

The background features a dark navy blue field filled with stylized, hand-drawn floral motifs. These motifs include large, multi-petaled flowers in shades of blue, red, and grey, with some petals showing internal line patterns. Scattered throughout are small, solid-colored circles in blue, red, and grey, adding to the abstract, organic feel of the design.

# Genetics 10

For educators

Joan Alcaide-Núñez – August 2024



# Why should I use it?



Topic: Genetics and Bioinformatics



Built from the scholar curriculum



Interactive & active learning



Customizable & adaptable → easier to use



First-person engaging



Applied activity promotes critical thinking & problem-solving skills



Collaboration, team projects and communication



## Why should I use it?

- Web-based
- No installation required → good for school-managed devices
- OS-agnostic
- No coding knowledge required
- Scalable tool

# How can I use it?

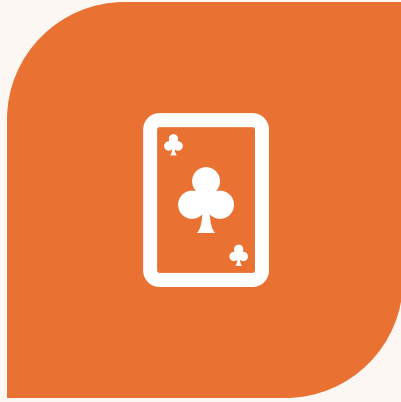


EXPLAIN FUNDAMENTAL  
CONCEPTS OF GENOMICS



IDENTIFY THE TIME TO  
INTRODUCE THE SOFTWARE

# Challenge-like activities



LEVERAGE IT BY INTEGRATING  
