Age	All ages (specially kids)	**Number of people**	300 approximately	**Topic**	Synbio in space
Date					
Purpose	The student is introduced to concepts of synthetic biology and biotechnology through various activities focused on the types of intelligences, taking into account that we all learn in different ways.		**Time**	150 minutes	
Name of the activity			**Expected learning**		
Synbio in space			Develops curiosity for biological subjects.		
Sequence				**Resources**	
Presentation (10 minutes per round)					
We made a presentation of the uses or solution that can arrise in topics that relate to space thanks to the use of synbio. We were carefull to use very simple language and avoid technisisms because the publis had no contact with the topics we were presenting. This lasted about 30 min per round of people that sat down to listen.				Presentation	
Q & A (10 minutes per round)				No material required	
Viewing the moon and stars with a telescope (10 minutes per round)				Telescope	

IGEM TEC-CHIHUAHUA 2022

SYNTHETIC BIOLOGY IN SPACE

Opening up new possibilities

Synthetic biology

What is?

The application of science, technology and engineering to facilitate and accelerate the design, manufacture and/or modification of genetic material in living organisms.

What organisms?

Cells, Bacteria, Yeasts, Fungi, Virus

Applications

¿Where has it been used before?

- Drugs

- Vaccines

- Nutrition

- Diagnosis of diseases

- Space

- Biofungicides

AGROCAPSI
AGRICULTURE INDUSTRY

INSTAGRAM: IGEMTECCHIH

Drugs

INSULIN

In 2021, Mexico ranked sixth place in the world for the most people with type 1 diabetes.

Insulin that used to be extracted from pig pancreas:

- was hard to obtain
- was collected in low quantities
- had negative health reactions

Bacterial biofactories are currently used.

VACCINES

Covid-19

Pneumococcus, Rotavirus, Hepatitis B, Tuberculosis, HPV, Tetanus

NUTRITION

Golden Rice

In the year 2000 the project was achieved. This new rice contained:

- Beta-Carotene
- Vitamin A

Acts against:

- Blindness
- Immune system diseases

DIAGNOSIS OF DISEASES

STDs

MULTI-ETS

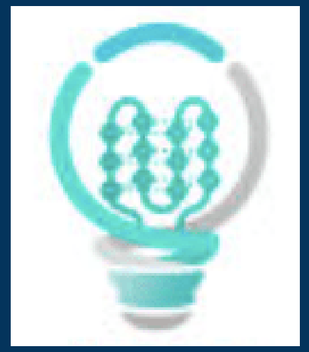
U-KNOW
Better Diabetes Prevention

DIABETES

U-KNOW

APTA VITA

VITAMIN, NUTRIENT AND MICRONUTRIENT DEFICIENCY DETECTOR



G-QUADRUPLEX

COVID DETECTION SYSTEM

SPACE NUTRITION AND SPACE TRAVEL

The change in the environment greatly impacts the nutritional needs of the astronaut.

They experience:

Exposure to intense radiation

High atmospheric levels of carbon dioxide

Microgravity

They begin to develop:

Muscle and bone loss

Decrease in the immune system

Vision changes

SPACE

The solution of a group of scientists (TOLOUSE-INSA UPS) was to produce a yeast rich in vitamins.

Currently bread is made with the help of yeast, it is the component that helps it to rise.

Thanks to these components the ship is able to carry out the solution:

Water

Nitrogen

Carbon dioxide

Oxygen

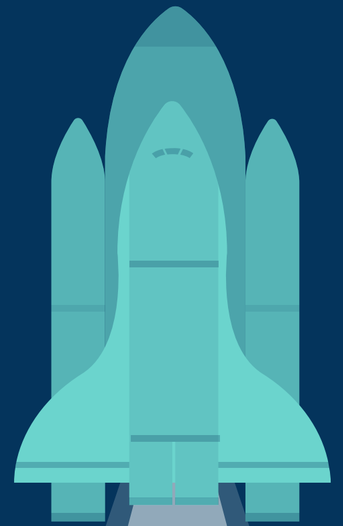
SPACE

RADIATION AND BIOREGENERATIVE LIFE SUPPORTS

Here on Earth we are protected by the atmosphere and magnetosphere. In space there are high levels of cosmic and solar radiation.

Life supports are responsible for recreating terrestrial ecosystems for long-duration travel (Earth-Mars).

Plants such as algae are commonly used as life supports but they are not able to withstand intense radiation naturally.

