OMG ESCAPE ROOM
GUIDE BOOK

An original game designed by iGEM NCKU-Tainan 2019

Foreword

OMG Escape Room was designed in the summer of 2019 by iGEM NCKU Tainan 2019 for the iGEM competition. One of our goals when designing our Escape Room was to make it completely open-source and customizable for everyone to use. Therefore, we will provide a full guide explaining our game setup and all the details. Our Escape Game is simple in design, and only requires a limited budget due to the use of DIY equipment. Chinese and English versions of the clues are also designed to make our escape room more user-friendly. Unlike usual Escape Rooms that require plenty of space, we managed to create an extraordinary experience in a limited space - just two normal sized classrooms. Through the simplicity of the game, we also ensured that players of all ages are able to play our game and still have fun.

We hope that through this, we are able to inspire more people to explore the wonders of synthetic biology.

Much love,
iGEM NCKU-Tainan 2019

Introduction

In an effort to combine all three facets of Human Practices - engagement, education and publicity outreach, we launched our very first and original Escape Room Activity. Players are able to learn more about synthetic biology and also our project through an interactive and hands-on experience. Part adventure, part intriguing storyline, and an assemblage of puzzles and readers, players will resort to critical thinking to be able to make their escape. Science has shown that when having fun, not only does time fly, but we are able to retain more of what we learn too.

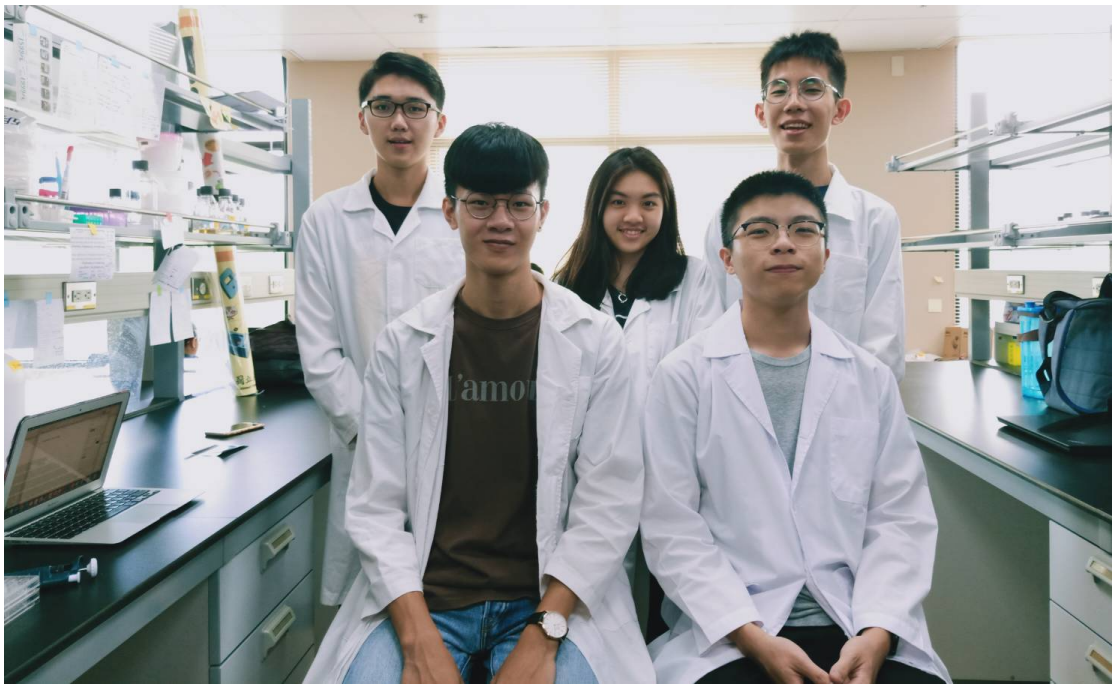
Inspired by our Oh My Gut project, OMG Escape Room is an interactive and hands-on way to learn about our project. By allowing the players to explore their surroundings and piece together our project via the clues we had left them, they are able to gain a deeper understanding of synthetic biology and also our project.

In two separate classrooms, a team of 4 -6 players are able to fully immerse themselves into the story plot and finish the mission they had been given. OMG Escape Room consists of three stages, each with a specific task they have to accomplish before they are able to continue to the next stage. Players are given a total of 60 minutes, 20 minutes per stage to finish the task. Even if they are unable to finish the task in time, they need to move on to the next stage.

During the game, at least one person will follow the team: known as the Game Master (GM). For our Escape Room, we highly advise there be two Game Masters, one for each room. GMs are there to explain the rules and also provide clues if necessary. After each session, GMs will then go through the entire game play and explain the riddles, and the scientific notion behind it.

