

# 4 Genetics

In this module, the students develop the basics of genetics and epigenetics. As participants in a scientific conference, they prepare an opening, an introduction and a PowerPoint slide.

The three tasks are performed in three groups from the beginning.

## Introduction

**“The idea that genes turn us into puppets and predetermine everything is nothing but superstition.”**

Craig Venter, biochemist, born 1946

Split the *Chair*, *Introduction* and *PowerPoint Slide* tasks between three small groups. All groups begin to prepare simultaneously.

⌚ 90 minutes

✍ **Tasks:**  
*Chair*, *introduction*,  
*PowerPoint-slide*

📄 **Material:**  
*Chair*  
*Introduction A*  
*Introduction B*  
*PowerPoint slide A*  
*PowerPoint slide B*

## Chair

Two students deal with the conference day opening – similar to the conference chair. They briefly introduce the concept of epigenetics. For this they will receive an article and key questions on the topic.

⌚ 35 minutes preparation  
10 minutes presentation

*Small group of two students*  
*Chair exercise sheet*  
*Chair material sheets*

## Introduction

Two students perform the task of introducing one researcher. They each receive material (Introduction A and B) and research notes.

⌚ 35 minutes preparation  
2 x 5 minutes presentation

*2 small groups of 2 students*  
*Introduction exercise sheet*  
*Introduction A material sheets*  
*Introduction B material sheets*



**PowerPoint Slide**

Two groups each work on an informative PowerPoint slide. The slide should briefly summarize both topics. The basic rules of good presentations apply:

- 3–6 points on the slide or in a diagram
- clear heading (44 pt.)
- font size at least 28 pt.

Students may use PowerPoint or sketch their slide on paper.

- 🕒 35 minutes preparation
- 2 x 10 minutes presentation
- 2 x 5 minutes questions

**2 small groups**

PowerPoint-slide exercise sheet  
PowerPoint-slide material sheet A  
PowerPoint-slide material sheet B

If needed:

computer with PowerPoint

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Following their joint preparation time, the groups present their results one after the other and thus reenact the conference day:

- 1) Opening by the Chair
- 2) Introduction of a female and a male scientist
- 3) Two short presentations with PowerPoint slide

**Outlook**

At the end of the lesson series you can take over the farewell to the conference participants: "Many thanks for the numerous interesting contributions to our conference!"

Afterwards, you can summarize your impressions on the lesson series.





## Welcome Address

At conferences, the Chair takes over the words of welcome and generally introduces the topic of the conference day. The Chair is basically the chairperson of the conference.

- TASK** As Chair, prepare a short introduction to epigenetics:
- Delineate the term genetics.
  - Describe how epigenetic changes in the genome are manifested.
  - Use one of the following examples to illustrate how epigenetic differences can make an impact:
    - o Bees: worker and queen
    - o Identical twins

- BONUS** Lead a discussion on how the judge should decide on Bob's application.



## Introduction

Important speakers at conferences are introduced. Their person and research are briefly discussed.

- TASK** Prepare two introductions for:
- Conrad Hal Waddington
  - Emmanuelle Charpentier

**OBJECTIVE** The best-known research results of the scientists should be summarized in your introduction.

- TIP** Use the search terms on the Internet search material sheets to find out more about Waddington and Charpentier's research.





## PowerPoint Slide

At conferences, scientists often present their results using PowerPoint slides. These present the most important facts and figures, for example using diagrams.

**TASK** Prepare an informative PowerPoint slide using bullet points. To do this, you will be given a newspaper article or a diagram.

### PowerPoint topics:

PowerPoint slide A: Current status of cloning

PowerPoint slide B: The CRISPR/Cas9 method

**TIP** Read more on the topics:

Therapeutic cloning:

<https://www.eurostemcell.org/what-cloning-and-what-does-it-have-do-stem-cell-research>

Targeted genetic modification of iPS cells:

<https://www.eurostemcell.org/crispr-changing-gene-editing-landscape>

<https://zellux.net> (in German)

