

Evolutionary Genomics Workshop – Colombia 2023

Report for the Society for the Study of Evolution

Workshop Overview

We* organized and developed an Evolutionary Genomics Workshop in Colombia in August 2023 with the aim of promoting the study of evolution and genetics among two target audiences: current and future researchers in evolutionary biology and related fields, and students from a rural school located in a biodiversity hotspot. The workshop was organized in two sections: Analysis of Genomic and Transcriptomic Data, and Meeting Genes and Evolution. Below we summarize the development and significance of this workshop.

Analysis of Genomics and Transcriptomic Data

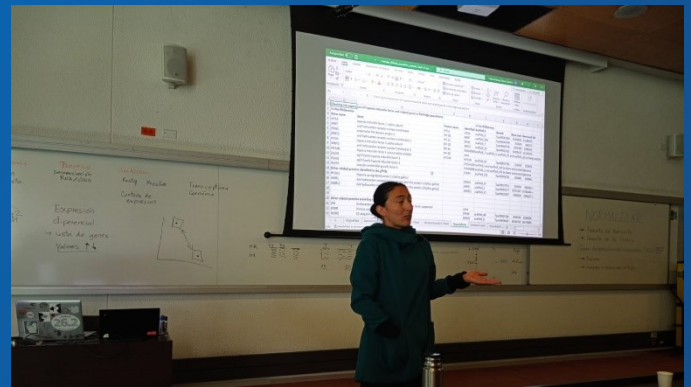


Participants and instructors of the Evolutionary Genomics Workshop in Bogotá, August 2023.

Overview

This section took place in Bogotá Colombia at Universidad de Los Andes from August 1 to 5, 2023 (25 hours). We covered topics including using the command line, connecting to a cluster, and managing genomic files and formats such as SAM, BAM, and VCF. Using real data and hands-on exercises, we followed the process from assembling short reads using a reference genome to calling and filtering variants. We used single nucleotide polymorphisms (SNP) for basic

analyses such as phylogenetic reconstructions and estimation of population genetic statistics. We also conducted exercises of differential expression analysis and metabolic pathway enrichment. The instructors were Dr. Catalina Palacios (KSU Postdoc) and Laura Pabon MSc (PhD student at Universidad de Los Andes).



Instructor Dr. Catalina Palacios during an explanation in the Workshop in Bogotá, 2023.

Participation, Inclusion, and Diversity

We received 192 applications for this section, including applicants from different Latin American countries. We selected 28 participants, prioritizing diversity and representation:

Academic level and occupation of participants: 12 undergrad students, 8 graduate students, and 8 professionals working in related fields (e.g. teachers or researchers).

Universities represented: 16 universities: 14 from Colombia, one from Canada and one from the UK.

Gender: 14 participants identified themselves as women, 13 as men, and one as transgender.

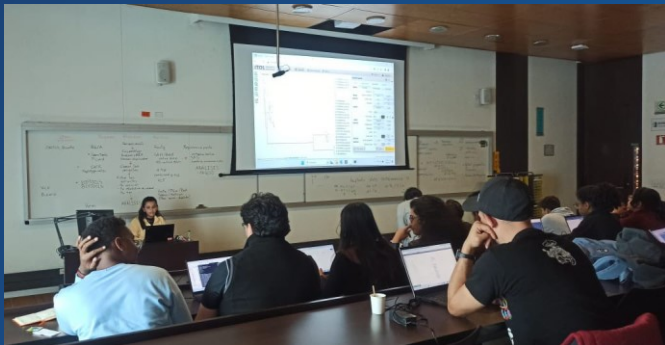
Age: We had participants from 19 to 46 years old.

Geographic coverage: participants came from 10 cities in Colombia: Bogotá, Bucaramanga, Calarcá, Cali, Florencia, Manizales, Medellín, Pasto, Tunja, and Yopal.

Feedback From Participants

We asked participants three questions; here are their main responses:

Things you learned: most participants mentioned using the command line, managing and analyzing genomic and transcriptomic data, new software, statistics, and concepts in genomics, transcriptomics, and phylogenetics.



One class of the Evolutionary Genomics Workshop in Bogotá, 2023.

Things you enjoyed: Participants pointed out that the workshop made a complex topic easy to understand. They liked the respectful and friendly environment, the instructors' experience and positive attitude, and the hands-on exercises. Participants also liked the resources, support, and infrastructure of the organizing institutions.

