JOB OFFER

Date: 05/12/2024

PRINCIPAL INVESTIGATOR: Ugo Bastolla

SCIENTIFIC PROGRAM: Genome dynamics and function

JOB OFFER: Pre-doctoral contract

PROJECT TITLE:

Phylogenetic and functional analysis of protein families using structural information

PROJECT DESCRIPTION:

Our group is actively working at integrating the evolution of protein structures and sequences for developing improved phylogenetic methods and predicting protein functions. In this context, we recently developed the program PC_ali that uses a hybrid measure of sequence and structure divergence to obtain improved multiple alignments and phylogenetic trees based on sequence and structure information (Bioinformatics 2023 btad630). We also developed the SSCPE model for describing the site-specific molecular evolution of protein sequences subject to selection on the protein structure and its protein folding stability, which we applied to maximum likelihood phylogenetic inference (Bioarxiv 2023.01.22.525075v2). We plan to integrate these two approaches in order to: (1) Developing a new method of phylogenetic inference that combines regularized maximum likelihood, minimum evolution and distance-based methods and tests the internal consistence of the generated trees. (2) Adopting the ratio between structural and sequence evolution as a predictor of changes of protein function. (3) Extending these methods to proteins of unknown structure using structures predicted with Artificial Intelligence. The proposed work will contribute to developing and testing these methods and applying them massively to CATH superfamilies.

DURATION: 3 years. Possibility to develop a PhD thesis

REQUIREMENTS, EXPERIENCE AND ACADEMIC QUALIFICATIONS:

Degree in Bioinformatics, Physics, Biology, Biochemistry, Chemistry, Mathematics or Engineering. Experience in programming simple scripts (or at least using the Linux operating system).

GRANT: PID2023-151032NB-C21 funded by MICIU/AEI/10.13039/501100011033/ and by FEDER, EU

CONTACT:

ubastolla@cbm.csic.es

DEADLINE:

15/01/2025