our research focuses on two riboswitches, the Moco and the *btuB* riboswitch, exploring the mechanism of recognition, structural changes and regulatory mechanisms. Group II introns are among the largest catalytic RNAs that fold into a defined 3D-structure and simultaneously induce self-cleavage from the precursor mRNA. We mostly concentrate on exploring the folding mechanism by sm FRET studies in combination with further experimental techniques, like NMR, X-Ray and MD-Simulations to obtain more insights into important local structural elements. Another ribozyme of interest in our group is the mammalian cytoplasmic polyadenylation element-binding 3 (CPEB3) ribozyme, which belongs to the hepatitis delta virus (HDV)-like family of ribozymes. Recently, we expanded our research to minimal HDV-like ribozymes having discovered a new subgroup of HDV-like ribozymes, theta ribozymes (qrz). We could show that qrz play a central role in tRNA processing of bacteriophages, part of the human gut microbiome, and are potentially involved in the code switch leading to the expression of recoded lysis and structural phage genes.

Wednesday February 7, 2024
3:45pm Tea, 4:00pm Seminar
BASS 305
266 Whitney Ave.
Hosted by: Anna Pyle and Chemistry Dept.
https://yale.hosted.panopto.com/Panopto/Pages/Viewer.aspx?id=ff58d612-f1f9-41f6-a651-b0ff01052705

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For more information contact: laurie.tomei@yale.edu

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