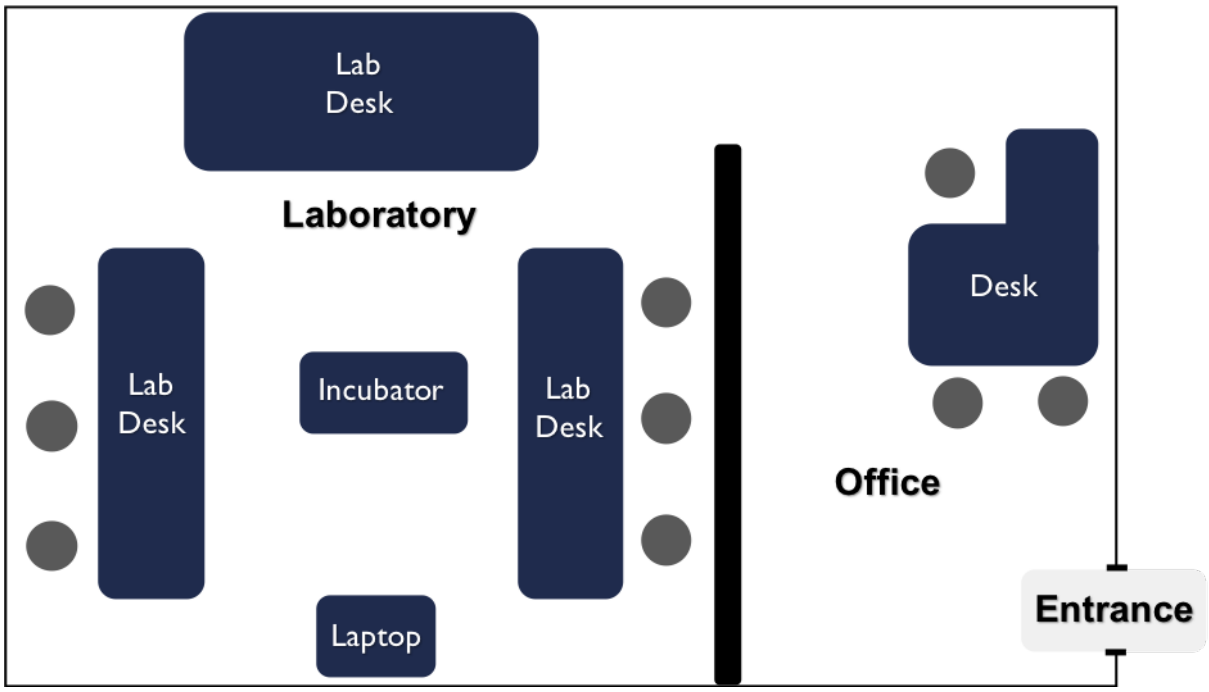
Escape Room Plotline

It was the year 1995, and the King of a little kingdom called Syldavia was found to have contracted a serious disease that is seemingly untreatable. The Queen had issued a plea far and wide, hoping to cure her beloved, and offered a humongous reward in return. She pleaded to all scientists around the world, to find the mystery cure to save her beloved husband. But just when Professor K.O was about to finalize the cure, he was found dead. The fate of the kingdom is in the hands of all players. They need to hurry and find the cure to this mysterious disease and save the King and give the kingdom the peace it deserves.

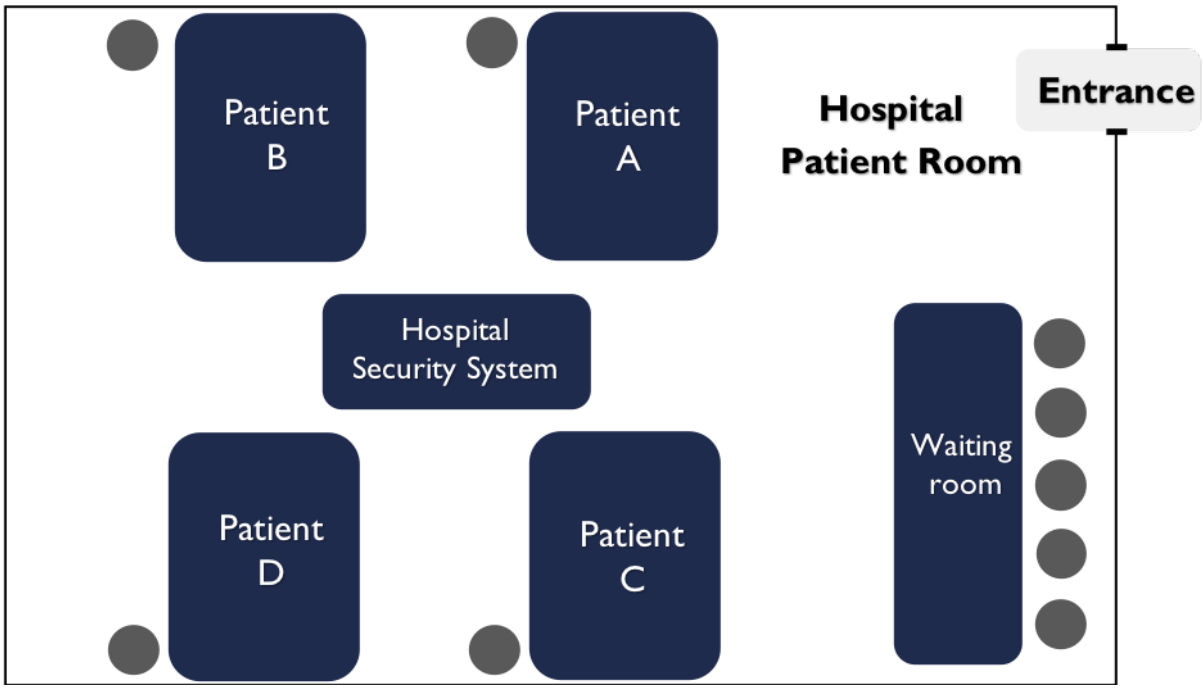


To make this experience as real as possible, we casted several teammates as key characters of our game. In the picture above is Professor KO (bottom left) and his team of researchers. One of the researchers (top right) is the murderer.

Room Setup



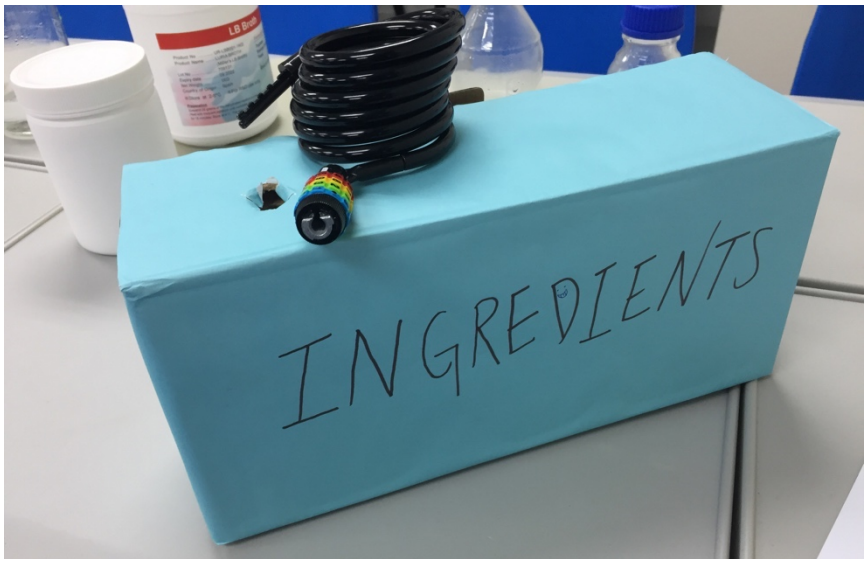
Room 1



Room 2

Stage 1 – Find the cure ingredients!

The first stage is set in Professor KO's office, where they have to sort through and find four clues scattered around the messy room. All the clues are located on the table. There will also be Professor KO's notebook located there, which includes several details that players might need to finish the game. It is here that players find out that the 'mysterious' disease is Chronic Kidney Disease. Players will need to solve the clues to find the right combination for the safe that holds the cure ingredients. The safe holds many ingredients (unlabeled tubes filled with colored liquid), which the players will have to bring to the next stage and determine the correct ingredients for the cure. Shown below is our ingredient safe.



Clues:

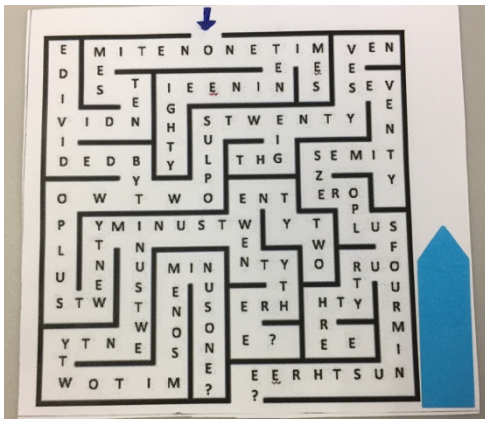
All our clues are singular digits and are also color-coded to correspond to the four colors (blue, green, yellow, red) on the lock on the ingredient safe. Players need to figure out this hint, before they are able to open the safe. Inside the safe contains 8 ingredients (tubes containing different colored liquids).

