FORENX - FORENSICS EXPLORATION

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MY PERSONAL INTEREST

WHY DID I CHOOSE THIS SUBJECT?

Since I was little, I've always wanted to work on something interesting. How is forensics interesting you ask? Well in many ways. The way forensic experts use numerous types of evidence that help make justice for many victims. And that's what I want to talk to everyone about. Not only are other people going to receive added information and learn something from this project, but I am too. I've always been fascinated by how science can be used to solve mysteries and uncover the truth, and I've always wanted to help people, and this subject does both. How many criminals were caught with the help of forensics (DNA, cyber traces, etc.), how many unfortunately weren't and how they were set free are topics that I really want to explore. The idea of analyzing clues, examining evidence really interests me and after talking about this topic other people might also pursue this as a career.

WHAT AM I GOING TO LEARN WHILE DOING RESEARCH

Like I said previously, I'm going to learn a lot by doing this topic and I really hope I do, because I'm always open to discovering new things. I hope I'll learn more about different branches of forensics such digital, biology and chemistry forensics. I will really enjoy learning about this theme.

1. INTRODUCTION

1.1 What is forensics?

Forensics is the use of scientific methods to help solve crimes and answer legal questions. It involves collecting and studying different kinds of evidence, such as fingerprints, DNA, blood, hair, or information from phones and computers. By examining this evidence carefully, forensic experts can figure out what happened at a crime scene, when it happened, and who might have been involved.

Forensics has many branches, like forensic biology, chemistry, and digital forensics, each focusing on a different type of evidence. The goal of all these areas is the same: to find the truth using clear, reliable scientific information. This helps police and courts make better decisions and ensure justice is served.

1.2 Evolution of forensics

Forensics has changed a lot over time. In the past, investigations were mostly based on witness statements or simple observations. As science developed, new techniques were introduced. Fingerprinting became a major tool in the late 1800s, followed by blood analysis and early crime scene photography. In the 1900s and 2000s, technology fortunately expanded what forensic experts could do. DNA testing, advanced chemical analysis, and digital forensics made investigations more accurate than ever. Today, forensics continues to grow with modern tools like computer algorithms, 3D imaging, and improved laboratory equipment.

1.3 Different jobs in forensics

There are many careers within forensic science, each focusing on different types of evidence. Some common jobs include:

Forensic Scientist: Works in labs analyzing DNA, chemicals, or physical evidence

Crime Scene Investigator (CSI): Collects evidence at crime scenes, photographs the scene, and ensures all clues are properly handled

Forensic Pathologist: A medical doctor who examines bodies to determine the cause of death.

Forensic Toxicologist: Studies substances like drugs or poisons found in the body.

Digital Forensic Analyst: Investigates evidence on computers, phones, and other electronic devices.

Forensic Psychologist: Helps understand the behavior of criminals and assists in profiling and evaluating suspects.

Overall, forensics is a constantly evolving field that uses science to support justice, with many specialized roles working together to uncover the truth. In this work, we are focusing on DNA and forensic pathologies.

2. INFORMATION ABOUT FORENSICS

2.1 Why is forensics Important

Forensics is one of the most important tools that we have for discovering the truth, solving crimes, and protecting society. Without forensics, information can be confusing, misleading, or incomplete. Forensic science stands out because it relies on facts, evidence, and proven scientific methods. It helps investigators answer essential and important questions (What happened? how did it happen? Who was involved? etc.). Without forensics, many of these questions would remain unanswered.

One of the main reasons forensics is so important is because of the ability to provide reliable evidence. Human memory isn't perfect, especially in moments of panic,

when victims may believe they won't survive. Witnesses may forget details or be influenced by stress, fear, or bias. But physical evidence such as DNA, fingerprints, blood patterns, or digital data does not lie. It offers concrete clues that can confirm or challenge statements made by witnesses or suspects. This scientific approach ensures that decisions in the justice system are based on facts rather than speculation. Lawyers and prosecutors can use that evidence to put someone in jail for good and ensure that justice is done.

Forensics is really important for finding out who did something and how they did it. Things like looking at fingerprints, checking DNA, studying bullets to find out which bullets are used with which gun, testing for substances and looking at computer evidence helps police figure out who committed a crime. This means they can accuse someone of the crime without having doubts. Forensics helps police catch the person who did the crime. It also helps ensure that innocent people are not wrongly blamed or punished. Forensics helps making sure that the police get it right and that no mistakes are made. Many people who were once imprisoned for crimes they didn't commit have been set free thanks to forensics, especially DNA evidence.

One big benefit that forensics also has is its ability to figure out what happened during mass events where a lot of people are involved such as terrorist attacks and shootings. It can help the investigators of the case to have a clear image of what happened without even being present. Forensic evidence is basically how they know what actions happened in which order. For instance, the way blood is spilled can show how something bad happened.

