



The European *Drosophila* Population Genomics Consortium (DrosEU)

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DrosEU consortium website: <https://sites.google.com/site/droseuweb/home?pli=1>

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Rationale

- This is an extremely exciting time for population genomic studies. The recent advent of powerful next-generation sequencing (NGS) techniques allows us researchers to examine genetic variation at unprecedented scale, at the whole-genome level and with single nucleotide resolution. The continuing technological improvements and the dropping costs of these methods means that even single labs can now generate terabytes of sequence data very rapidly at a relatively low cost. However, the resulting data are typically used to address only a very limited number of specific questions, so that the overall value of these data sets for the community as a whole is somewhat limited. The best-suited organisms to track genetic changes and adaptation are those that are easy to collect, which are broadly distributed, possess a short generation time, have a well-annotated genome and for which hypotheses about climate adaptation can be tested in the laboratory. The fruit fly *Drosophila melanogaster* and its sibling species are ideally suited for this purpose and have already been shown to respond to global and local climatic changes over short periods of time. Indeed, the genus *Drosophila* is one of the most powerful model systems for studying adaptation. However, in contrast to other continents, population samples of *Drosophila* from Europe are so far available only from a few environments and from single time points of collection.

Objectives of DrosEU

- To foster the integration and exchange of population genomic information and data, we have founded in 2013 the *European Drosophila Population Genomics Consortium (DrosEU)*, a collaborative consortium of scientists and laboratories interested in evolutionary genetics and genomics of *Drosophila*. Our main objective is to cooperate closely in collecting, generating and analyzing genomic and environmental data for numerous *Drosophila* populations across Europe (and beyond). While our initial focus is on sampling and analysis of the most tractable species, *D. melanogaster*, we also plan in the future to include related species such as *D. simulans*, *D. subobscura* (a model for climate change adaptation) and *D. suzukii* (a recent invasive pest species). Our long-term goal is to regularly sample and sequence *Drosophila* populations through both space and time in order to track their eco-evolutionary dynamics. We plan this to be a continuing multi-year effort. Importantly, many of the sampled populations are being kept as isofemale lines by the members of the consortium as a resource for phenotypic, functional (genotype-phenotype mapping) work.
- A similar consortium already exists in the US: the *Drosophila Real Time Evolution Consortium (Dros-RTEC)*, coordinated by Alan Bergland (Virginia), Dmitri Petrov (Stanford) and Paul Schmidt (Philadelphia). The goal of *DrosEU* is to extend and complement the North American efforts by implementing a similar initiative focused on Europe. We are closely collaborating with *Dros-RTEC*.

What we have achieved so far & future plans

- To date, we are approximately 50 scientists from approx. 16 European countries and also including several North American colleagues from *Dros-RTEC*.
- In 2014 we have collected 51 population samples across all of Europe: this collection comprises approximately 30 different locations, most of which have been sampled once in summer and once in fall.
- Within the consortium we have internally raised about 50K Euros to perform sequencing of 48 out of 51 samples in 2015, using Illumina NextSeq technology. The data quality is very good (median coverage approximately 60x), and the different internal working groups are now starting to analyze these data. Our US colleagues from *Dros-RTEC* are actively contributing to some of our working groups.
- We are in the process of writing a first joint consortium paper based on this first set of sequencing data, with everyone who has actively contributed being involved as co-authors. The different working groups will work on their projects in parallel and hopefully make good progress until the data become available to the community.
- We are now in the process of sequencing 52 samples collected in 2015, and we will continue our sampling efforts in 2016. Some of us are also planning to extend sampling to *D. simulans* and *D. suzukii*, and we have active plans to improve our geographic coverage. For many populations we are keeping live isofemale lines.

- The next (4th) official DrosEU workshop will be held in Barcelona at the end of May 2016. It will be devoted to discussing the ongoing data analyses and interim results, the writing of the papers, etc. Future workshops are currently in the planning stage, including a satellite workshop at the 2017 ESEB meeting in Groningen.

Joining DrosEU

- We encourage scientists - especially members of ESEB (!) - interested in joining us to contact Josefa González (josefa.gonzalez@ibe.upf-csic.es), cc to Thomas Flatt (thomas.flatt@unil.ch); we are now accepting applications for active consortium membership.
- Active consortium membership for 2016 requires a commitment and contribution to a minimum of 2 out of the 3 requirements:
 - (1) to perform sampling in 2016 for a minimum of 1 geographic location and for a minimum of 2 timepoints (once in summer and once in fall/autumn), following our sampling protocol for pool-seq.
 - (2) to make a financial contribution to covering sequencing costs in 2015/2016.
 - (3) to make an other valuable contribution to the consortium effort in 2015/2016. This could, for example, include: data analysis; maintenance of live isofemale lines; coordinating a working group; organizing and hosting a consortium workshop; data storage; coordination tasks within the network; developing, hosting and maintaining databases; developing, hosting and maintaining web-based communication tools for the consortium, e.g. websites, twitter, etc.; generating funding for the consortium, e.g. via grant writing; and so forth.
- Active membership entails being involved in all democratic decisions of the consortium, having access and being privy to all consortium-internal informations, communications, data, analyses outputs, and so forth.
- Statements of interest should be sent to Josefa González and/or Thomas Flatt; the commitment agreement form is available from us upon request.

Main consortium organizers

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