Yellow: Sudoku

The sudoku puzzle is hidden inside a newspaper. By solving the sudoku, the number inside the box underlined with yellow will be one of the codes to opening the safe.

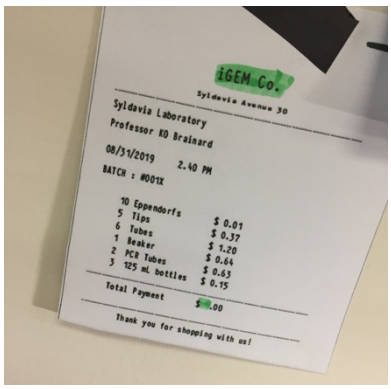
Answer: 7

Blue: Maze



This maze is hidden inside a folder on the table. Players need to complete the maze first to find the correct order of the mathematical equation before solving said equation. The final number they ended up with is another code to opening the safe.

Answer: 1

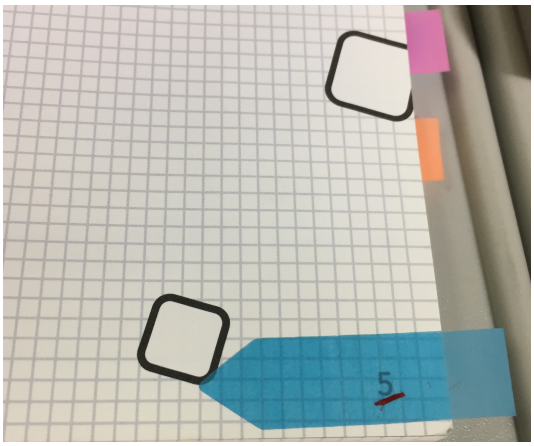


Green: Payment Receipt

This payment receipt is stuck on the wall. It shows the items what iGEM NCKU company bought. The players need to calculate the total payment, which will result in another code to opening the safe.

Answer: 3

Red: Associative Question



The associative question is the last but the most difficult one. This question is hidden in the magazine near the diary. Players need to find the connection between the page number and the red underline, or they won't get the hidden number we show to them.

Answer: 5

Notebook

The notebook is the KO professor's diary. From 1994 December 25 to 1995 April 11, We have designed the complete notes that describe the KO's daily life and experiment status. Also, we hide some potential clues that imply the suspect of murderer on it. By reading the notebook carefully, players will be able to discover suspense points in the game plot in the stage 2.

Here is what is written inside the notebook:

Biodata :
Name : KO. Brainard (but usually people called me KO or Bryan)
Age : 50 years
Occupation : Head Professor of Syldavia Laboratory (well you know Syldavia Lab is the most famous lab in our country!)
I'm single hahaha and so happy haha cos i'm married to bacteria
Hobby : I love to play sudoku ! It helps me to relieve my stress
I am interested in biology and chemistry but no for physics! hahaha

1994 December 25
Well today, we got an announcement from our king of Syldavia, he is suffering from unknown disease that can kill him! He even asked every Syldavia researchers to try find him a cure and he will give us a reward! OMG, I think it can be our project for next year! I will try to contact my fellow professor first, Mr.Mark maybe wants to join me and we can share the rewards together hahaha. OH! Probably Merry is also interested to join us.

1994 December 31
Oh yes! It's finally the end of the year! Ready to celebrate new year 1995, I wish our king's cure Research Project can work well! I hope Mark can help me to earn this reward! If he agreed to join me so we can be a good team partner I guess hahaha I hope so! :))

1995 January 1
Happy new year! Yeay new me! I don't know how all of my students heard about my upcoming new project and all of them want to join us here but… Since the reward is crazy I don't want to have many useless students, so from 5 students I have maybe I will just choose 2 of them.

1995 January 2
I don’t know which student to choose in this project. ARGH! Actually Merry, John and Andy are great, but Andy is my assistant, I don't think he needs to join our project so maybe just leave him out. Ok, let’s welcome my two students to join my team!

1995 January 3
ARGH! BAD DAY! I fought with Mark! Such annoying! He is mad at me because I didn’t let him choose which students should join our project! So sensitive!

1995 January 4
OK! We agreed about our projects term and everything! Time to start our lab days!

1995 January 20
The lab is doing fine for these few weeks we keep getting good results but erm IDK why I have a bad feeling toward one of my students, Merry. She just ... kind of different. I feel she joined this project only just for the money, I can’t accept this kind of thinking! But how can I kick her out?! I have no idea.

1995 January 30
Here I am again, fighting with Mark. Who is the leader? Why he keeps wanting to lead everything and change everything I have decided?! I don't understand! I know he wants to be known by Syldavians and take my work credits… HA! Do u think it will be that easy?!

1995 January 31
I bet the only person who I can trust in this project only John, he seems nice and listens to everything I told him. He deserves to be my assistant professor rather than that crazy Mark!

1995 February
One month break from laboratory because it's Syldavia Festival Month where we can't do anything! Hahaha actually I did experiments secretly because I can't stand with pending results! I need to take that bloody money asap!

1995 March 1
Ok! I made up my mind! I need to find a way to kick Merry out of my project! because I just can't share her that much reward money! I know she worked like 50% of our project for now but still, I'm the leader right! she can't ask more money to be given for her!1995 March 2
Oh last night, I couldn't sleep ! I was thinking about what plot should i make to make merry out from our project! Yea it's worth it! I will make her to be corruptor of our project haha! Time to edit a 'lil bit payment receipt

1995 March 5
YEY! MY MISSION IS ACCOMPLISHED! We kicked her out in a good way and the one who talked to her was mark so I won't feel guilty toward her hahahaha.

1995 March 6
So today we had a meeting and my assumption that this disease has relation with kidney, maybe the kidney malfunctions or something. Because looking through the symptoms like they have much more amount of urine compared to normal people or even they lose appetite.

1995 March 15
We did some research about patients in hospital that possibly are suffering the same disease with our king.
This kidney disease has several symptoms:

- Weight loss and poor appetite.
- Swollen ankles, feet or hands – as a result of water retention (edema)
- Shortness of breath.
- Tiredness.
- Blood in your pee (urine)
- An increased need to pee – particularly at night.
- Difficulty sleeping (insomnia)
- Itchy skin.

