

# THE JOURNEY OF LORAN

## FROM THE JUNGLE TO THE LAB

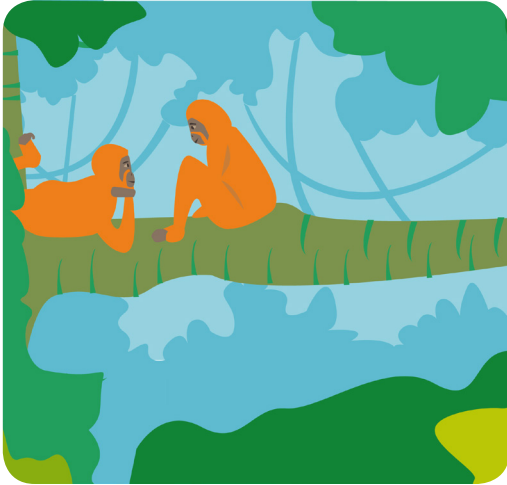
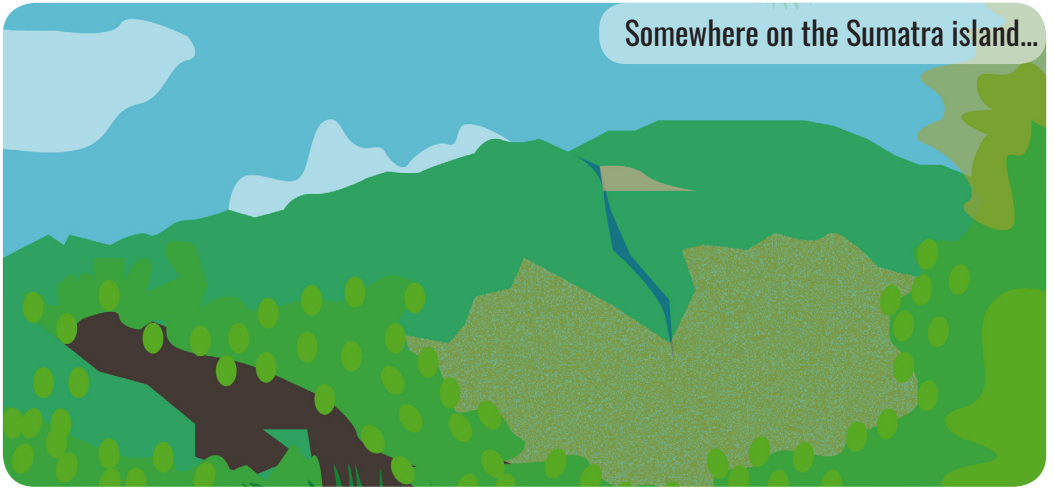


**Script : iGEM Sorbonne Université**  
**Illustrations : Marlène Mezache**

# *THE JOURNEY OF LORAN*

FROM THE JUNGLE TO THE LAB

Somewhere on the Sumatra island...



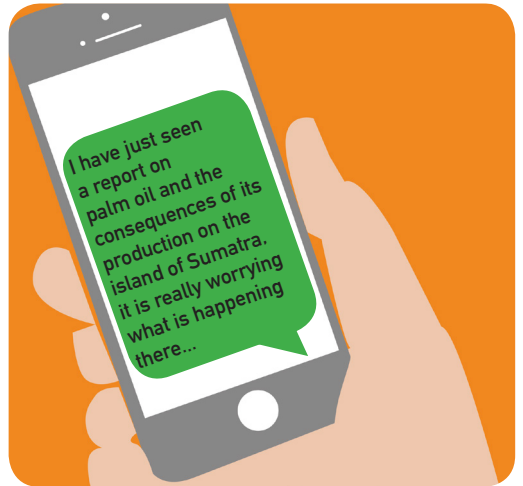
10000 km away in Paris...



**PALM OIL PRODUCTION REQUIRES A LOT OF SPACE TO COVER THE WORLD DEMAND....**



**THE ECOLOGICAL CONSEQUENCES ARE DEVASTATING...**



Next morning at the sciences faculty Pierre-et-Marie-Curie



*Chlamydomonas Reinhardtii* is a microscopic photosynthetic alga that can grow in the presence of light and, when its environment is deficient in nitrogen, can accumulate fats in the form of lipid droplets.