Things to improve: Most participants suggested having more time for the workshop, particularly for transcriptomics analyses. Similarly, they would like to review in more detail some of the content like the command line, scripts, and population genomics analyses. Participants also suggested discussing related literature, and the biological and social relevance of these analysis.

Meeting Genes and Evolution

Overview

This section took place from August 9 to 11, 2023, at *Institución Educativa La Tagua*, a rural school in La Tagua hometown, located in the Sierra Nevada de Santa Marta region. We previously worked with the school's biology and chemistry teacher, Professor Monica Patricia

Hernandez, to identify students' context and needs. Considering this, we designed and carried out interactive activities about genetics, evolution, and conservation. The instructors in this section were Dr. Catalina Palacios (KSU Postdoc) and Zory Buitrago (SELVA).

Participants drew elements of their cultural and biological inheritance, learned to use micropipettes for the first time, assembled DNA fragments and translated a message hidden in the sequence, and played a game to learn about the life cycle of migratory birds. These activities led to conversations about the participants' questions and interests.



Student drawings of their cultural and biological inheritance, La Tagua, 2023.

We discussed for example, macro biomolecules, types of cells (such as red blood cells, neurons, eggs, and sperm), the structure and function of DNA, RNA, and proteins, how DNA helps us to study biodiversity, and even how DNA is used in paternity cases.



Students assembling genetic reads and decoding a hidden message, La Tagua, 2023.

Participation, Inclusion, and Diversity

In this section we had 80 participants from elementary, middle and high school, including a group of 10 young adults who had abandoned school and come back to finish their high school studies. We had one session (90 min) with elementary school students, two sessions with middle and high school students, and one session with the adults. The students from La Tagua are mainly the children of the local rural workers and the children from local indigenous communities (Kogui).



Students learning to use micropipettes, La Tagua. 2023.

Feedback From Participants

To our three feedback questions the students of La Tagua answered:

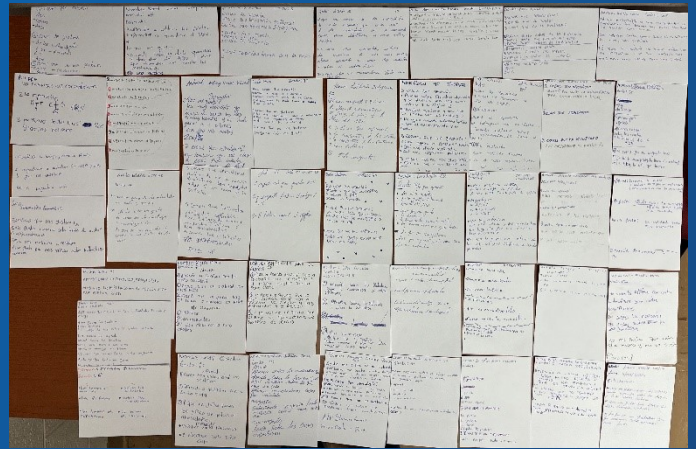
Things you learned: the most common answer was learning how to use the micropipettes. They also mentioned learning about genetics, cultural and biological inheritance, DNA, cells, molecules, units of measure, migratory birds, and learning how real scientist work.

Things you enjoyed: Most participants enjoyed using the pipettes and deciphering DNA. They said the activities were fun and interesting. Many students enjoyed talking about DNA, biological and cultural inheritance, sex, and cell types. They also liked the food (we gave them a snack).

Things to improve: The most common answer was that they “like it all”, but some suggestions were to make the workshop longer, have more snacks, and share more materials and resources.

For the Future

The workshop was successful considering its aim, the participants’ representation, the quality of the activities, the resources available, and the participants’ feedback. It was a great strategy to collaborate among institutions to put together this workshop. For future versions we would like to include more people as organizers and instructors. We need to design more activities focused on evolution and on the local relevance of evolutionary and genetic research and we need to connect closely the two sections of the workshop. Also, we need to raise funds to develop the workshop in 2024.



Feedback about the workshop by students from La Tagua, 2023.

*About the Organizers

The Evolutionary Genomics Workshop – Colombia 2023 was led and organized by Dr. Catalina Palacios. Collaborating institutions included SELVA: Research for Conservation in the Neotropics (Colombia), the Department of Biological Sciences and the School of Science of the Universidad de Los Andes (Colombia), and the Omics Lab from Kent State University (USA). This workshop was funded by the organizing institutions and by the International Event Grants of the Society for the Study of Evolution (SSE). We thank the SSE and all the people involved in the workshop for their support.