1995 March 20
I made some improvements like using which bacteria is suitable for our chassis, and what to put in our bacteria … we first thought to have this cure to be injection but after long considerations, drug is a better option

1995 March 31

Its only like few parts haven't being tested and I am optimistic that my cure can really cure the king! But ... Idk I have these anxieties again... Actually, I haven't told my teammates about my current research, I am afraid if I told them about ingredients of the cure, they will steal and use it for their own benefits ... What should I do!?

1995 April 5

These past few days, Mark is so strange! he keeps asking me about my research's result and ingredients! I'm so suspicious he will sneak my laboratory to steal what I have done! I need to secure it to place where no one knows about it!

1995 April 10

Its weekend and weird thing happened! John was rummaging around on my lab desk. But he said to me he thought I took his pipette .. but it just doesn't feel right to me. Oh I can't believe anyone in my lab!

1995 April 11

Its 7 am in the morning and I did my experiment on Sunday! 'Cause it's a peaceful day! No one is here on Sunday! Hahaha

Stage II – Make the cure!

The second stage is set in Professor KO's laboratory, which is located just beside his office. Players must find a hidden USB that contains all the ingredient's information, and determine which tubes correspond to which ingredient. There will also be clues scattered around the room that will guide players to choose the 4 correct ingredients needed to make the cure. They also need to find the correct incubator in which they should place the correct ingredients and show to the game master in order to escape this stage.

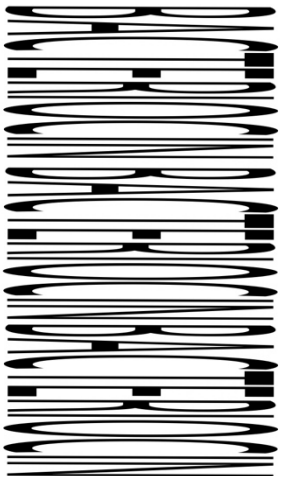
Clues:

We left a clue on the wall. The sign says, “Don’t forget to wear lab coat before you enter the lab.” By looking through lab coat, players will find an encrypted USB in the pocket, which they can then open using the laptop we provided. Inside the encrypted USB, is a file containing slides that includes all eight ingredients’ information and introduction.

However, the file is protected with a four-letter password. We designed 2 plasmids with 12 bases sequence. By considering the 12 bases, the 12 numbers on the clock and mimicking the minute and hour hands corresponding to the time written on the bottom right of the picture, they are able to guess the four codes.

Ingredients slide

These slides show that the name and introduction of 8 ingredients players found. (See Attachment) Through finding the clues in the lab, they can understand the association between colors and the title of each element. In the end, if the players can find the right four elements smoothly, they will be able to successfully make a cure to save the king.

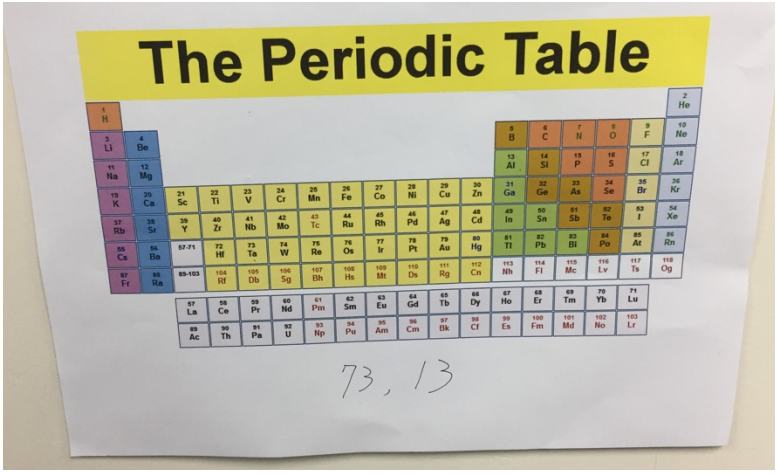


Bacteriocin

By tilting the paper and looking at it from a flat angle, the player can see the hidden clues, bacteriocin. If the players watch at a normal angle, it will return it as an invalid clue and think that it is garbled and ignore it.

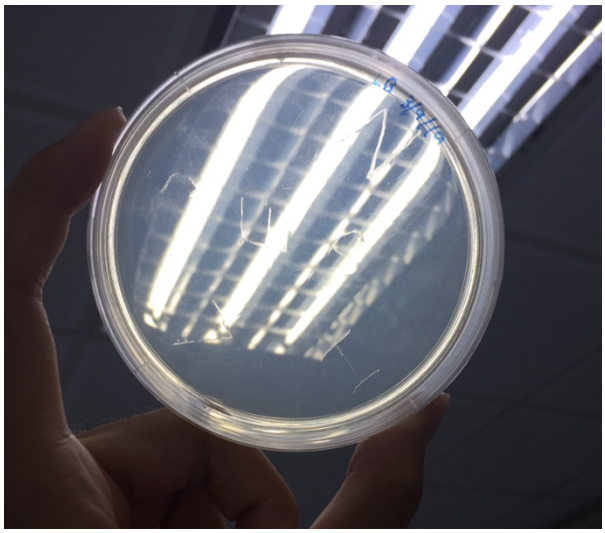
Periodic Table (TAL)

By exploring the periodic table, players will observe the numbers that our previously written above."73" and "13" means "Ta" and "Al". By associative thinking and the merging of the two words, players will find the TAL ingredient is the correct material.



TyrP

Flipping the papers which we left on the lab desk, players will find that our pre-written word games are on the top. By folding it in different ways and in different directions, they will get one of the correct elements.

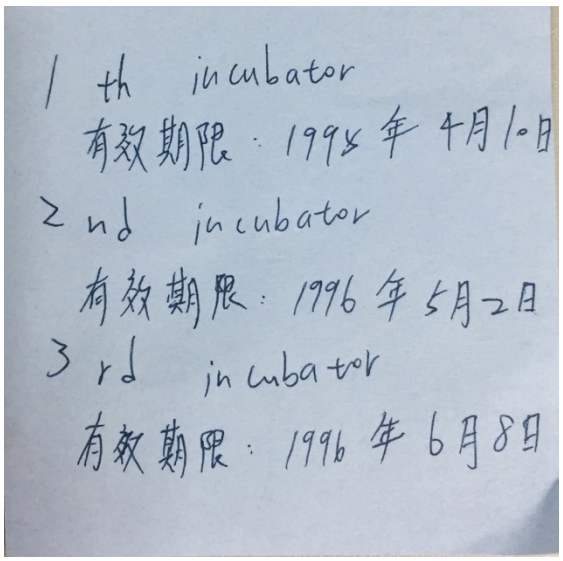


Nissle

This clue is the most easily overlooked part. Because it is the most inconspicuous, playing will take more time to observe it. We use the tip to scratch several LB plate then sealed them to show the clues. Through seeing the scratches, players can faintly observe the words, Nissle.

Incubator

After having found the four correct ingredients, players need to find which incubator to be used. There is a "expiry date" for the incubators, which players must determine from the dates in Professor KO's notebook.