For example, where a bullet lands and which angle can logically indicate where the shooter was standing. Also, if you think when you delete something such as messages, files and documents and that now it's completely erased, you're wrong. It can still be accessed from certain people such as the digital Forensic investigators, which can help find out about the accomplices, the plan and strategy of the crime.

Even burner phones, that are used by many criminals, can be tracked in some circumstances.

All these details help create a clear picture and reveal the truth even when there are no witnesses.

Forensics is not only about solving cases, but it also plays a big role in preventing crimes that happen in the future. When criminals are identified and put in jail, it stops them from committing crimes again. Patterns that are found through forensic investigation can help law enforcement identify high risk felony criminals and recognize threats. This leads to a better society, less crimes, and overall good public protection.

Forensics also indirectly helps people's mental health, since it helps families find closure after events like natural disasters or accidents where a loved one is injured and when a family member is reported missing and found. Forensic accounting can help uncover fraud and protect the economy by putting those criminals away for good, so people know they have consequences for those crimes. Digital forensics tracks hackers, recovers lost data, and protects important information systems. his shows forensics is not just about catching criminals but also plays a role in everyday areas of life, like technology.

Basically, forensics is important because it helps complicated situations, makes sure that there's equality in the justice system, protects the innocent by finding the culprits, and helps make the world a safer place.

3. WHAT HAPPENS AT A CRIME SCENE?

3.1 The process

When a crime is committed and someone finds out, they usually call for help and probably just go on about their day and just forget about it. But what happens after that? Let's use murder as an example. Someone reports they heard banging and screaming in a house. Well usually some police officers go check out what happened, and if they find something, let's say, a body, they request a crime scene processing service. After that, a crime scene investigator will contact either the officer who requested the crime scene processing services or with the detective/officer assigned to manage the crime scene.

Then the crime scene investigator gets some information. The Indiana State Police give us an example of the usual procedures:

- number assigned to the investigation.
- Type of agency investigation
- Exact location of the scene
- Detective and reporting officer's names and identification numbers
- Names of victim(s) and personal information, if needed

There is also other information that need to be collected depending on the crime such as the:

- Suspect information
- Vehicle(s) information

- Witness names
- Additional crime scene locations

Each crime scene is different, so they're also handled differently.
The crime scene investigator also discusses with the detective or officer in charge about the type of investigation that is going to happen and everything that is important should be made known prior to scene entry.
When the investigation is happening, new information about the crime scene can be developed, when that happens, the agency should communicate that information to the crime scene investigator. This new added information can cause the crime scene investigator to make changes in scene processing such as expanding to other areas and additional items of evidence.
Crime scene investigators can also find new information in the processing of the scene that may back up the agency's suspicions or may conflict with statements made by the individuals involved in the investigation. When that happens, the crime scene investigator advises the detective or officer in charge of the new evidence/information so that the agency can proceed with its investigation.

3.2 Trace evidence

Trace evidence is a small particle of evidence left by someone in the scene of the crime (such as hairs, fibers, glass, soil, paint, etc.). It's one of the most important types of evidence that helps solve crimes. Crime scene investigators are trained to recognize trace evidence that is very important and valuable to the case and collect it so that it can be inspected in a lab.
Some materials are available to use in the Search if needed, such as:

- flashlight/hand lantern—a portable light source that is used to see when it's dark or inspect something.

- Vacuum—a portable vacuum that usually has a filter and an attachment so that no evidence can be drawn into it.

3.3 Crime scene photography

Crime scene photography is also a very important task the crime Scene investigator must do. It's one of the first things that occurs at a scene. The photographers take accurate high-quality photos, so that the officers/detectives investigating the crime can see the evidence without having to back to the crime scene every time. It's also so that if someone trespasses the property to grab evidence and to destroy/hide it, the people working on the case still know that that evidence was there, and so they can still use it in court.

Photographers usually start by taking an establishing shot (which means they take a wide/long view photo. Then they take individual photos for each piece of evidence in a medium/midrange view that focuses on it. Lastly, they take a close-up view that clearly shows what the evidence is and its condition.

4. HOW DOES DNA HELPS SOLVE CRIMES

4.1 What is DNA?

To first understand how DNA can be a huge factor to solve crimes, you must understand what DNA even is. DNA stands for deoxyribonucleic acid, which is a molecule carrying genetic information about development and functioning of an organism (a living thing, such as humans, animals, etc.). This molecule makes us who we are. It's what makes us look different in appearance but also makes us have different in personality. Nearly all cells in a human's body contains DNA and every human has a different DNA code, so even small DNA can help identify people. Forensic science usually relies on skin cells, blood, hair follicles, and saliva to identify someone that committed a crime.