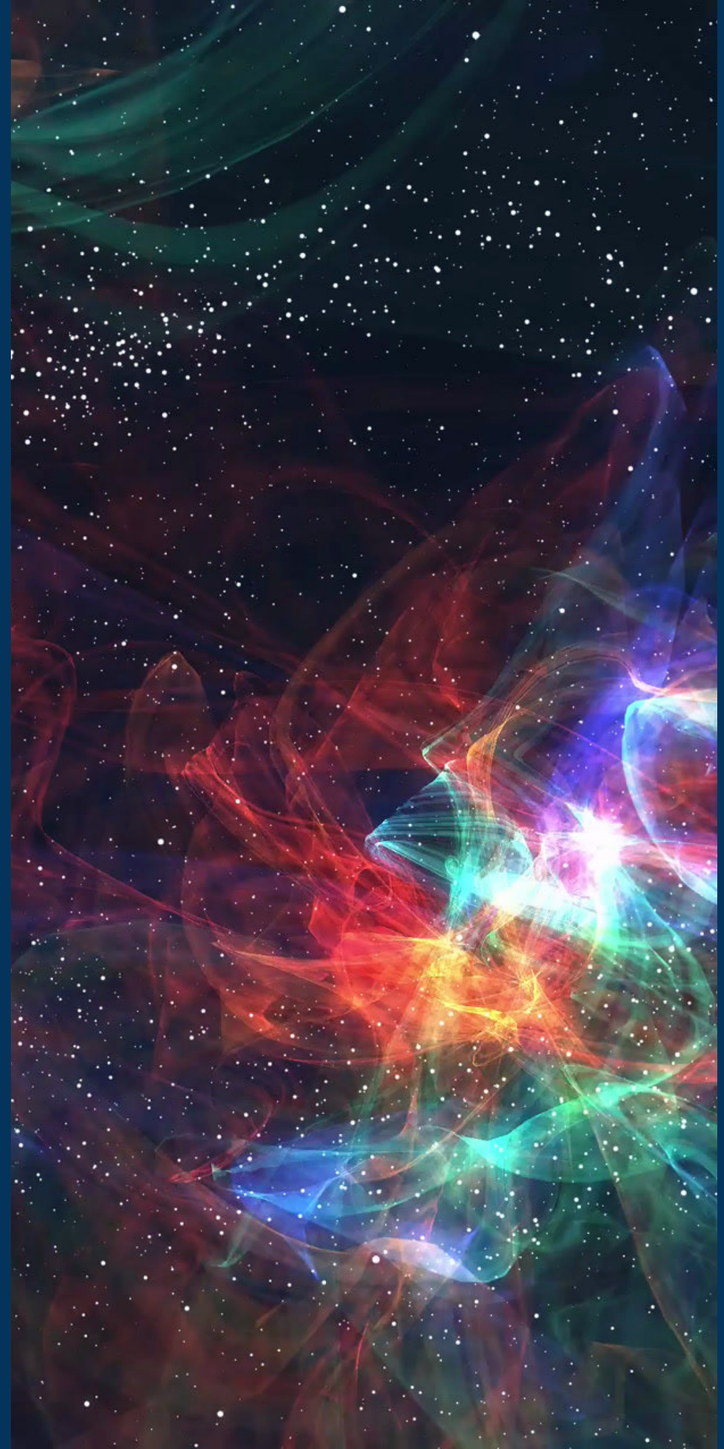


SPACE

Therefore, the SORBONE_U_PARIS team succeeded in extracting genes from Deinococcus radiodurans and inserting them into the genome of green algae.

D. radiodurans is a bacterium that is unaffected by radiation and can withstand extreme heat. Now that quality was given to viable algae to make Bioregenerative Life Support.

Opening up the possibility of longer space travel.



BIOFUNGICIDES

CHILI CROP LOSSES OF UP TO 100%.

The oomycete Phytophthora capsici is capable of eliminating (in an imperceptible way at the beginning) entire chili bell pepper crops and remain in the soil for multiple years.

Current treatments use agrochemicals that are harmful to the environment and health and do not prevent the fungus from reappearing.

BIOFUNGICIDES

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We are developing a biofungicide from 2 P.capsici resistant proteins and RNAi for oomycete gene silencing.

Protein and RNAi genes were put into E.coli biofactories to obtain large quantities.

DNA sequences are inter-spliced into the E.coli genome. They are then extracted and a formulation is made so that they can be safely applied to the cultures.

SYNTHETIC BIOLOGY IS A TOOL THAT OPENS UP NEW POSSIBILITIES BEYOND WHAT IS KNOWN.