Stage III – Save the King!

The final stage is a game of reasoning to find out the real murderer who killed the Professor KO that is set in a hospital's patient room. There are 4 patients lying in that room, and players have to use the clues located around the room to find out which patient is the King. And with all the clues they have seen in the previous two stages, players can find out who exactly killed Professor KO.

Clues:

First, they will face the challenge of the hospital's security system. This level is executed by the coding designed by the Dry department. The most important thing is that they only have one chance, so they must be cautious to answer. Players must find out who is king in the patient room. Then, they will find the corresponding prescription through searching the clothing or body of the patient lying on each bed. If they scan the QR code left beside the laptop and reason out the corresponding symptoms, players will successfully answer the question.

Patients & King's biodata

Looking through the hospital bed and the clothes on fake patients we made, players will find the biodata we left for them as the clue. Through the QR code can find the king's symptoms, and the comparison analysis can identify which of the four patients is the real king. Players will be given further instructions after answering in the security system

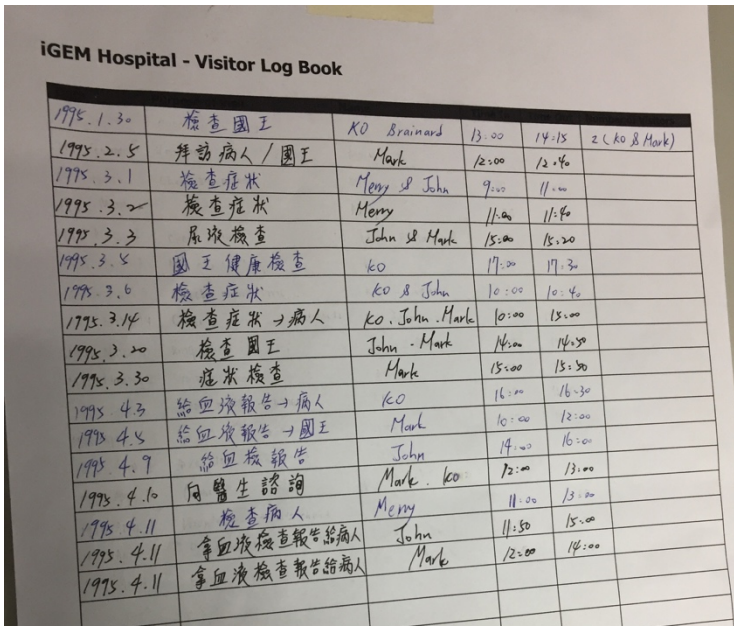
Suspect

When the first instruction is completed, the player will start a series of brainstorming and start guessing who the murderer is. Because the first two stages and the third stages are different rooms, players can only guess the murderer by memorizing or taking photos and using the clues on hand. If they are unable to plot reasoning or the imagination of previous clues, then the player will be trapped in the third stage.

Secondly, players need to speculate who is the real murderer that killed Professor KO. This question will be the most in need of logical reasoning. Players must combine the first stage's biodatas and Professor KO's diary to think out who is the suspect. In addition, we design a key point to give the players a bonus. If they remember the inconspicuous lab photos at stage 2, they will find out the real murderer instantly.

Murderer is left-handed, as seen in the picture above.

Because according to autopsy result, they will comprehend the real murderer is the only one who is left-handed. But if not, we also designed a visitor list of hospital and suspects' alibi in order to give players more information to deduce the answer.



iGEM Hospital - Visitor Log Book

1995.1.30	檢查國王	KO Brainard	13:00	14:15	2 (ko & Mark)
1995.2.5	拜訪病人 / 國王	Mark	12:00	12:40	
1995.3.1	檢查症狀	Merry & John	9:20	11:00	
1995.3.2	檢查症狀	Merry	11:00	11:40	
1995.3.3	尿液檢查	John & Mark	15:00	15:20	
1995.3.5	國王健康檢查	ko	17:20	17:30	
1995.3.6	檢查症狀	ko & John	10:00	10:40	
1995.3.14	檢查症狀 → 病人	ko. John. Mark	10:00	13:00	
1995.3.20	檢查國王	John - Mark	14:00	14:30	
1995.3.30	症狀檢查	Mark	15:00	15:30	
1995.4.3	給血液報告 → 病人	KO	16:20	16:30	
1995.4.5	給血液報告 → 國王	Mark	10:00	12:00	
1995.4.9	給血檢報告	John	14:00	16:00	
1995.4.10	向醫生諮詢	Mark. ko	12:00	13:00	
1995.4.11	檢查病人	Merry	11:00	13:20	
1995.4.11	拿血液檢查報告給病人	John	11:50	15:00	
1995.4.11	拿血液檢查報告給病人	Mark	12:00	14:00	

ATTACHMENTS
-Biodata-

約翰John

研究生
Research Fellow Student of Syldavia Laboratory

HERE'S MY STORY:

I'm an unique Research fellow student of Syldavia laboratoryI'm hardworking, diligent, and dedicated—all qualities I put forward in everything I do.

EDUCATIONAL INFO

National Syl University
BIOLOGY
1989-1992

Syldavia High School
BIOLOGY
1980-1983

EXPERIENCES

1995-now
Research fellow student in Syldavia Laboratory 1992 - 1994
Research fellow student in Syldavia University

PROJECTS

1995-now
Syldavia King's Cure Research Project under supervision of Professor KO Brainard and Professor Fuji

LET'S CHAT:

123-456-7890
123 Anywhere Street, Syldavia 12345
yeoh@outlook.com

馬克MARK

ASSISTANT PROFESSOR
SYLDAVIA LABORATORY

PERSONAL PROFILE

EDUCATION

SYLDAVIA UNIVERSITY
LIFE SCIENCE
1970 - 1974

DALE VALLEY HIGH
HIGH SCHOOL
1967-1970

CONTACT

FUJI@OUTLOOK.COM

PROJECTS

1995 - NOW
SYLDAVIA KING'S CURE RESEARCH PROJECT ASSOCIATE WITH PROFESSOR KO BRAINARD

1990-1994
ESCHERICIA COLI AS A DRUG FOR GUT MICROBIOTA

ACHIEVEMENTS

- SYLDAVIA SCHOLARSHIP 1971-1973
- SYLDAVIA UNIVERSITY DEAN'S LISTER, 1ST SEMESTER OF SCHOOL YEAR 1969

EXPERIENCES

1975-1979
POSTDOCTORAL RESEARCH FELLOW OF SYLDAVIA BIO.
1979- 1983
POSTDOCTORAL RESEARCH FELLOW OF GENE SYLDAVIA
1983-1990
ASSISTANT PROFESSOR, DIVISION OF GENE AND RESEARCH CENTER SYLDAVIA
1990-NOW
ASSISTANT PROFESSOR OF SYLDAVIA LABORATORY

瑪莉MERRY

BACHELOR GRADUATE
OF SYLDAVIA
UNIVERSITY

MAIN OBJECTIVE

I am a bachelor graduate who hopes to obtain a full academic scholarship that can help me pursue a degree in Japan. .