4.2 The process

Many people think this method is simple and quick, but it is actually not such an easy process. Usually when someone is brought to custody, they must be “processed” into the criminal legal system. That means that the individual is searched, fingerprinted, photographed, and informed of their rights. Their fingerprint is then sent into state and national databases. So, when DNA is discovered in a crime scene, The officers working on the case check if there’s a match that is already in the databases. Are you required to give a DNA sample? No, at least to a certain point. If officers ask you for a voluntary DNA sample, then you have every right to say no. Now if officers have a court order/warrant or if you’re under arrest, then yes, you are legally required to give out a DNA sample.

4.3 How does DNA solve crimes?

Like explained in the process, one of the ways DNA helps is **database matching**. What if the officers don’t find a match? Well, of course they continue investigating and if they find a suspect, they’ll usually try to get their DNA to check if that is the right person (**identifying suspect**). This makes DNA very helpful since it speeds up the process to prove a crime. DNA can also help by **forensic genealogy,**

officers/detectives compare the DNA from the crime scene with free commercial genetic databases to find relatives of suspects. Another thing that makes many people grateful for DNA, is **Identifying Remains**. Every day all around the world dead bodies are found globally, and every day around the world many people are reported missing. Investigators often use this method to find out who the dead person is. They see if the missing person's DNA matches one of the bodies. Even though it doesn't bring them back to life, it helps family to find closure. **Exoneration** is when a suspect, or even someone that was already convicted is proven innocent and set free.

5. HOW DO FORENSIC EXAMINERS INVESTIGATE DEAD BODIES?

5.1 Types of deaths

The investigation of a deceased body is complex and takes a lot of time. First of all, there an overview needs to be conducted, where they discover the identity of the deceased, date and place of death, cause of death and finally manner of death. What is manner of death you may ask, well it basically explains how the cause of death even came about. They're categorized into five types:

Natural: Natural death caused by aging, medical illness or natural disease

Accidental: Unintentional death caused by an unexpected injury or accidental poison

Suicide: Intentional death caused by the person itself

Homicide: Death caused by the actions of another person (in forensics this doesn't equal murder since it doesn't imply intent or criminality)

Unclassified: Death caused by MAID (medical assistance in dying) when a person has a severe medical condition that isn't curable (only allowed in some places)

Undetermined: Death with no evidence of any other classification (it might be known the cause of death but not how it came to it, if it was intentional or not)

5.2 The death investigation

The investigation is usually made up of a 5-step plan:

- **Scene of death:** Interview/question the witnesses on the scene and family that is already there. Register the deceased's demographic information (Basic info. Such as age, gender, income, education, and location. Next is noting the deceased's medical history. Then the photography scene happens. The last part of this step is collecting any important evidence. Personal items at the scene are stored in a secure office.
- **Body transportation:** After step 1 is completed, the body is transported to a forensic facility to do an examination. The transportation is done safely, securely, and planned.
- **Body identification:** The medical examiners try to identify the body as fast as possible since it's a vital part of the investigation and to be able to communicate with the family of the deceased. The investigator might ask the person doing the identification to view the deceased body if they're at the scene, view the CCTV footage, or view a photograph of the deceased.

- **Examination:** There are two types of autopsies. The forensic autopsy is an autopsy that might be requested by legal authorities if a death is suspicious and sudden. A clinical autopsy is performed by a pathologist when the family requests it because they want to know the exact reason of a natural death. An autopsy is basically an external examination followed by an internal inspection of the organs. The organs are removed, then weighed and sampled. Then the results come back documenting diseases, injuries, and toxicology findings.

6. FAMOUS CASE SOLVED BY FORENSICS

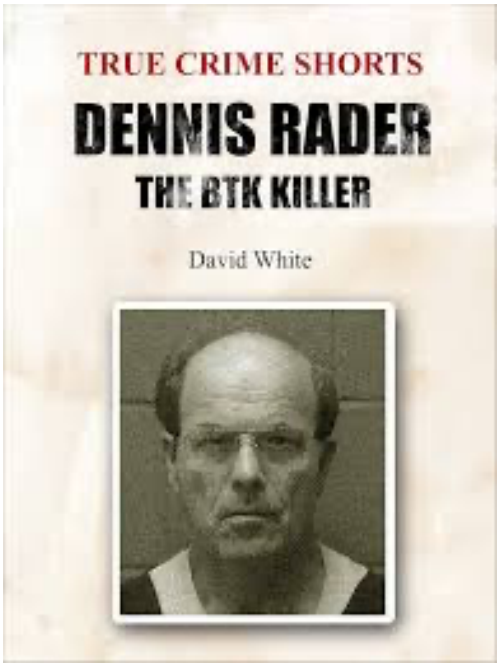
6.1 The start of the story

Dennis Rader, also known as the famous BTK Killer. A perfect example of one of the cruelest, gruesome cases that does not only have something to do with DNA forensics, but also digital forensics. It started in 1974. It was a normal morning, in a neighborhood of Wichita. A family of four in the house, when something tragic happened. A man entered the house with a firearm, claiming he's a wanted criminal that just needed some money and a car, which he wasn't, but he was about to be. He then proceeded to bind all the four family members, tortured them and eventually killed them. That was the start of the patterns. Other murders soon followed, same pattern. That's how his name was made, BTK, "Bind, Torture, and Kill".