1h later at the IGEM team meeting

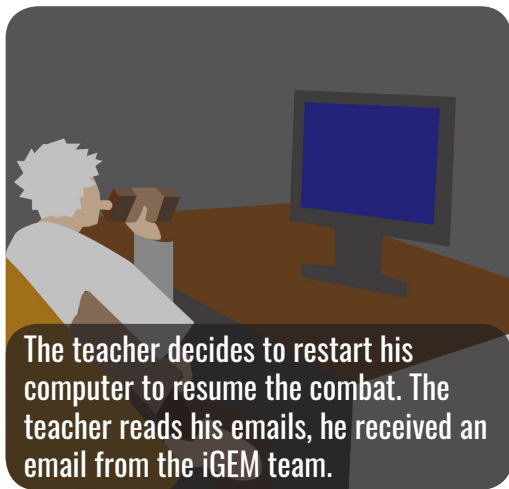
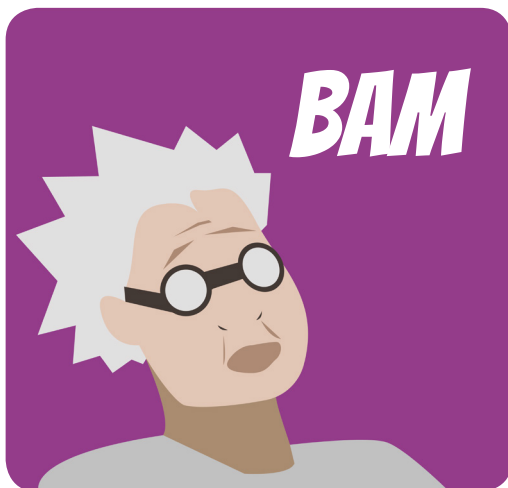


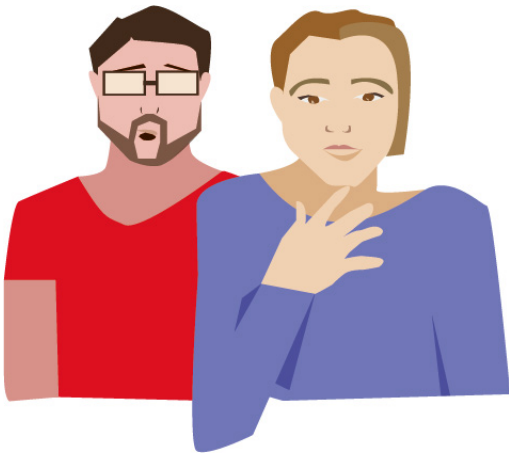
**IT'S STRANGE... THERE'S NO SIGN OF PROFESSOR X SINCE 1996 SINCE HIS RESEARCHES ON PALM OIL.**



**SEND AN EMAIL, WE CAN ALWAYS TRY!**







The DNA corresponds to the genetic information of the cell. It is composed of elementary bricks that are nitrogenous bases: adenine thymine cytosine and guanine (ATCG).

In a cell, DNA is read and transcribed into RNA, which also consists of nitrogenous bases (AUGC).

The succession of 3 nitrogenous bases codes for an amino acid, an elementary brick of proteins. If we take this text and translate it, we find the corresponding letters of each amino acid encoded by the DNA sequence.

But it's weird, these letters don't give you any sense...

Let's try to look at their position in the alphabet, this should give us a series of numbers.

A -> 1

B -> 2

It looks like GPS coordinates, let's see where it goes on the world map?.....





After a long journey...