CONTACT DETAILS

Home: 123-456-7890
Cell: 123-456-7890
meghi@outlook.com

EXPERIENCES

Research Fellow Student in Syldavia University
1991-1992

Research Fellow Student in Syldavia Laboratory
1993 - now
under supervision of Professor KO Brainard

-

ACADEMIC HISTORY

Syldavia University
Class of 1993
-

Beechtown High School

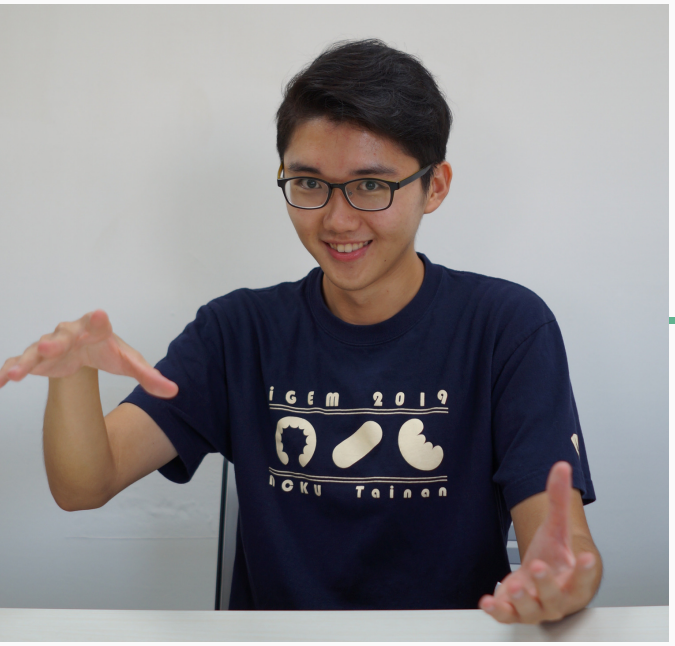
Class of 1990
-

ACHIEVEMENTS

- Syldavia Laboratory granted scholarship 1991
- Syldavia Laboratory outstanding performance scholarship 1992

PROJECTS

--King's Cure Research Project (1995 January - 1995 March)
--Volunteer Research Project (1995 April - now)



安迪ANDY

PROFESSOR KO'S ASSISTANT

PROFILE

Extremely motivated to constantly develop my skills and grow professionally. I am confident in my ability to become the next professor of Syldavia Laboratory

CONTACT

512 Moore Street, Indigo Valley, Syldavia

872-871-9271
allen@mail.com

EDUCATION

Syldavia University
Bachelor in Molecular Biology, 1988
Syldavia University
Master in Genetics , 1990

SKILLS

- Exceptional laboratory skills
- Successful working in a team environment, as well as independently
- The ability to work under pressure and multi-task
- The ability to follow instructions and deliver quality results

EXPERIENCES

RESEARCH ASSISTANT OF SYLDAVIA LABORATORY
1993 - NOW

RESEARCH FELLOW STUDENT OF SYLDAVIA UNIVERSITY

1990-1992

RESEARCH FELLOW STUDENT OF SYLDAVIA BIO
1988-1990

PROJECTS

1993 - NOW

ATTACHMENTS

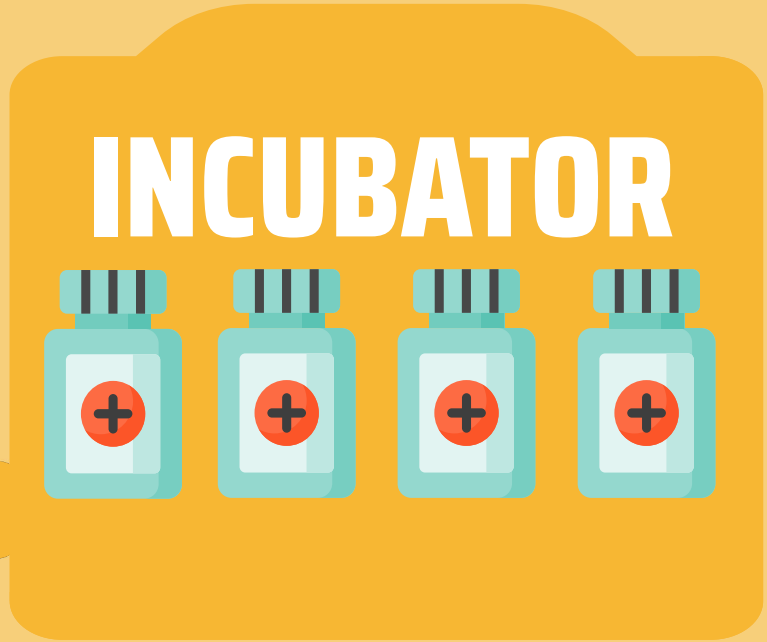
-Ingredient slides-

MY INGREDIENTS

Professor KO Brainard
Associated with Professor Baba and Student Coco

REMINDER !

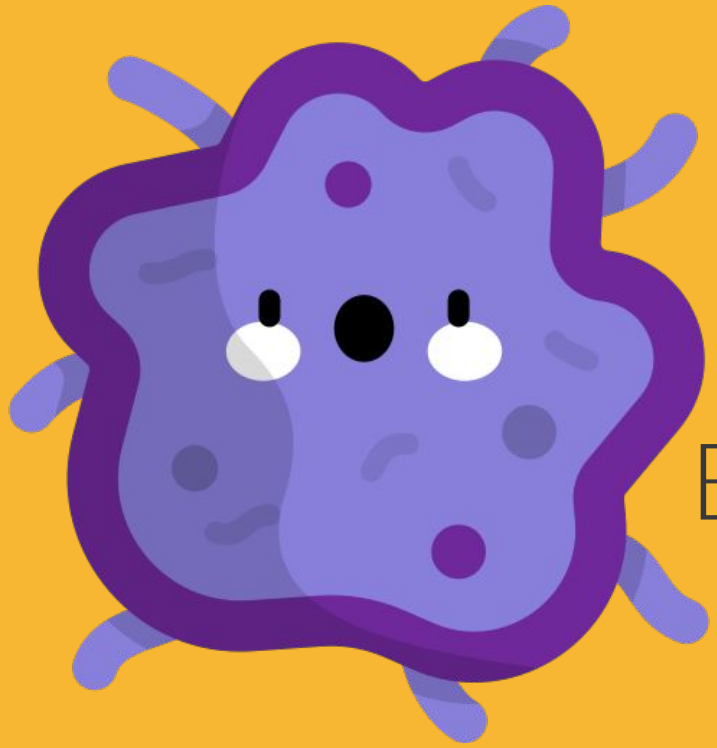
IF YOU ARE GOING OUT FROM LAB , PLEASE PUT INGREDIENTS IN THE SUITABLE INCUBATOR



