Project 1.8. Evolutionary genomics of astrocytes (bioinformatition)

Supervisor: Dr Aleksandra Pękowska

Laboratory: Dioscuri Centre of Chromatin Biology and Epigenomics

WWW: https://pekowskalab.github.io

Background: Recent studies indicate that astrocytes, in addition to strictly homeostatic functions, play critical roles in the regulation of synaptic plasticity and in the processes of learning and decision making. Astrocytes have changed in the evolution of mammals: morphology, interaction with neurons, and the dynamics of signal transduction pathways are significantly different in human and mouse astrocytes. At present, however, it is not known which evolutionary changes in the genome underlie the modification of astrocyte biology.

Aim: Identification of the evolutionary changes in the genome that are critical for human-specific features of astrocytes

In close cooperation with experimentalists in the laboratory, the Ph.D. student will identify genes and regulatory elements that play critical roles for astrocyte evolution. Then, using data generated in the lab, the PhD student will delineate the regulatory sequences that control the expression of genes in astrocytes. In parallel, the Ph.D. student will take advantage of public data (including bulk and single-cell RNA-seq, ATAC-seq, and Genome-Wide Association Studies (GWAS) hits) to identify and analyse genetic elements, active in astrocytes, that are associated with neurodegenerative diseases.

Requirements:

- master's degree bioinformatics or informatics
- knowledge of the tools of DNA sequence analysis
- outstanding commitment to science (documented by trainings and/or internships in research institutes)
- ability to work independently
- systematic working style
- excellent lab-work reporting skills
- good spoken and written English
- programming skills are a plus (image processing/bioinformatics).