**Writing an Abstract—Biology GT Science Fair**

**Due Friday, January 6th**

What is an abstract?

* It is a snapshot of a research paper
* It can stand alone—someone reading your abstract should understand your project and your conclusions without needing to read the entirety of your research paper

Your abstract **must include**:

* The purpose of your experiment, clearly stated
* An easy-to-follow summary of your procedure
* An overview of your data
* Brief statement of your conclusions
* If applicable, you many include in your abstract any potential applications for your findings

Your abstract **must not:**

* Exceed 250 words
* Include any in-text citations
* Include any acknowledgements

Sample template to help you organize your abstract:

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| --- |
| * Purpose of project / experiment:
* An introductory statement of the reason for investigating the topic of the project.
* A statement of the problem or hypothesis being studied.
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| * Summarize procedures, emphasizing the key points or steps:
* A summarization of the key points and an overview of how the investigation was conducted.
* Omit details about the materials used unless it greatly influenced the procedure or had to be developed to do the investigation.
* An abstract should only include procedures done by the student. Work done by a mentor (such as surgical procedures) or work done prior to student involvement must not be included.
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| * Detail succinctly observations/data/results:
* This section should provide key results that lead directly to the conclusions you have drawn.
* It should not give too many details about the results nor include charts or graphs.
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| State conclusions/applications.  |

Sample ISEF Abstracts

**DEVELOPMENT OF A LOW COST ELECTROPORATOR FOR HIGH SCHOOL AND DEVELOPING WORLD APPLICATIONS**
Molecular biology is a scientific discipline that has been rapidly expanding due to the development of a few major technologies. One of these technologies is the ability to transform organisms, specifically using electroporation. Transformation is the process by which foreign genetic material (typically DNA) is taken up by a recipient cell. Electroporators are devices used to artificially insert genetic material into cells. Scientists artificially transform cells in order to alter their genetic makeup. Commercial grade electroporators are expensive (usually costing between $5,000 and $10,000), require extensive infrastructure, single-use parts, and power supplies to operate. The goal of this project was to design, build, and implement an open-source electroporator for approximately $20 in parts, making it suitable for molecular biology experimentation in cost-sensitive environments. I hypothesized that a self-powered, reusable, and self-sterilizing electroporator could be developed for approximately $20 in parts. Circuit schematics for an electroporator were designed, built, and tested using simple cloning experiments. The electroporator successfully transformed E. coli (DH5alpha) with pBluescript (a plasmid DNA), and was built using commercially available parts totaling approximately $25. Making enabling technologies, like electroporation, open-source and inexpensive will facilitate the expansion of molecular techniques to scientists and students in cost-sensitive environments, creating opportunities for independent accomplishment in molecular biology.

**ARE FINGERPRINT PATTERNS INHERITED?**
We can often tell that two people are siblings because they appear to have several similar physical traits. This is because children receive half of their DNA from each parent. All biological siblings are the mixture of both parents' DNA. This results in a greater degree of matching traits between siblings than between unrelated individuals. Therefore, if DNA determines fingerprint patterns, then siblings are more likely to share the same fingerprint pattern type than two unrelated pairs. Fingerprints have a general flow to the ridges that translates into one of three major pattern tpyes: arch, loop, or whorl. If the primary ridges appear while the volar pad is still quite pronounced (a characteristic described as a high volar pad), then the individual will develop a whorl pattern. If the primary ridges appear while the volar pad is less pronounced (dubbed an intermediate volar pad), then the individual will develop a loop pattern. Finally, if the primary ridges appear while the volar pad is nearly absorbed (a so-called low volar pad), the individual will develop an arch pattern. <br><br> I wanted to determine if fingerprint patterns are inherited by comparing the fingerprint patterns of related siblings to those of unrelated pairs. I gathered the fingerprint patterns of twelve sets of siblings and twelve sets of unrelated participants. Each participant's right index finger was fingerprinted using a black ink pad and card. Each pattern was then categorized and recorded as an arch, loop, or whorl. I found that nine out of the twelve related siblings fell into the same fingerprint pattern category. Only three out of the twelve unrelated pairs fell into the same fingerprint category. Therefore it can then be accepted that fingerprint patterns are inherited.