GFP (Green Fluorescent Protein)

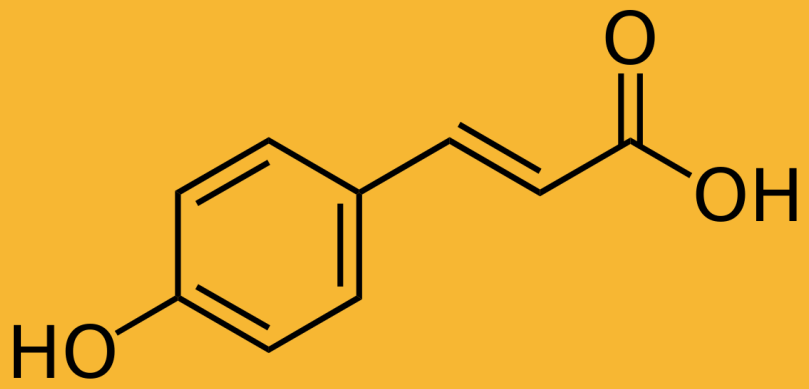
It emits green light in response

Escherichia coli Nissle 1917



Bacteria chassis for Professor KO's cure

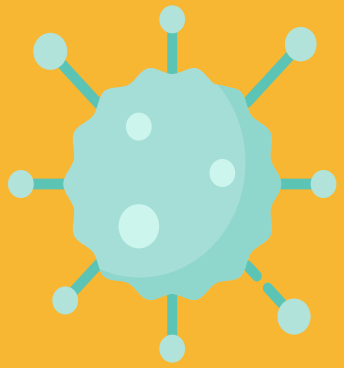
TAL (Tyrosine Ammonia Lyase)



an alternative pathway for tyrosine instead of metabolizes

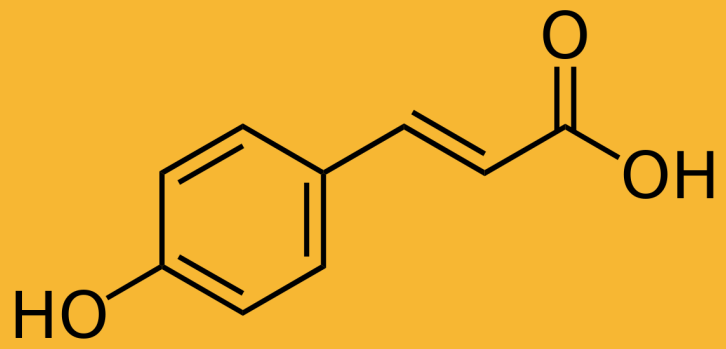
into *p*-Cresol , it produces *p*-Coumaric acid

para-Cresol



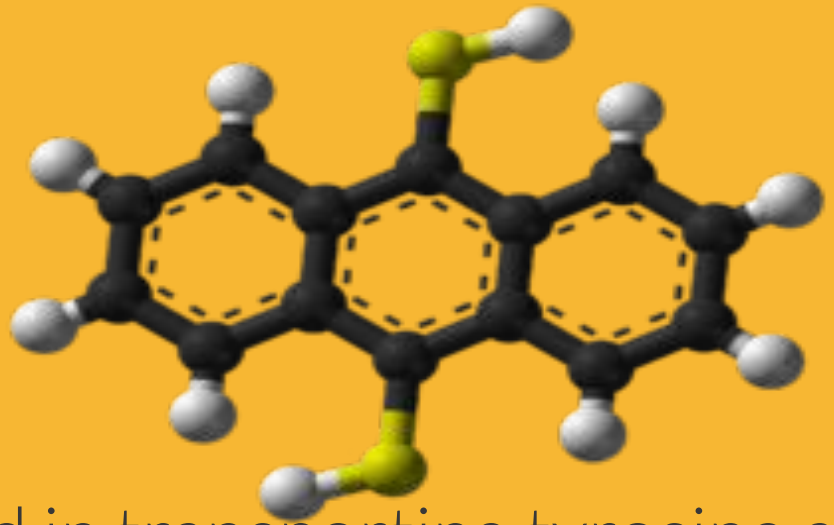
- Produced by *Clostridium difficile* (bacteria in gut)
- one of uremic toxins that can harm the body

p-Coumaric acid



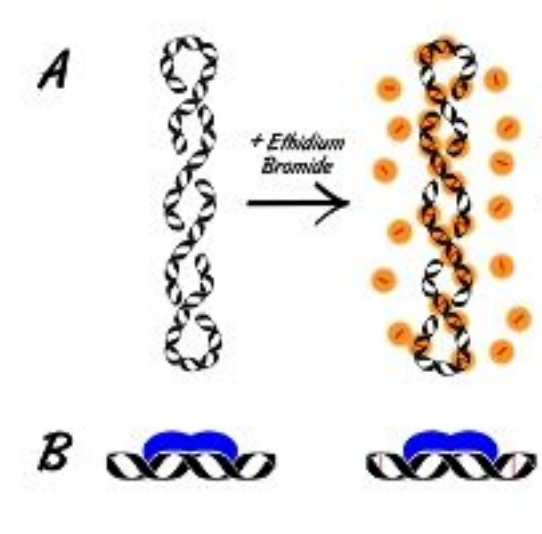
- Harmless substances in body
- Produced by TAL

tyrP (Tyrosine specific transport gene)



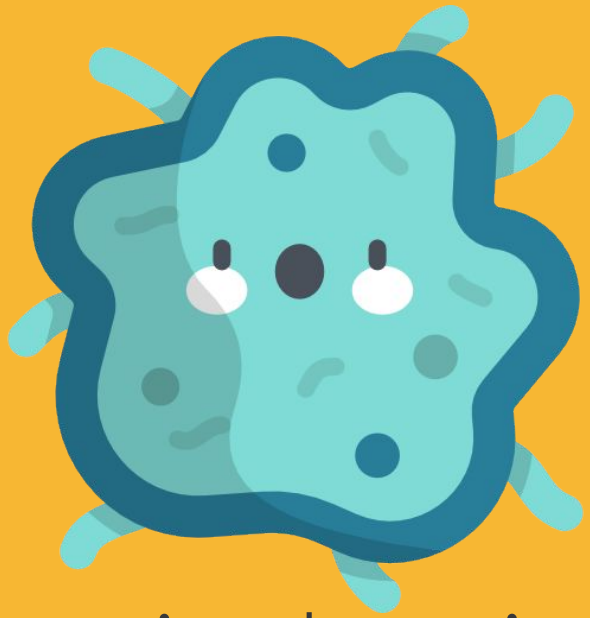
involved in transporting tyrosine across the cytoplasmic membrane

