

Exercises assignment #1 - *Drosophila melanogaster* and *Bombyx mori* genomes comparison

Drosophila is known to be one of the most recognized and studied model organisms and is used to gain better recognition in various processes occurring in more complex organisms such as vertebrates, humans in particular. Observing similarities and differences between the genome of fruit fly and other already-sequenced genomes we gain better understanding of how these processes vary between species.

As might be expected, fruit fly genome has been already sequenced, thus we may ask a question about desirability of repeating such an intricate experiment. Paradoxically, thanks to this practice we could gain another anchor point, meaning comparison of two studies with a long time and technological gap between. Repeatedly cited and discussed research on *Drosophila* genome took place 24 years ago (Adams, Celniker, Holt, Evans et al. (2000). The Genome Sequence of *Drosophila melanogaster*. *Science*), meaning that all the techniques used were up to date back then, but may seem a bit outdated now. Furthermore, a lot of studies were conducted over the past few years revealing more and more detailed aspects of *Drosophila* brain, such as its connectome analysis (Scheffer, Xu, Januszewski et al. (2020). A connectome and analysis of the adult *Drosophila* central brain. *eLife*).

Other insects have been investigated as well - studies on silkworm moths show that - for example - odor-mediated steering is done by central complex neurons projecting to lateral accessory lobes (LAL) from which descending neurons project to thoracic motor centers (Adden, Stewart, Webb, Heinze (2022). A Neural Model for Insect Steering Applied to Olfaction and Path Integration. *Neural Computation*).

A research question that I would like to ask is the location of genes responsible for odor-mediated steering, which has been connected with respective neural circuit, and what is the role of LAL in this process concerning *Drosophila*.

Financial outline (using PacBio):

- Number of samples: 5x *Drosophila*, 5x *Bombyx mori*
- Library preparation: 10 * 270 USD = 2 700 USD
- Sequencing: 10 * 2750 USD = 27 500 USD

Overall cost: 30 200 USD

The remaining 200 USD will be paid by researchers, or we are going to find another funding.

Sources in the order of appearance:

- <https://www.science.org/doi/10.1126/science.287.5461.2185>
- <https://elifesciences.org/articles/57443>
- <https://direct.mit.edu/neco/article/34/11/2205/112953/A-Neural-Model-for-Insect-Steering-Applied-to>