REAL-WORLD EXAMPLES, AND  
CHALLENGE-LIKE ACTIVITIES



PROMOTING CRITICAL  
THINKING



OPPORTUNITY FOR TEAMWORK

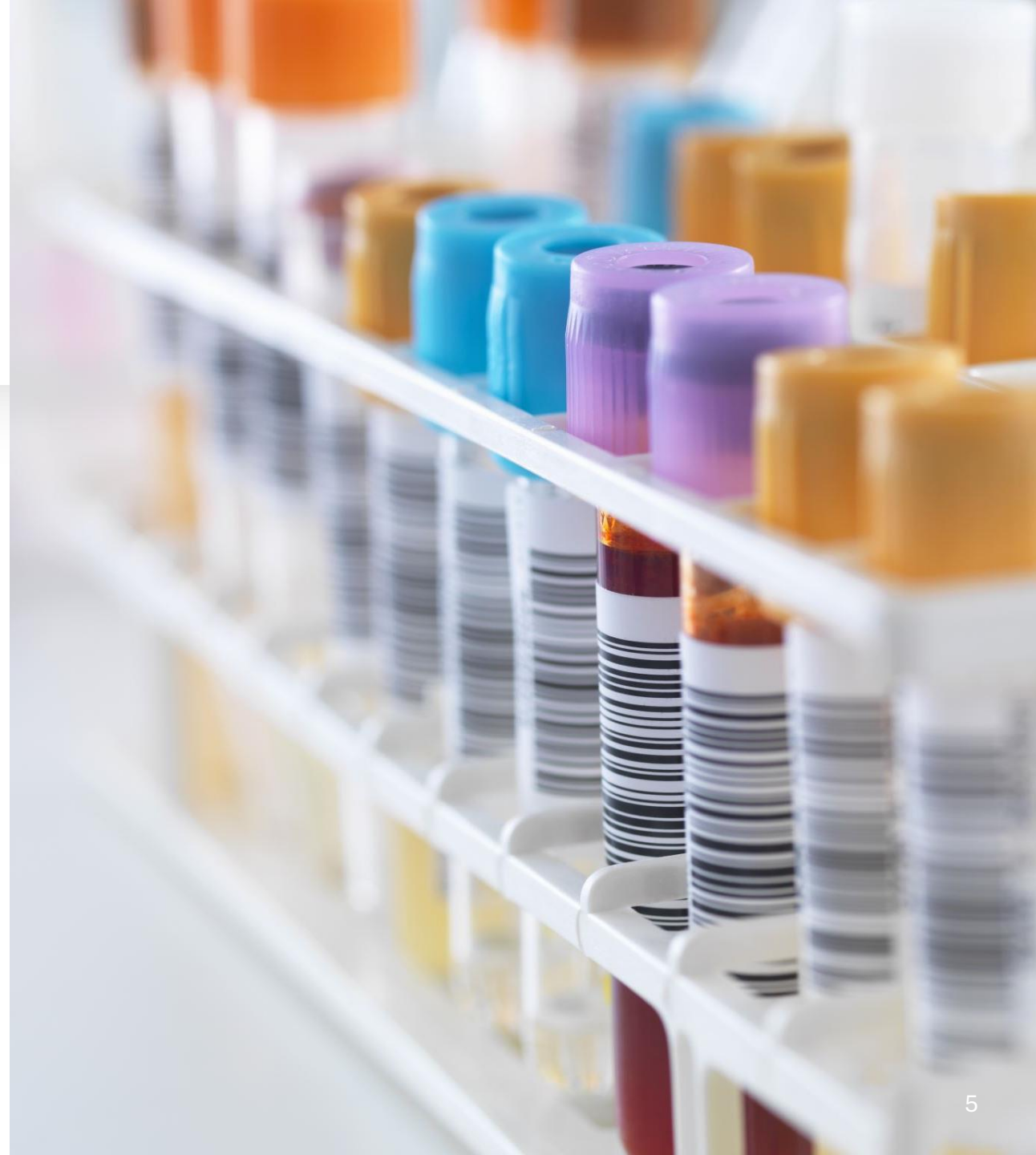


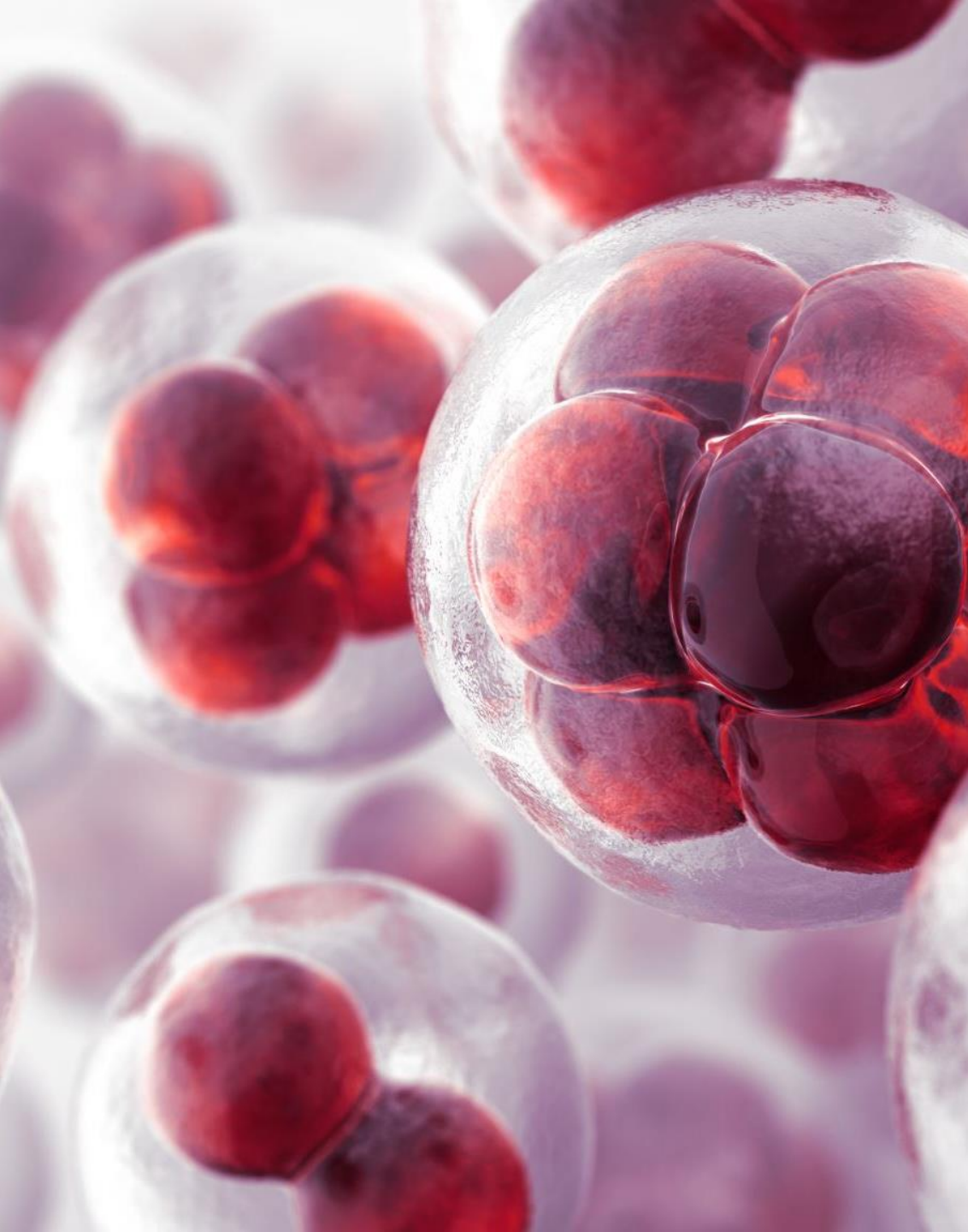
# Correct mutation

***“You were given two copies of a gene. One of them has a mutation that causes a disease, you are asked to identify and correct that mutation. Write your own code using the pre-established functions.”***

Educators can use the `createmutation()` function to create DNA or RNA strings.

Students then use the `compare()` and `check()` to find mutations. In addition, they can use `translate/transcript` the string into amino acids to see the effect of mutations.





# Protein structure

***“Researchers have identified a gene mutation causing a disease. To develop a treatment, you want to know how the mutation in the DNA sequence causes changes in the protein structure. Write your code with the pre-established functions.”***

Students would use the AlphaFold API to compute the structure of proteins. Then they could use 3D visualization to see the differences.



