

## PLOT DETAILS

### **World Building:**

The fictional story takes place in Geneva, during the 10<sup>th</sup> Biological Weapons Convention review meeting. The agenda is to amend the Cartagena Protocol. The nations have been alarmed due to the recent advances in genetic engineering, synthetic biology to create genomes from scratch, rewrite and edit genomes on will, exacerbated by the tensions after the pandemic. This sets the stage for tense discussions, and protests against ethics, biosafety at the convention.

Against this backdrop, the participants will have to follow up on an anonymous tip concerning something that puts the convention and every person there in danger. leads them on a wild goose chase, across labs and locales, with several murders, all sprinkled with different aspects of safety and safety issues, *particularly in the labs*.

The puzzles that send them scurrying all over the city are all inspired by synthetic biology, yet solving them won't require any prior understanding of biology, simply googling will give them the clue.

The story and the puzzle were split into four acts that the teams had to navigate through. The end goal for the participants was to guess what had exactly ha

### **The Storyline:**

You are Lt Colonel Aran Subramaniam, a member of the HSI-TAG (Health Security Interface-Technical Advisory Group), part of the WHO. You are attending the convention as part of the WHO delegation, you are given the current copy of Cartagena Protocol, its current provisions, and the agenda for the convention. You are generally going over these, when the HSI-TAG team receives an anonymous tip regarding some suspicious behavior that concerns the convention. The message said, *"They were talking about demonstrations during the conference, something about showing the world what can be done."*

The informant also referenced a doctor named Alvarez Muller who works at the fictional Institute of Microbial Technology (IMTech), in Geneva. You have been tasked with investigating the veracity of this tip and following its implications for security to the HSI-TAG Director as part of the security interface. The UN Security Council must be notified quickly in the event of an emergency.

#### **- Act 1:**

Following the tip, you go visit Dr Muller's lab where you are immediately shocked as you find a body. Upon inspection you realize that it is Dr Muller's body. His body is convulsed, and probably died due to some sort of paralysis. After taking a good look around the lab, you realise it's in terrible shape. The lab is a complete mess, with bottles of chemicals lying around and the biosafety cabinets wide open. It seems like somebody was in a hurry to complete the task at hand. Because there are no outward indications of a struggle or conflict, we can assume that whatever caused his paralysis and

subsequent death originated here in the laboratory, This is now a high risk situation, so without touching anything, you take a picture of the surroundings, quickly leave and close the windows and doors of the lab, inform the institute security and cordon off the area and call the authorities.

You also snap a photo of his whiteboard, which is covered with experiment notes, and what appears to be a design for novel viral vector with a synthetic genome, a random dna sequence, and a line discussing six files (an OS, a virus, an 1895 French film titled Arrival of Train at La Ciotat, and a 1948 study by Claude Shannon, among others).

As you find that this line is about DNA digital storage after a quick search, and you immediately begin decoding the DNA sequence in order to obtain the text using the principles of DNA storage. Upon decipherment, you obtain an address **Chem. de l'Ecorcherie 47, 1253 Vandoeuvres, Switzerland.**

*Solution to puzzle: First convert the DNA sequence present to binary using the key A: 00, T: 11, G: 01, C: 10. After obtaining the binary sequence, you convert the binary to normal text to obtain the address.*

- **Act 2:**

You immediately proceed to the decoded location after consulting with the competent authorities and receiving the all-clear. There appears to be no one living in the single household. There's a resignation letter from Lobi Awa, who claims he's leaving his job because of unfair treatment from Dr. Muller and Maja Eklund, and a pamphlet advertising a festival in Burkina Faso. There is also an image of genetic circuits and a recording of a call from A. Muller on his phone. A name, Maja E once more, is given to you after you decode the genetic circuits to determine their output. Your curiosity is piqued, so you look up the convention's guest list and discover that a Maja Eklund is among them. Since you and the other attendees have been staying at the same hotel, you make haste to locate Maja's room.

*The answer to the puzzle is: The AND and NOR gate circuits in these genetic circuits are activated by the presence of an initial compound. Sal and Ara are inputs to the AND gate, while Ara and aTc are inputs to the NOR gate. In other words, we can determine the outputs of each gate by counting the presence or absence of these conditions as 1 or 0, respectively.*

- **Act 3:**

Your return to the hotel is met with the shocking news that Maja has been found dead in the bathroom; security and the local police have already checked the room and given you a preliminary report. The report states that the red purple stain on an item of clothing in her suitcase was not blood but rather something of chemical origin. You can also find

the invitation to the convention in her phone, as well as an encrypted pdf file. The Cartagena protocol, some background on the protocol, the convention, and a card from A.M. staying here requesting a public meeting place are all on the desk. Furthermore, there is a journal that was apparently kept by her, in which she details her experiences in prison and her subsequent financial difficulties upon her release. The autopsy report states that she suffered blunt force trauma to the head, which led to her death. The lack of signs of forced entry and the janitor's testimony that he saw nothing suspicious point to the most likely explanation: an accidental death.

*The encrypted pdf opens with the dates mentioned in the diary, the date of release specifically.*

- **Act 4:**

You can find A.M.'s signature and the address (175 Rue de Pontenay, 01360 Sergy) in the PDF. You decide to visit a house that has been left empty. You're almost certain you're in Dr. Muller's home, despite the fact that it's a mess, untidy, and full of noxious odours. His apparent lack of concern for basic hygiene or personal security is likely what ultimately led to his untimely demise. Ripped pages from his diary show his obsessive desire to develop a biological weapon to punish the people he holds responsible for his misfortune. His plans to create a synthetic virus, complete with a toxin and one that targets specific individuals based on genetic markers, have been the subject of a number of scholarly articles. In addition, he writes about a once-in-a-lifetime chance to show the world this concept and make a name for himself financially.

When you consider that the convention was going to be the showcase for whatever it was that he designed, that the anonymous tipper must have overheard him and Maja discussing the same, that the money was quite important for Maja, and that she was helping him out, and that Lobi Awa is currently missing, things start to fall into place. There is a voice call recording on Lobi Awa's phone purportedly from Muller telling him to back off after he discovered what Muller and Maja were up to. He was nowhere to be found at his house or in his lab, leading you to suspect that Muller or Maja may have murdered him. While the cause of death of Muller remains a mystery, Maja appears to have met a tragic end due to an accident. Was he murdered because of his careless attitude toward safety? Based on his stated goal of creating a viral bioweapon with a synthetic genome that encodes a toxin, it is possible that his toxin weapon, most likely a neurotoxin, has backfired and resulted in his death.

The interested parties are no longer active; you must compile this data and report it to your superiors. Since you have the virus's synthetic genome with you, you can quickly sequence and compare the rest of the samples to rule out danger and figure out how to neutralise the system if there is a leak, making containment of the locations you've visited a top priority. It appears to have been contained for the time being.

The Materials:

The story was divided into four acts and there were three puzzles that were the connection points for transition between Act 1 to Act 2, Act 2 to Act 3 and Act 3 to Act 4. Two of the puzzles were based on concepts of synthetic biology, namely DNA Digital Storage and Genetic Circuits.

The files have been attached [here](#)