Competition notice

PRELUDIUM BIS

Project title: Understanding the exaptation of tissue-specific enhancers by modeling the changes of spatial chromatin architecture

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Project description: The availability of sequenced genomes of many organisms allows for understanding the molecular evolution of the regulatory process itself. It turns out that some traits arise due to a phenomenon called phylogenetic exaptation, where a certain previous evolutionary adaptation starts serving a new function. As an example, consider the regulatory region for the FOXF1 and TBX4 genes, which are associated with lung development in all species, and disruptions in their function in humans lead to lethal developmental disorders in newborns. It contains a highly conserved non-coding region that first appeared evolutionarily in the genomes of Coelacanths fish and tetrapods. The role of this regulation in the evolutionary adaptation during the transition of aquatic animals to land is very intriguing. We postulate that through exaptation, these sequences could have been co-opted in the fish genes to enable critical stages of lung formation, which were necessary for a major evolutionary leap 390-360 million years ago.

The immense selective pressure associated with such a leap means that evolutionary advantages might be linked to genome instability. Drastically accelerating events in evolution include bursts of transposon activity in the genomes of tetrapod fish. The challenge we address in the project is to construct a model of genetic regulation evolution, studied through chromatin interactions using Hi-C technology, in response to structural changes in the genome. We aim to leverage the previously developed tool for analyzing regulatory disruptions (https://tadeus2.mimuw.edu.pl/) and create a Hi-C database for genomes altered by structural variants, which will be used as the training set for the model. Based on deep learning, the model will enable the prediction of changes in chromatin organization induced by structural variants in the genome and aid in understanding the process of phylogenetic exaptation of tissue-specific non-coding regulatory regions.

Requirement

The call is open to all those who are not Ph.D. holders and are not students at doctoral schools. The candidate should:

- hold a Master's degree in bioinformatics, mathematics or computer science before October 1, 2023.

- be interested in computational biology and genetics.

- have a good command of the English language, enabling them to communicate fluently, independently

read scientific literature, write publications, and present results at international conferences.

- be highly motivated to pursue scientific research.

- apply for a foreign internship at Baylor College of Medicine in Houston, USA (up to 6 months) through the NAWA program.

Discipline: Computer science

Admission limit: 1

Recruitment schedule

- registration in the Internet Registration of Candidates, referred to as "IRK", submitting an application to the IRK: **26.07 - 16.08.2023**
- qualification procedure: **24.08 - 30.08.2023**
- announcement of the ranking list: **until 05.09.2023**
- accepting documents from qualified candidates: **21.09.2023**
- announcement of the list of accepted candidates: **until 30.09.2023**

Recruitment fee

200 PLN

Form of the qualification proceedings

Qualification proceedings include the assessment of the following items:

1) the candidate's scientific activity, based on their CV or Resume, documented by scans of materials attached to the application for admission to the School;
2) an interview with the candidate;
3) other achievements.

Language of the selection process, including the interview

The interview shall be carried out in Polish or English – in accordance with the candidate's preferences presented in IRK. If the Polish language is selected, the interview may include parts in English.

Required documents

The candidate shall submit a School admission application only through the IRK. The application shall include the following:

1) indication of the selected discipline in which the candidate plans to pursue education or in the case of applying for the Interdisciplinary Doctoral School – fields of science with the specification of the leading field (and where there is no leading field – at least two equivalent disciplines), PESEL number or passport number, nationality, contact information (residence address, e-mail address, telephone number), information whether the candidate agrees to receive administrative decisions by means of electronic communication, consent for processing of personal data for the purposes of the admissions procedure;
2) a scan of the graduation diploma of uniform master's degree or postgraduate studies or an equivalent diploma obtained under separate regulations or in the case of candidates pursuing education within the European Higher Education Area – a certificate of obtaining a Master's degree

or a declaration that the diploma or certificate of obtaining a Master's degree shall be provided by 21.09.2023 – declaration form. In case the diploma was issued in a language other than Polish or English, the candidate shall attach its certified translation;

3) a resume or CV outlining the candidate's scientific activity, including scholarly interests and achievements during the five calendar years preceding the application (if a candidate became a parent during this time, as evidenced by a scan of the child's birth certificate attached to the application, this period shall be extended by two years for each child), including, but not limited to:
   - publications,
   - research and organizational work at student research groups,
   - participation in scientific conferences,
   - participation in research projects,
   - awards and honorable mentions,
   - research internships,
   - research skills training programs completed,
   - activities promoting science,
   - activity in science movement representative bodies,
   - average of their university grades,
   - professional career,
   - level of proficiency in foreign languages;
4) scans of materials evidencing scientific activity mentioned in their CV and/or resume;
5) a document confirming at least B2 proficiency level in English or a declaration of the level of proficiency in English allowing education at the School;
6) the scan of a declaration by the planned supervisor, confirming their agreement to undertake the duties of a supervisor and of the number of doctoral students, for whom they perform the duties a designated supervisor, in accordance with the template constituting Appendix no.4 to the Resolution no. 17 of the Senate of the University of Warsaw of 20th January 2021 on rules of admission to doctoral schools at the University of Warsaw (the University of Warsaw Monitor of 2023, item 43), the candidate may also attach a scan of their planned supervisor's opinion and opinions of other academics about the candidate and their scientific activity and/or proposed research project;
7) the photograph of a candidate's face that allows for their identification;
8) a declaration confirming whether the candidate was or is a doctoral student or a participant of doctoral studies or whether they have initiated a doctoral dissertation process or whether proceedings to award them a doctoral degree have been initiated – and if yes, the title of their doctoral dissertation or the research project prepared by a candidate, including the name and last name of the candidate's tutor or supervisor;
9) a declaration confirming that they have reviewed the Resolution no. 17 of the Senate of the University of Warsaw of 20th January 2021 on rules of admission to doctoral schools at the University of Warsaw (the University of Warsaw Monitor of 2023, item 43) and Articles 40 and 41 of the Code of Administrative Procedure;
10) scanned transcripts of records of the graduate and postgraduate studies or the uniform Master's degree studies, or equivalent documents (e.g. diploma supplement);
11) abstract of the master's thesis or master's project in English (up to 3,000 characters with spaces);

Evaluation criteria

a) competencies to perform specific tasks in a research project (70% of the final score)
   ● 3 points - very good
   ● 2 points – good
   ● 1 point – poor
   ● 0 points - no competencies

b) publication track record, including publications in renowned scientific papers / magazines (30% of the final score)
- 4 points – prominent
- 3 points - very good
- 2 points – good
- 1 point – poor
- 0 points - no publication track record

Education program

The education lasts 4 years. It includes obligatory classes (no more than 300 hours in total during the whole period of education) and the implementation of an individual research program, carried out under the supervision of a supervisor. Beginning of education – October 1, 2023.

Scholarships

PRELUDIUM BIS doctoral scholarships shall amount to:
- PLN 4266.00 gross per month, until the month in which a PhD student's mid-term evaluation is performed at the doctoral school and
- PLN 5119.00 gross per month, after the month in which a PhD student's mid-term evaluation is performed at the doctoral school and

shall be awarded pursuant to the Act on Higher Education and Science of 20 July 2018.