

# Safety Guide

## About Safety Guide

- "Is genetic engineering safe?" is a well asked question when we explain about iGEM to people. Therefore, we made this safety guide to explain "what is genetic engineering" and "how genetic engineering is kept safe" briefly.



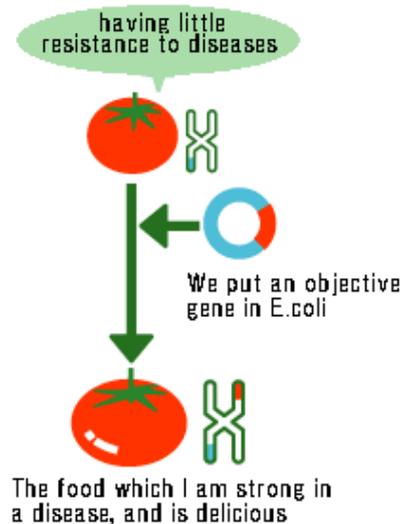
### What is iGEM?

iGEM is an international competition of synthetic biology that is held at MIT (Massachusetts Institute of Technology) in every November. Mainly, undergraduate and graduate students participate this world's largest competition. Each team designs their own biological device, constructs the device from "genetic parts" and makes a presentation of their project at the competition. Each team will be evaluated overall their

## What is genetic engineering?

- Genetic engineering is a technique that adds a new character to an organism by inserting a particular gene from another organism to its cell.
- Genetic engineered foods are well known but the technique is applied not only to foods but also to various fields. For example, agricultural, environmental, industrial and medical fields. However, there are limits for the use of this technique. There are concerns about the unknown effects of LMO (Living Modified Organism) to the biodiversity and the sustainability of the ecosystem. (cf. genetically modified foods' effect to human body) Therefore, a rule called Cartagena protocol was set.

### the technique of gene recombination



## What kind of experiments do we do?

- We transform a particular gene to improve the E.coli to be more useful.
- In fact, we TMU iGEM team use E.coli in our experiment. For instance, we can make a detoxifying E.coli by tranforming a gene that decomposes the toxic substance.

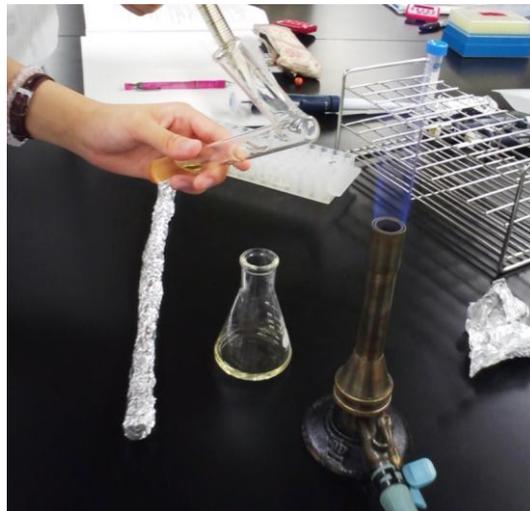
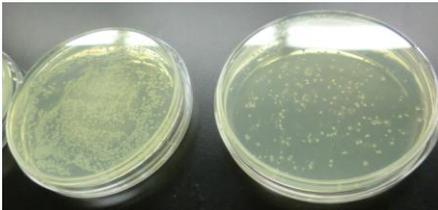
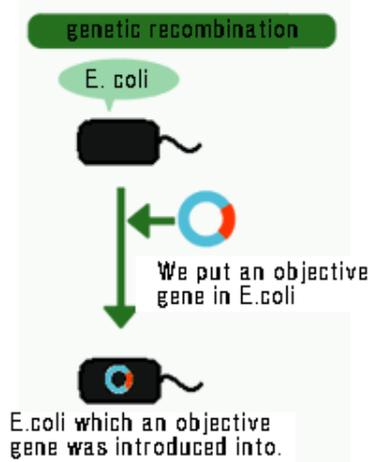


Fig.

## What is Cartagena Rule ?

- Cartagena Rule is the rules of recombinant DNA technologies and experiments.
- January 2000, the "Cartagena Protocol on Biosafety" was adopted in the Extraordinary Meeting of the Conference of the Parties : ExCOP.
- "The Cartagena Protocol on Biosafety to the Convention on Biological Diversity is an international agreement which aims to ensure the safe handling, transport and use of living modified organisms (LMOs) resulting from modern biotechnology that may have adverse effects on biological diversity, taking also into account risks to human health" (cited from <http://bch.cbd.int/protocol/>).

## Is there any rules in Japan?

- Japan has a national regulation for transgenic technologies.
- Japan ratifies the Cartagena Protocol. And for the domestic enforcement, the treatment of the LMO is classified into two groups.
- "Class 1 use": Use without measures for nonproliferation in the environment.
  - Regulations for outdoor use, LMO cultivation, LMO circulation as grains. It requires an admission by the minister in advance.
- "Class 2 use": Use in laboratories and factories to avoid diffusion to the environment.
  - The objects are studies and industries involve laboratory experiments. Regulations for nonproliferation is imposed. Measures for nonproliferation according to the ministerial ordinance or admitted by the minister.
  - The rules in Japan is more strict than the Cartagena Protocol in the point of the regulation over "imported LMO food, feed, processings" as Class 1.
- The conservation of the biodiversity from transgenic technologies is done as above regulations.

## Where are the experiments done?

- In laboratories that achieve a high safety level.
- There is a strict standard called "physical containment" (details below)

- (1) Inactivate LMO, polluted facilities and instruments before recycling or disposing it.
- (2) Keep the laboratory door closed.
- (3) Keep the windows closed. (to avoid insects etc)
- (4) Keep the aero-zoospore generation minimum
- (5) Transport LMO with containers that avoids leaking and spreading
- (6) Wash hands in order to prevent LMO's infection and adhesion.
- (7) Prohibit people's entrance to the laboratory who do not know the experiment

## We want you to know...

- genetic engineering is thought as operating genes arbitrarily but the subject that incorporate the gene is not human but is living self. Researchers investigate the features of the creature, and arranges the best conditions for transforming its gene exploiting their intelligence and experiences.
- These days, genetic engineering is getting more common than we can imagine. This technology may change our life better or may have dangers as well. We want you to know what is dangerous about it, how we can eliminate the risks and what kind of measure are taken now.

Written by:

Tokyo Metropolitan University iGEM team:TMU-Tokyo

HP <http://www.igemtmu.net>

Twitter: @igemtmu