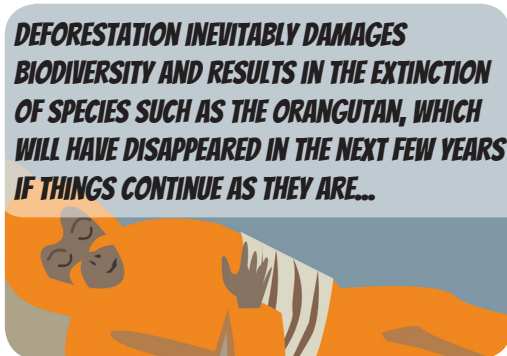
FINALLY, HERE YOU ARE

they finally discover the teacher's gate



**THANK YOU FOR MAKING THIS LONG TRIP. I BROUGHT YOU HERE BECAUSE THE SITUATION IS CRITICAL...**

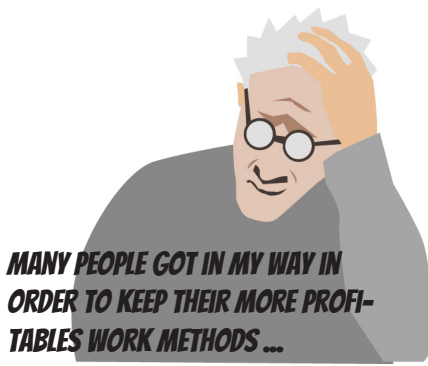
**THIS IS DENMARK. ITS SURFACE AREA IS 42000 KM<sup>2</sup>. WELL, YOU SEE, MALAYSIA HAS LOST AN EQUIVALENT AREA OF PRIMARY FOREST TO PLANT MONOCULTURES OF OIL PALM TREES.**



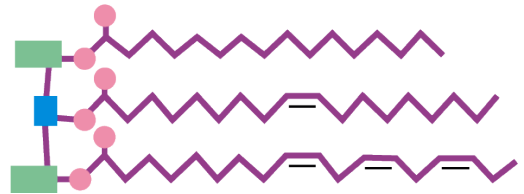
**DEFORESTATION INEVITABLY DAMAGES BIODIVERSITY AND RESULTS IN THE EXTINCTION OF SPECIES SUCH AS THE ORANGUTAN, WHICH WILL HAVE DISAPPEARED IN THE NEXT FEW YEARS IF THINGS CONTINUE AS THEY ARE...**



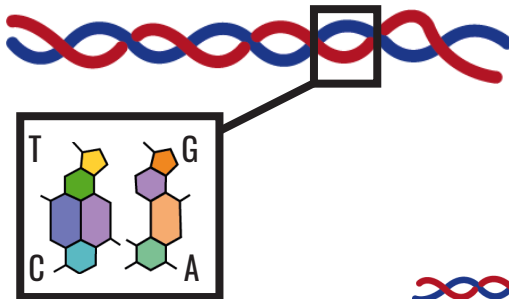
**BUT, IF I MAY ASK, WHY DID YOU LEAVE AFTER ALL THE RESEARCH YOU DID, PROFESSOR?**



Palm oil is a mixture of several fatty acids, mainly palmitic acid and oleic acid, which are stored as triglycerides.



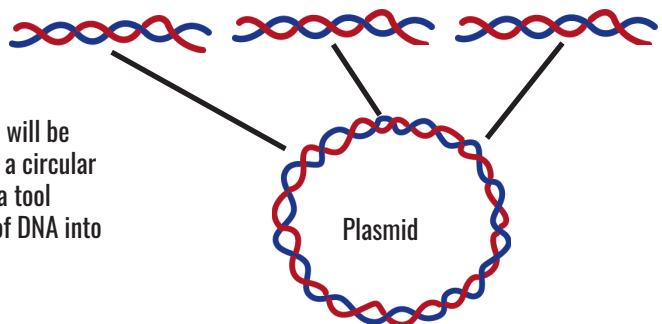
To produce fatty acids, we need proteins called enzymes, which are coded by DNA. Here's how we will proceed: Let's start from the beginning



