

## Science Theatre (ST) – Sample

### Rosalind Franklin

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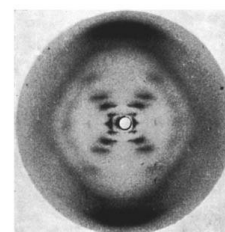
*The activity exemplified in this Sample was part of the project "Donne e Scienza. Il valore della diversità di genere nella scienza" ("Women in Science. The value of the difference in science", supported by the Italian Minister of Education, Research and University 2012-2013. This project was realized with 12-16 year old pupils. Scientific study themes: Biology (DNA and evolution) and physics (light).*



We started the workshop by introducing the story of Rosalind Franklin:

Born in 1920 in London, England, Rosalind Franklin earned a Ph.D. in physical chemistry from Cambridge University. She studied crystallography and X-ray diffraction, techniques which she applied to DNA fibers. She took photographs

that provided key insights that brought her to deduce the shape of DNA structure. Her supervisor and her colleagues, Watson and Creek, used it as the basis for their DNA model and received the Nobel prize for the discovery. Franklin died of ovarian cancer in 1958, at the age of 37.



### Scientific Exercise

We posed the following key questions, thus stimulating a discussion about DNA and evolution: *What defines whether something is natural or artificial? If it has life or not? Is a mountain natural or artificial? A crystal? A shell? A beehive? Why?*

#### ***Cycle 1- The evolution model***

We proposed a *toy model* to introduce a model of evolution, starting with the drawing of a fish. We asked the pupils to copy the drawing as precisely as possible. We put all the drawings in a row. Surely, some 'mutations' of the original fish occurred. We chose one of these new 'generations' of fish (for example the fattest) and asked the pupils to reproduce this



new one. Another row of fish was produced, and this time we chose the fattest of this new generation. We then asked the pupils to reproduce this one.



We observe the fish after three 'generations' e.g. the fish of third generation are fatter than fish of previous generations.

#### *Questions and inquiry*

We discuss why this occurred, and how we can see an analogy with nature in this exercise. We closed the session with the question: how can the information pass from one generation to the other?

### ***Cycle 2 – Crystals and DNA***

Students built crystals (sugar, salt, etc..) and observed them. Then the tutor presented a crystal and asked them to identify it. We discussed Schrödinger's definition of DNA as an a-periodic crystal.

### ***Cycle 3 – Models of the Light and diffraction images.***

We proposed an inquiry-based training about the models of light: from the geometrical optic to the wave model. We analysed the diffraction images, from the simple pattern of a red laser to the images of crystal X-ray diffraction.

### ***Cycle 4 – The shape of the DNA.***

We stimulated the discussion using photographs of Rosalind Franklin and images of the DNA models.

### **Drama Exercise**

The pupils built models of evolution with their bodies.



## **The Video**

High School "Casimiri", Gualdo Tadino

<https://www.youtube.com/watch?v=MqKkD35ez-g>

This video is realized by the Students of Gualdo Tadino High School after the Science Theatre project.



Enjoy!