

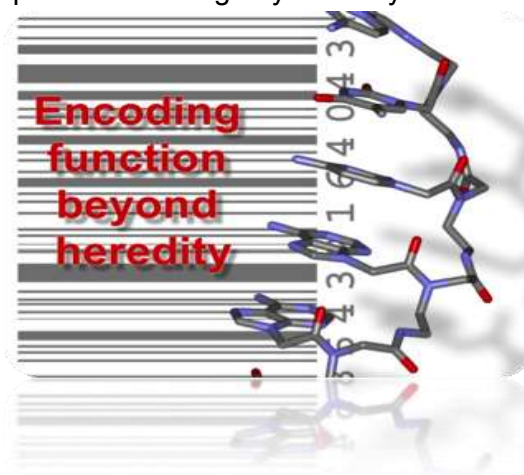
Programming responsive assemblies from PNA-encoded and folded peptides

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Life is orchestrated by biomolecules interacting in complex networks of biological circuitry with emerging function. Progress in different areas of chemistry has made the design of systems that can recapitulate elements of such circuitry possible. At the circuitry level, the programmable nature of nucleic acid hybridization provides a powerful platform to design dynamic systems that can respond and integrate diverse logic gates. In order to interface with diverse biomolecular inputs (e.g. cell surface receptors or therapeutic target) and yield outputs other than oligonucleotide sequences (e.g. drugs or fluorophores for sensing) it is desirable to engineer nucleic acid conjugate that can translate assemblies into output through proximity enhanced reactions. Peptide Nucleic Acids (PNA) are endowed with attractive properties for this endeavor as they are more robust and form more stable duplex than their natural counter parts. Several applications from our laboratory to encode and program self-assemblies of small molecules, template chemical reactions and respond to biomarkers will be presented.



References

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Nicolas Winssinger is Professor at the University of Geneva. He began his independent career in 2002 at the Institut de Science et Ingénierie Supramoléculaires, Strasbourg and moved to his current position in 2012. Nicolas carried out his PhD under the guidance of K.C. Nicolaou (The Scripps Research Institute) and postdoctoral training with P.G. Schultz (NIH postdoctoral fellow). His research interests lie in bioorganic chemistry and chemical biology. An important theme in his lab is the use of chemical synthesis and natural product synthesis to aid in the development of chemical biology probes, with a particular emphasis on covalent interactions. Another important theme is the use of oligonucleotides to encode molecules, program spatial organization of ligands and direct reactions. A long-term objective is to extend these principles towards complex systems which can emulate some of the fundamental features of living systems.