



iGEM IISER_TVM 2022
Presents

Online **SciBio** Camp

EVENT SUMMARY

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PREP WORK

We conducted the online SCI-BIO camp on June 4 and 5th. This was when the students reached the end of their summer vacation, and hence, we thought it would be great to hold a session then, teaching students new things before the start of their new academic year.

Since our participants are middle school students, before making the materials, we carefully referred to their current syllabus and had interactions with some of the students to get an idea of how much knowledge they had prior to the session.

Next, we sent out a poll question in the registration form to get an idea of how many students knew about the topics. Seeing a varied level of knowledge, we decided to go from the basics and increase the complexity.

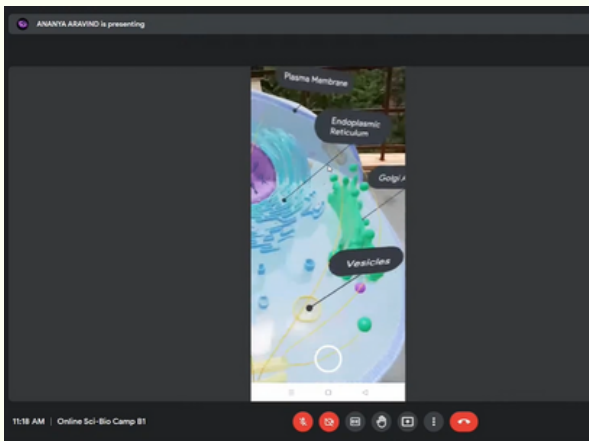
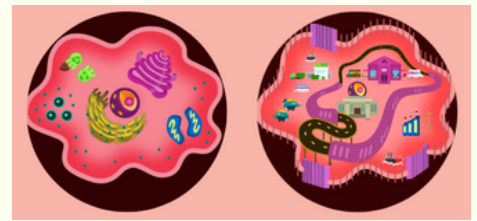
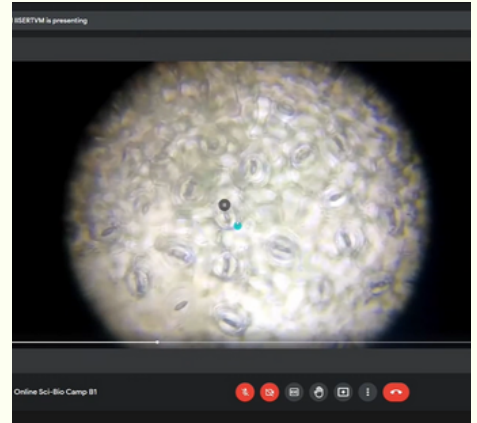
We also decided to live stream the sessions so that the knowledge is not restricted only to the given age group students. Everyone from all age groups was invited to attend our sessions through our live stream on youtube.

We decided on four sessions, two per day - a 3-hour morning session and a 3-hour evening session. Each session was further divided into 1-hour lesson followed by an hour of interactive activity and then another hour of lesson.

WHAT IS A CELL?

The first hour of Session 1 started with a brief introduction about the science they observe around themselves and showed them a microscopic image of leaf. The kids were asked to guess what was shown under a microscope, and the students were very surprised to know that it was stomata. Though they knew the textbook definition of stomata, it was some of their first times seeing the stomata under the microscope.

Further, the functions of cell organelles were described by drawing an analogy to how a city works. The animation from Cell City YouTube was used to explain after getting prior permission from the creator McKenzie Tucker to use it.




The interactive activity was something all the kids loved the most—AUGMENTED REALITY.


We used the Google AR feature to show the kids the 3D image of the cell. The kids were super enthusiastic to try this feature on their phones. We had fun exploring the different organelles of a cell in three dimensions with their relative size and location. Further, we observed plant cells, mitochondria and bacteria.

The history of cells, microscopes and different scientists involved in the development of the science field was explained in the next 1 hour of session 1. We gave a brief introduction to cell theory and the remarkable invention of cloth merchant, Antonie van Leewenhoek.

Antonie van Leewenhoek



- He was a merchant.
- To access the quality of thread, he discovered special types of lenses.
- Through his lens, he could observe things big.
- He was the first to observe live cells.
- He was the first person to observe a bacterium.