## Heritage or surroundings?

***“You are asked to show if a disease is heritable or not. Previous studies have identified the amino acid sequence of the disease protein. At your disposal you are given 10 DNA strings from an ill person.”***

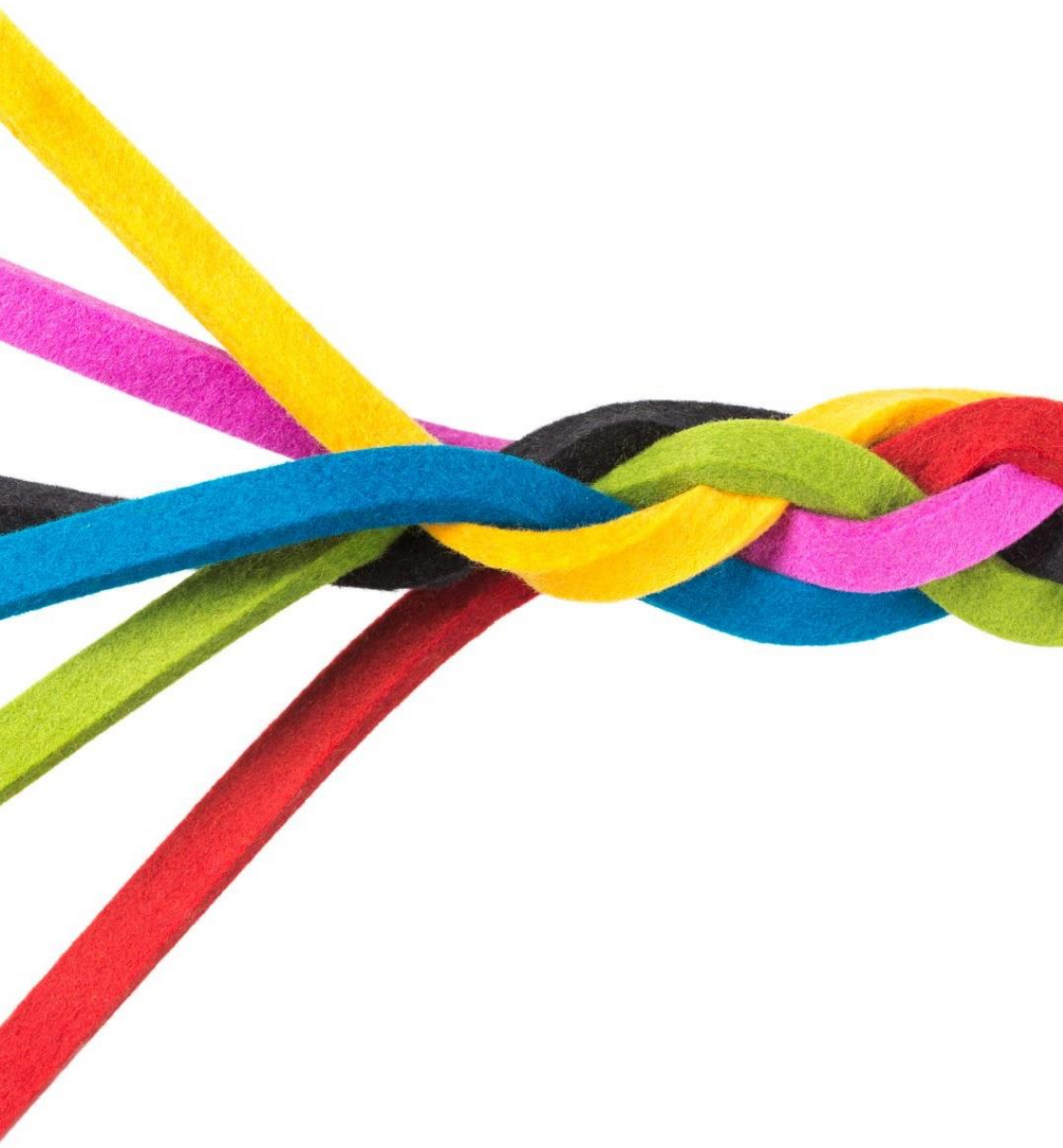
Students would need to read literature and extract the amino acid sequence of the malicious protein (optional). Then they will use the `iterate()` function to compute 10 translations and transcriptions. And the `compare()` and `check()` functions to compare the amino acid sequence of the protein with the computed ones. If they are identical, the disease is heritable, otherwise the disease is caused somewhere else.



# Flipped classroom

- Assigning tutorials as homework
- Use class time for interactive and active learning
- Maximized classroom engagement
- Personalized instruction





# Collaboration

- Encourage group projects (e.g. create a new function)
- Fostering of teamwork and communication skills
- Learning from each other

The background of the slide is a dense, overlapping collage of numerous small, rectangular sticky notes. These notes are in various colors including blue, green, pink, and yellow. Each sticky note has a large, black, handwritten-style question mark printed on it. The notes are scattered across the entire frame, creating a textured and busy visual effect.

# Questions?

Submit a GitHub issue @ [github.com/joanalnu/gen10!](https://github.com/joanalnu/gen10)