No one suspected Dennis, of course. A normal family guy, married with two kids, worked at security services and went to church every Sunday, but he had a dark side to him. Nine months after the murders, Dennis got confident. Nine months after and he still wasn't caught, so he decided to poke the bear. He placed an anonymous phone call to the "Wichita Eagles" giving directions to a textbook in a library. Inside of the book was a letter taking credit for the murder of the Otero family with

information the public didn't have, which confirmed to the investigators that it was in fact the BTK Killer communicating with them.

At least ten murders. At least six more attempted ones, and that's only the confirmed crimes of Dennis. And every few months he would remind the police that they still haven't caught on. But how did the police even come to this number or this name, the one people less expected? Well forensics is a big part of that answer.



6.2 How was Dennis Rader caught?

After literal decades, Dennis started communicating and sending messages to the police again, why you may ask? Well Dennis got off on attention, that's why he even started to murder, he wanted people to talk about him, to remember him and be afraid of his dark side. Once he noticed that was going away, he couldn't bear it, so he broke the silence. In 2004, about 20-30 years after, he started sending letters

and packages to show he was still there and wanted to continue haunting the investigators that “failed” their job.

He wanted another way of communicating, so he sent a letter through packaging to the cops, saying quote “Can I communicate with a floppy disk and not be traced to a computer? Be honest.”. Floppy disks were used to transfer digital data, so he could use it. The police were smart, so they answered saying No, even though they knew it could easily be traced. Dennis was naive, so he trusted the answer. Short after that, Rader sent one with some word document confirming it’s him. The investigators recovered the metadata which contained:

- The author's name: “Dennis”
- Organization (where it was created): Christ Lutheran church
- Evidence that the file had been edited on a church computer in Wichita

Investigators already had BTK’s DNA from the crime scenes but not Rader’s. After the evidence from the floppy disk pointed to him, they knew it was him, but they needed confirmation. They couldn’t legally take a DNA sample because of no sufficient evidence, so they had to find another solution. The investigators then found out one of his daughters had given a tissue sample during a medical procedure at a local university clinic. They knew that was their chance and took it. The investigators obtained a court order from a judge to test that medical sample for a DNA match. At that time, DNA evidence started getting better, and more accurate. So, when the DNA from the crime scenes and from his daughter was compared, it showed a parent=child match showing that **Dennis Rader was the infamous BTK Killer.**

6.3 The sentencing

In August 2005, Dennis Rader was sentenced for three consecutive life sentences in el dorado correctional facility in Kansas, after confessing to 10 murders and 6 more

attempted ones. He confessed to his crimes giving a very formal letter explaining, how he chose the victims, the procedure of every victim's kill, which he referred to as projects, focusing more on his "skill" and how he was "efficient at not being caught" than feeling sorry for his actions.

7. CONCLUSION

7.1 What I learned throughout this research

Throughout the whole research for this project, I learned a lot. To be honest, I thought that many questions I would already know what to answer, but just by doing this I saw other perspectives received new important information.

Just on the first answers I learned a lot, like on **pages 4 and 5**. I of course already knew that forensics is not only about inspecting bodies but much more than that. Not only are there multiple careers in forensics than most people think but also the meaning of forensics is much more. I also understood more about how forensics helps in **pages 5,6 and 7.** I of course knew that forensics makes it easier to put criminals away, but researching about this made me realize how much it helps families and giving closure. Many forensic scientists expressed how much they love doing their job because of that, and I think it's great. It helps people grief and it helps them move on. To be honest, I didn't really know much about procedures, only that they collect evidence, photograph it and use it. But now I know a lot more about it after searching for answers on **page 11 and 12**. The procedure is very much detailed and complicated, but now I know it step by step. I already knew about many cases, some about forensics, some not, so I wanted to talk about a case I didn't know anything about, and I decided on the B.T.K case that I talked about on page **13 and 14**. The research I did about this case made me realize how many criminals are living their lives for decades or even forever before getting caught. The gruesome crimes this criminal did showed me how much it also affects other people's life, like family, friends, etc. This was 100% the most interesting thing I learned about, it gave me

another perspective of when someone is convicted and how a criminal looks like a totally different person on paper.

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