EtBr (Ethidium Bromide)



to visualize DNA in agarose gel electrophoresis experiments

Escherichia coli MG1655

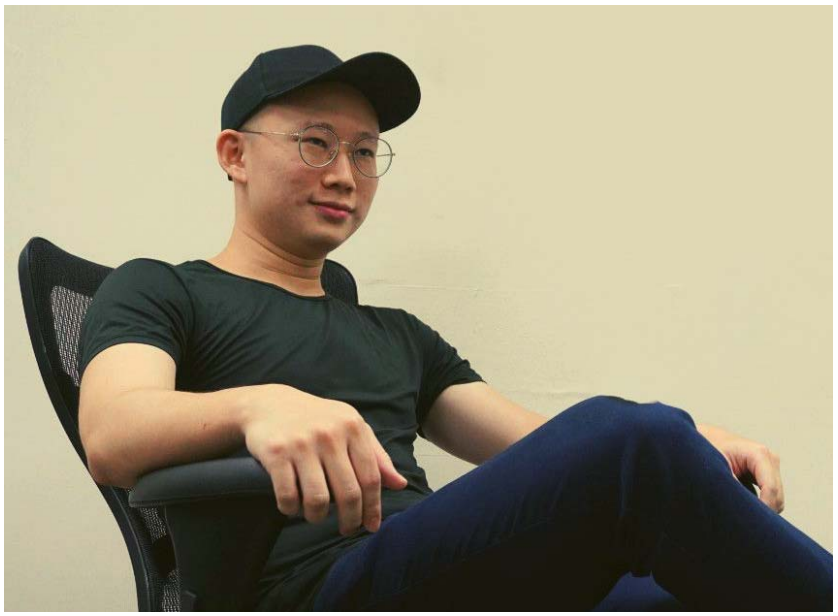


Bacteria chassis for
Professor KO's cure

ATTACHMENTS

-Patient List-

KING OF SYLDAVIA



SUFFERING FOR 3 AND HALF YEARS

DISEASE : UNKNOWN

- **SMOKING**
- **OBESITY**
- **DIABETES**
- **SWELLING IN FEET ANKLE**

Patient A

SUFFERING FOR 3 AND HALF YEARS

- have family history of the disease
- High blood tension
- Smoking
- Have sleep disorder

Patient B

SUFFERING FOR 4 YEARS

- Smoking
- Lung infection
- Oedema
- insomnia
- Shortness of breath

Patient C

SUFFERING FOR 3 AND HALF YEARS

- Smoking
- High blood sugar
- Oedema
- insomnia
- increase amount of urines

Patient D

SUFFERING FOR 3 AND HALF YEARS

- Smoking
- weight loss and poor appetite
- blood in pee (urine)
- insomnia
- increase amount of urines

ATTACHMENTS

-Autopsy Results-

MEDICAL EXAMINER 1001 AVENUE RD.

SYLDAVIA COUNTRY SYLDAVIA

AUTOPSY REPORT

NAME: KO Brainard **CASE NUMBER:** 09123881

DATE OF DEATH: 1995, April 11

AGE : 50 **SEX :** Male **RACE :** White

ESTIMATED TIME OF DEATH: 12.00 PM

DATE AND TIME OF AUTOPSY: 1995, April 12 10.00 AM

AUTOPSY FINDINGS :

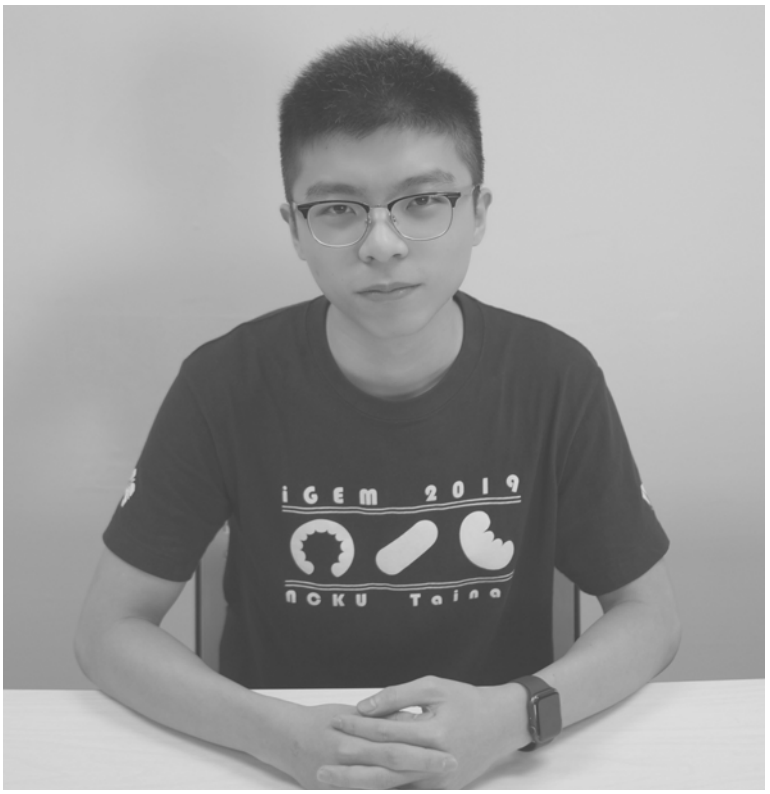
1. Abrasion of right cheek
2. Stab wound of chest
3. Stab wound of abdomen

CAUSE OF DEATH: Stab Wounds by knife (left-handed murderer)

MANNER OF DEATH: Homicide

ATTACHMENTS

-Suspects-



SUSPECT

-Name : Mark

-Age : 40

-Occupation： Associate Professor in Syldavia Laboratory

-Blood type : O

-Personal profile :

One of the members of the King's Cure Research Program

-Alibi：

Arrived at the hospital at 11AM, April 11 1995

SUSPECT

-Name : Andy

-Age : 27

-Occupation :Professor KO's assistant

-Blood Type : AB

-Personal profile：

wasn't chosen as one of fellow members in King’s Cure

-Alibi: 1995, April 11, 12.00 pm -> was in church

SUSPECT

-Name : John

-Age : 26

-Occupation : PhD student in Syldavia Laboratory

-Blood type: O

-Personal profile:

One of the members of the King's Cure Research Program

-Alibi:

10.00 AM in the Syldavia Laboratory,April 11 1995

12.00 AM at the hospital,April 11, 1995

SUSPECT

-Name : Merry

-Age : 25

-Blood type： B

-Occupation： Graduate student in Syldavia Lab

-Personal profile：

One of the researchers of the King's Cure Research Program,

but was removed from the project due to mistakes.

-Alibi: Do survey at the hospital at 12 pm, April 11 1995