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VABILO NA PREGLOV KOLOKVIJ / INVITATION TO THE PREGL COLLOQUIUM

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ob/at 13^h**

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Conceptualization in Chemistry and Molecular Biology - A Prerequisite for Methodological Advances and Scientific Progress

Conceptualization precedes abstract reasoning and is thus constitutive for natural science research. Theoretical concepts as much as methodological developments determine and even define the framework in which scientific investigations are performed as well as the questions possibly being addressed. Scientific terminology (or jargon) therefore introduces a scientific bias that is often ignored. Taking into account this interdependence is, however, indispensable for deeper understanding of science in general and for scientific developments to continue to occur. To illustrate how scientific jargon pre-defines the scientific topics I will discuss the paradigmatic structure-function concept that protein functionality relies on the existence of a stably folded protein scaffold. Although it has already been put in question and it is now acknowledged that an increasing number of proteins are lacking stably folded tertiary structures (Dyson & Wright, 2005) and that this intrinsic flexibility has significant impact on biological functionality, an appropriate scientific conceptualization is still missing. The popular dichotomic partitioning of proteins into ordered and disordered specimens does not adequately grasp the dynamic conformational ensembles of fluctuating polypeptides and their relevance for biological function. In the lecture I will try demonstrate that the binary order-disorder conceptual framework can be overcome by the recently introduced meta-structure approach (Konrat, 2009) and by adapting concepts from theoretical physics a higher level of description is obtained in which intrinsically disordered proteins reveal many more of their intricate physico-chemical properties. The theoretical predictions are validated with a diverse set of experimental data obtained on several proteins implicated in cell cycle regulation, tumor growth and metastasis.

Methods development is another cornerstone of natural science. In the past major scientific breakthroughs were triggered or initiated through the availability of novel scientific techniques. Amongst others Fritz Pregl was an eminent figure in the long series of methodological advances in chemistry and a shining example for how technology drives science. As an illustration (also how proper concepts and methods development coincide) I will discuss some of our recent NMR developments in protein chemistry. Although NMR spectroscopy was introduced as an analytical technique to determine the structures of small molecules, recent past has witnessed considerable improvements of the methodology and it therefore continues to play an important role not only in chemistry but life science research in general.

Vljudno vabljeni! / Kindly invited!

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