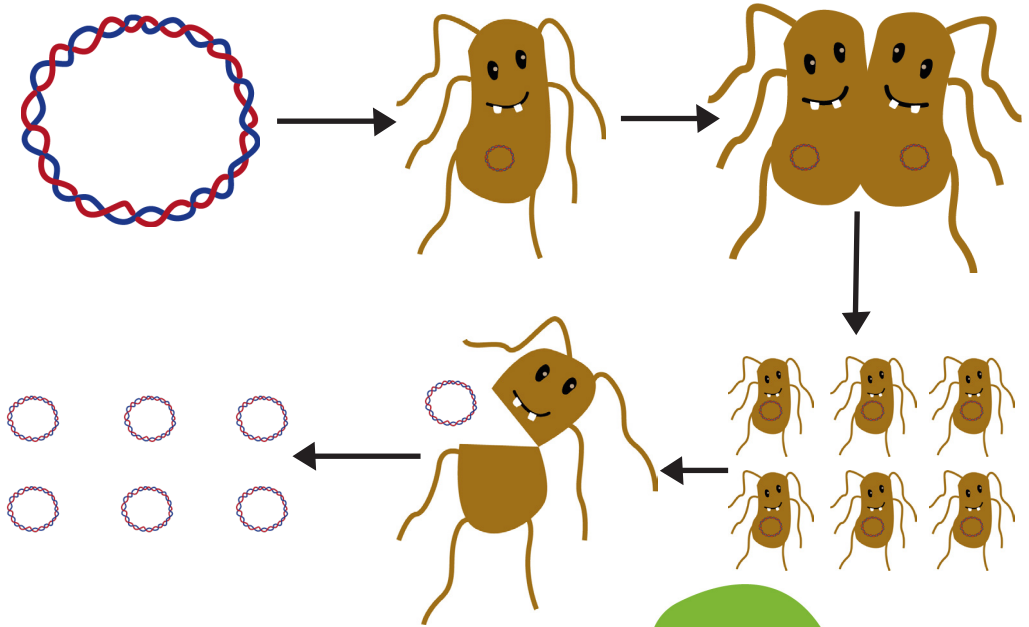
DNA is the support of genetic information. It consists of elementary molecules called nitrogenous bases.

There are 4: Adenine Thymine Cytosine Guanine. The succession of nitrogenous bases defines a sequence called a gene. A gene codes for a protein.

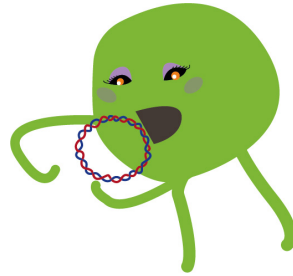
The sequence that codes for our enzymes will be introduced into a plasmid. The plasmid is a circular DNA. In synthetic biology, the plasmid is a tool called a vector that allows the insertion of DNA into an organism.



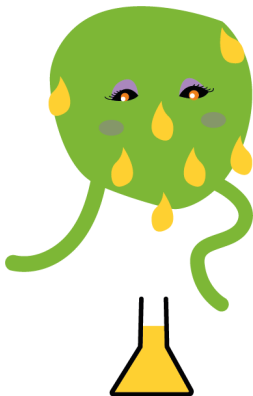
A large number of our plasmid must be obtained. To do this, we insert it into a bacterium called *Escherichia Coli*. By multiplying, the bacteria will also multiply the amount of plasmid. The plasmid will be extracted from our bacteria and harvested. This technique is called cloning.



Once the plasmids have been collected, they will be inserted into the alga *Chlamydomonas*. The inserted genes will allow us to obtain our 3 enzymes, which will act on the fatty acid production pathway. This will increase the amount of palmitic acid and oleic acid. The last step is to recover the oil droplets accumulated in the algae.



*Chlamydomonas* is a photosynthetic alga. It uses the sun as an energy source. It is also mixotrophic, i.e. it can use both mineral and organic elements as a carbon source. Finally, it is able to grow in both solid and liquid media, which makes it ideal for cultivation.



The experiments are launched



After several months of hard work, the team finally manages to obtain an oil with a composition similar to palm oil.



The research of the iGEM Sorbonne University 2019 team and the Crazy Professor has led them to the creation of their start-up, the bi[oil]ogical factory, which has specialized in the production of various and diverse oils for food or industrial purposes, by developing and optimizing their *Chlamydomonas* model. Through this project, the production of conventional palm oil has certainly not been replaced by this new production method, but has nevertheless made it possible to offer an alternative. This project reflects the range of solutions that synthetic biology can offer in response to various modern problems (environmental, societal, medical), with a field of possibilities that is constantly expanding.