DIVE INTO THE WORLD OF MICROBES

The first hour of session 2 in the afternoon began with a short explanation about all five kingdoms of organisms. This was followed by a short experimental proof we conducted in our lab for this camp. Does soap really kill germs, and how efficient is it?



We got three LB plates, placed our fingers with washing our hands and without washing our hands and left them to incubate. As expected, we can see the growth of fungi and other microbes in the unwashed fingerprint LB plate but minimal microbial growth in the washed fingerprint. This gave the kids the actual experiment proof of why it is very important to often wash hands to kill microbes and maintain hygiene.



The interactive activity was basically a lab tour of our facility on our campus. A simple working principle of the equipment present was explained. Then slides under microscopes were shown, and the working parts of the microscope were explained. We also explained the importance of cell staining in cell imaging and the different types of stains we use in our lab.

The last session was an interactive game from <https://www.amnh.org/explore/ology/microbiology/bacteria-in-the-cafeteria-game> whose idea was to determine whether or not a bacteria living in different locations was harmful through riddles. We explained all 12, both good and bad general microbes with actual microscopic images of them.



HEREDITARY

In the first hour of the session, the students were introduced to the basics of genetics. Starting with hereditary, we explained to them the hereditary factor genes and how they governed our phenotype and genotype.

The students were very eager to know more about DNA. Then we gave them a very brief introduction to the code of life, nucleotides, and triple nature of codons.



LANGUAGE OF LIFE

Make words from the 26 English alphabets . similarly, there is 3-letter words or 'codons' using only 4 letters of the alphabet: **A, T, G and C.**

Each word that can be made using these ATGC letters are called aminoacids

A	Alanine	GCT
B		GCA
C	Cysteine	TGC
D	Aspartic acid	GAT
E	Glutamic acid	GAG
F	Phenylalanine	TTT
G	Glycine	GGG
H	Histidine	CAT
I	Isoleucine	ATA
J		ATC
K	Leucine	AAG
L	Leucine	CTC
M	Methionine	ATG
N	Asparagine	GAC
O		GAT
P	Proline	CCC
Q	Glutamine	GAG
R	Arginine	CGT
S	Serine	TCA
T	Threonine	ACT
U		ACG
V	Valine	GTC
W	Tryptophan	TGG
X		GTA
Y	Tyrosine	TAC
Z		JAT

What is DNA code of your name?

EXAMPLE - ANANYA
GCT GAC GCT GAC TAC GCT

Once we taught them the different codons for Amino acid letters, the interactive activity was to write their name in the code of life secret letters. The kids wrote their own names using the Amino acid symbols.

The next hour, we explained to the kids what mutations are and their consequences. We gave possible changes in the gene sequence that can change the function of the organism and gave a brief idea about different examples of natural mutations in humans.

DIMPLES ARE TYPE OF MUTATION

The gene responsible for facial dimples is said to be carried by chromosome 5, and it influences the formation of defective muscle to develop, resulting in the formation of dimples.



ASK US ANYTHING

The last session of the camp was "ASK US ANYTHING" based on the information they gained those two days. They asked us many questions related to the evolution of organisms and how the first DNA came into existence. When we explained to them our project idea, they were intrigued and asked many questions like the difference between cancer cells and normal cells.

As a concluding activity, We asked the kids to create their own microbe with superpowers. We were amazed by imaginative young kids who came up with very creative microbes, some of them even being iGEM projects! There was a kid whose idea was to create a microbe that can eat fungi. That was precisely what our past team's project was - modifying bacteria to produce antifungals to fight against fungal infection.

IF YOU COULD DESIGN A MICROBE WITH A SUPERPOWER, WHAT WOULD IT BE?



On the occasion of World Microbiome Day, we put up a story on Instagram showing these innovative superpowered bacteria that the kids came up with, comparing them with the existing bacteria having the same function.

These two days were very exciting, with loads of enthusiasm from the kids. We, as conductors of the events, learnt a lot too! In an online session, not all the students are attentive. Usually, there are only a few sets of students who repeatedly interact. To ensure everyone had the chance to participate, we addressed every student by name, gaining interaction from all. Since there were a lot of people from various backgrounds, we made sure to start from the basics so as to maintain uniformity.