ANTIFREEZE GLYCOPEPTIDES: A STRUCTURAL APPROACH TO ENGINEER ANTIFREEZE PROTEINS

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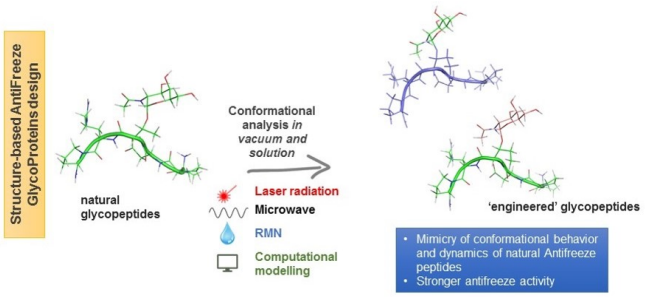

Antifreeze glycoproteins play a crucial role in biochemical adaptation to supercooled waters and polar environments for the survival of many species, from animals, to plants, and insects and bacteria. Notwithstanding their vital importance for these species, and their many potential applications (medicine, biology, food industry,...), not much is known about their principle of action, except that they prevent, somehow, the formation of ice in living systems. Accessing information on their structural and conformational properties, as well as the nature of their interaction with water, promises to shed light on the underlying mechanisms governing their function.

The project focuses on connecting the conformational behaviour of these antifreezes proteins to their pivotal role in their biological activity. Natural and unnatural glycopeptides will be interrogated using IR ion-dip spectroscopic techniques, coupled with quantum chemical computation, to aid the design of 'engineered' antifreezes proteins, optimizing the response and facilitating the development of a new generation of this type of proteins.[a]

[a]I. A. Bermejo, I. Usabiaga, I. Compañón, J. Castro-López, A. Insausti, J. A. Fernández, A. Avenoza, J. H. Busto, J. Jiménez-Barbero, J. L. Asensio, J. M. Peregrina, G. Jiménez-Osés, R. Hurtado-Guerrero, E. J. Cocinero, F. Corzana, *J. Am. Chem. Soc.*, **2018**, 140, 31, 9952-9960.