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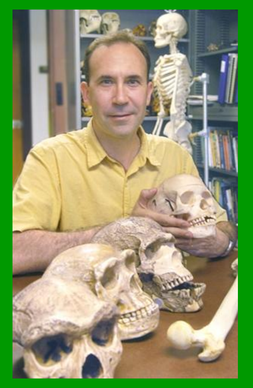
Environmental Effects on Pig DNA Degradation over Time



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Introduction

Through many years of research, studies on genetics and deoxyribonucleic acid (DNA) has become a very popular option for a variety of tests. Today, DNA is providing many answers to questions such as "Why people have differences in height, weight, eye, and hair color?" DNA not only can provide us more answers about ourselves and the things that are different among us, but also identify victims and suspects. The purpose of this research is to look at how the environment effects the degradation of DNA and to provide the Forensic Science Community a more thorough knowledge of DNA degradation in pig tissue in different environments.

Background Research

In a research study, Johnson and Ferries (2002) looked at the nuclear and cellular degradation of pigs, average weight, 85 kg. Using Single-cell gel electrophoresis was used to determine the level of DNA damage or DNA repair. This research suggested that the most DNA degradation took place between the time of death and 56 hrs after death.

Another study has been done to see if there is a correlation between postmortem interval (PMI) and DNA fragmentation (Kaiser, Conrad , Nerlich, Bratzke, Eisenmenger, Peschel; 2008). Samples of human femur bones were collected from bodies that were buried in a local Munich Cemetery. A sample was cut from the middle of the bone and divided into three parts, Inside, middle, outside. Their research provided support that there is a correlation between time of death and length of DNA fragment.

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Hypothesis

•Tissue samples from buried piglet will yield more DNA overall compared to tissue samples collected from pig that was submerged and placed on surface.

Research Method

•Three environments used in this research:
- ○burial underground
- ○surface positioning
- ○submerged in water

•Because pig tissue is similar to that of human tissue, piglets was used as model human decomposition.

•3-6 piglets were used in this experiment.
- ○1-3 piglets was put in each environment
- ○Subject piglets died of natural cause at birth
- ○Subject piglet were refrigerated until use

•Data was collected daily during the first three days of the experiment

•After initial three days, data was collected every two days.

•DNA extraction will be through the use of a DNeasy Blood and Tissue Kit (Qiagen).

•The DNA concentration and purity will be measured using a Nanodrop 2000, and DNA will be visualized using gel electrophoresis.

•After tissues were collected, they will be analyze using Polymerase Chain Reaction (PCR). DNA will also be analyzed with PCR.

Research Question

- Does freezing tissues collected allow better DNA extraction and results?
- How does the rate of decomposition compare to the rate of DNA degradation?
- Can the degradation of DNA be of use in determining the Postmortem interval in crime scene investigations?

This is around the area that I did part of my research at.

Conclusion

•Based on the studies that I have read, DNA extraction seems to be most successful in samples that were buried. Samples had to be washed and carefully rinse of other debris that it was surrounded by to prevent contamination.

Resources

Johnson L.A., Ferris J.A.J. (2002). Analysis of postmortem DNA degradation by single-cell gel electrophoresis. [Electronic version]. Forensic Science International, (126) pg. 43-47 Ireland: Elsevier.

Kaiser C., Bachmeier B., Conrad C., Nerlich A., Bratzke H., Eisenmenger W., Peschel O.. (2008). Molecular study of Time Dependent Changes in DNA Stability in Soil Buried Skeletal Residues. [Electronic version]. Forensic science International, (171) pg. 32 36. Ireland: Elsevier.

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