

Department of Zoology

Academic year 2020-2021

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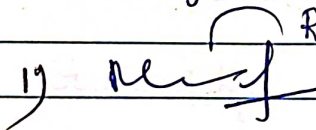
STUDENT STUDY PROJECT

Topic name: DNA Fingerprinting.

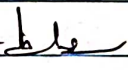
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03	18055034445025	K. Priyanka	BZC III yr e/m	K. Priyanka
04	18055034445038	P. Mounika	BZC III yr e/m	P. Mounika
05	18055034445026	K. Roopa Sri	BZC III yr e/m	K. Roopa Sri
06	18055034445041	Saniya Begum	BZC III yr e/m	Saniya Begum

Guided by

R. Krishna and A. Padma.

1)  Department of Zoology

SRNK GDC Banswada.

2) A. Padma - 

PRINCIPAL  
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BANSWADA-503 197

**SRNK GOVT. DEGREE COLLEGE, BANSWADA**

**KAMAREDDY (DIST.), TELANGANA.**

**(AFFILIATED TO TELANGANA UNIVERSITY)**

**NAAC ACCREDITED WITH 'B' GRADE**



**STUDENT STUDY PROJECT 2020-2021**

**DEPARTEMNT OF ZOOLOGY**

**TITLE : DNA FINGERPRINTING**

**SUBMITTED BY**

- |                   |               |                    |
|-------------------|---------------|--------------------|
| 1. 18055034445003 | ANJUM BEGUM   | BZC III YEAR (E/M) |
| 2. 18055034445020 | G. MEERA BHAI | BZC III YEAR (E/M) |
| 3. 18055034445025 | K.PRIYANKA    | BZC III YEAR (E/M) |
| 4. 18055034445038 | P.MOUNIKA     | BZC III YEAR (E/M) |
| 5. 18055034445026 | K.ROOPASRI    | BZC III YEAR (E/M) |
| 6. 18055034445041 | SANIYA BEGUM  | BZC III YEAR (E/M) |

**GUIDED BY**

**R.KRISHNA and A.PADMA**

**LECTURES**

**DEPARTMENT OF ZOOLOGY**

**SRNK GOVT. DEGREE COLLEGE,**

**BANSWADA.**

## ABSTRACT

DNA fingerprinting is a powerful new forensic technology, that many argue is the greatest tool in the history of forensic science. But as is often the case for new technologies, its acceptance by society was not straightforward. This project investigates this technology describing how it is done, its uses, and its indirect path of acceptance in the courtroom.

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## PROJECT OBJECTIVE

The purpose of this IQP was to document the impact of a new technology on society. The topic chosen was DNA fingerprinting, that many argue is the greatest tool in the history of forensic science. It was chosen in part because of its powerful technology, well worth investigating, and in part because of its ongoing controversy in the courtroom, thus its impact on society could be documented.

## **CHAPTER-1: DNA FINGERPRINTING TYPES AND APPLICATIONS**

DNA fingerprinting is one of the greatest identification systems we have to recognize an individual or living organism. Every living creature is genetically different in its own way, except for identical twins, triplets etc. DNA is comparable to a serial number for living things. Each individual contains a unique sequence that is specific to that one organism. Unlike traditional fingerprints which can be surgically altered or self mutilated, the DNA sequence can not easily be changed once the material is left at a crime scene, thus increasing its effective use in forensics, and the probability of finding an exact match. This method of identification is useful in many applications such as forensics, paternity testing, and molecular archeology, which we will discuss later on in this chapter. To further understand DNA fingerprinting we must first discuss the basics of DNA.

### **Introduction to DNA Basics**

DNA, also known as deoxyribonucleic acid, contains a specific sequence of bases called nucleotides which contain the information of all the characteristics of living organisms. This information was inherited through the DNA of their parents. DNA is found in almost every cell of every living organism. The DNA represents the “instruction book” for making living organisms. The four nucleotides that constitute the sequences of DNA are adenine (A) which bonds exclusively with thymine (T), and

to amplify the specified region, which is usually between 150-3,000 base pairs in length. In order to amplify the DNA sequence, a pair of short priming sequences (which are complimentary to the ends of the targeted sequence), a special heat-resistant DNA polymerase called Taq polymerase, and a solution of the four DNA bases are all mixed together in a test tube which contains a few copies of the targeted DNA sequence (Genetic Analysis, 2004). The DNA is then amplified (or replicated) by the repetition of a cycle which contains three vital steps:

- The solution is heated to 95°C to unzip the double helix DNA structure (Fig. 4A).
- The solution is cooled to 55°C to allow the primers to bind to the ends of the DNA (Fig-4B).
- The solution is then reheated to 75°C which is the optimal temperature for the Taq polymerase to create new copies of each DNA strand (Fig-5C).

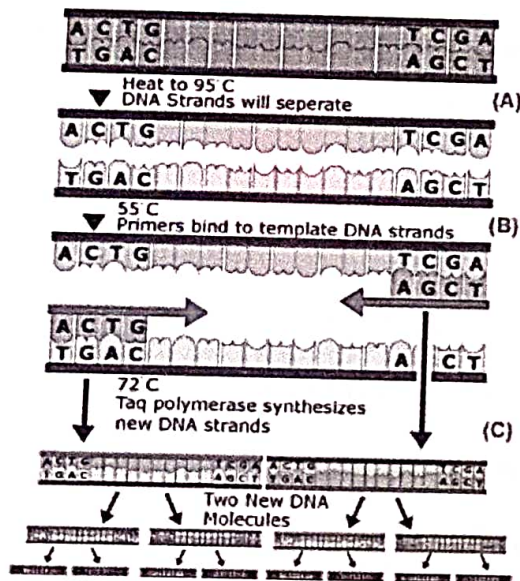


Figure 4. The three steps of the PCR cycle (Genetic Analysis, 2004).

One PCR cycle takes approximately 2 minutes to complete. Each cycle doubles the amount of the previous amount of targeted sequences in the test tube, so it only takes about 50 cycles to produce hundreds of thousands of DNA copies (Genetic Analysis,

## CONCLUSIONS

DNA fingerprinting is the most sophisticated way to identify living organisms. DNA is a unique piece of genetic material within biological organisms, which have characteristics that are one of a kind. DNA cannot easily be altered once it is left at a crime scene or deposited with a mummy, which makes it a strong forensic tool. RFLPs and VNTRs are the traditional methods of fingerprinting DNA, which uses a relatively large sample that uses the method of probe hybridization to detect polymorphisms in the DNA. STRs are the most current form of DNA fingerprinting, which is PCR based and uses a very small sample of DNA. DNA fingerprinting has many applications that range from criminal rape cases, paternity tests, molecular archeology, sports memorabilia, etc. The DNA molecule is like a snowflake in that there are no two exactly alike, but is one of the only things in common that all biological organisms are created with.

DNA forensics is one of the greatest tools in piecing together a crime scene. Over the past ten years there have been many advances in the methods of collecting and preserving these DNA samples to help facilitate the acceptance of this evidence in the court room. By avoiding contamination and properly storing it to prevent degradation, forensic science has made a monumental step in allowing DNA samples as valid evidence in United States courtrooms. DNA evidence is now one of the most powerful tools used in determining who is responsible for a crime. With criminals altering their fingerprints and other physical characteristics, DNA evidence is one of the only true methods to correctly identify an individual. Now with the help of chemicals such as



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