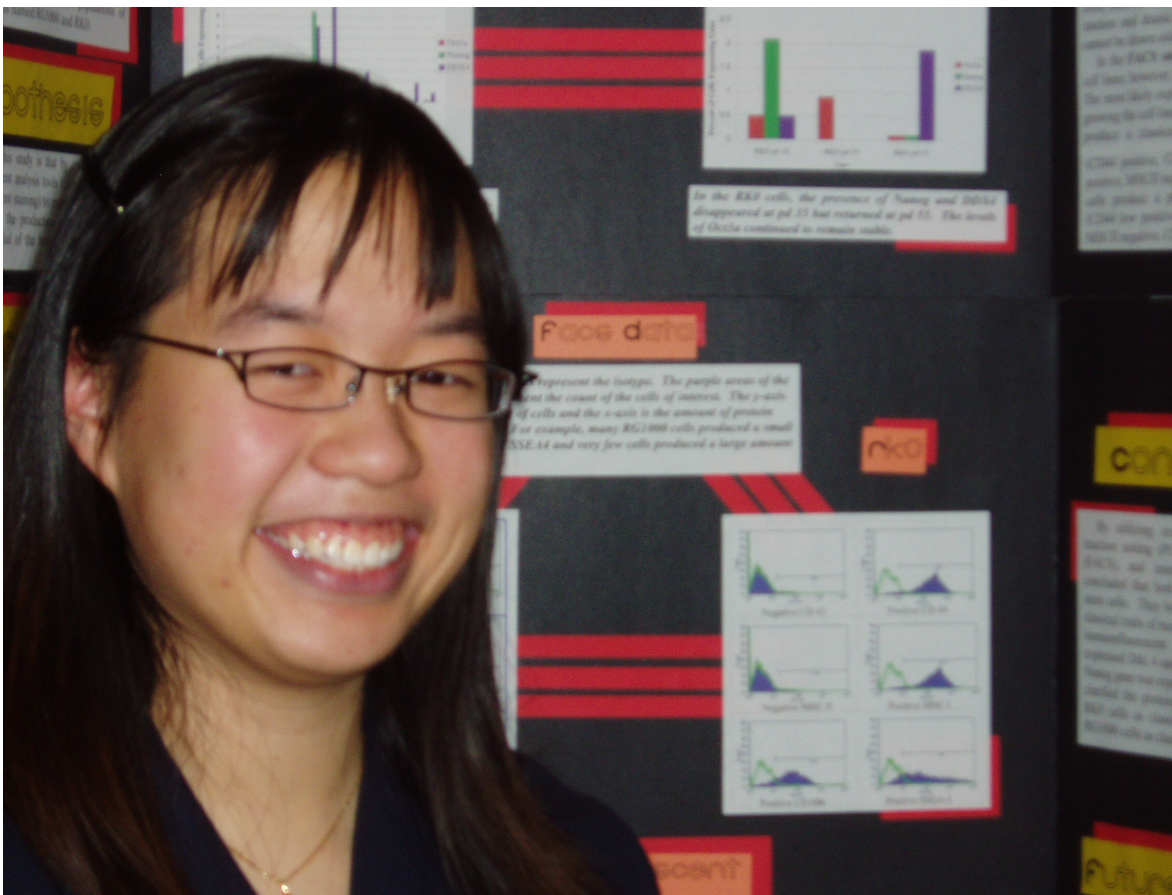


## Example Science Fair Posters

Examples can serve as great learning tools. They give you a foundation from which to build. As you review what others have done, it can help you to clarify what you like and what you don't. Examples can allow you to see opportunities for how you can do more, or do something different. Let's look at a series of examples. Along the way consider:

- What do you like?
- What don't you like?
- What do you see as effective communication tools?
- Which color schemes are attractive? Which aren't?
- What makes your project unique, and how might you capitalize on that?
- 

Grab your laboratory notebook. Start sketching down ideas. Make lists of things you want to remember and consider as you make your own unique creation!



## Example #1

# Which Hand Soap is Best at Inhibiting Bacterial Growth?

Lisa Persson, Hopkins West Junior High School, Minnetonka MN

Photos: Lisa Persson

**Purpose:**

The purpose of this experiment is to determine which agent is most effective at inhibiting growth of *E. coli* bacteria: Alcohol-based hand sanitizer, antibacterial soap, or regular soap and water.

The eventual purpose is to determine which method of hand-washing is most effective in preventing harmful bacterial growth on hands.

**Hypothesis:**

If alcohol-based hand sanitizer is applied to *E. coli* bacteria, then it will inhibit bacteria growth better than the other agents.

**Background/Research:**

**Hand Sanitizers, Soap or Bath?**

**Antibacterial Soap vs. Regular Soap**

**Experimental Method: "Zone of Inhibition"**

Petri dish with nutrient agar  
Entire surface inoculated with *E. coli* K12  
Test coupons saturated with agents:  
1. Sterile distilled water (control)  
2. Antibacterial soap (Triclosan 0.6%)  
3. Hand sanitizer (62% Ethyl Alcohol)  
4. Conventional hand soap

- Plate is incubated for 24 hours
- Measure radius – calculate average

Original Experiment      Follow-up Experiment

**Results:**

- In the first experiment, there was inconsistent data and large variances, but the antibacterial agent appeared best after 24 hours
- First experiment results questionable because the control agent (water) showed evidence of significant inhibition
- Second experiment with improved procedure clearly shows antibacterial soap far superior to all other agents after 24 hours

**What this study did not determine:**

- How the agents work against bacteria in the short-term (minutes)
- How the agents work against a broad range of pathogens (other bacteria, viruses)
- Which types of bacteria are commonly found on our hands
- Are any "good" bacteria destroyed by these agents and is there any negative effect from that?
- Does any antibacterial agent stay on your hands after washing, and continue to inhibit growth?

**Conclusions:**

- The hypothesis is **not** supported: alcohol-based hand sanitizer is no different than plain water or soap after 24 hours – all show no inhibition
- Antibacterial soap is extremely effective after 24 hours, showing no *E. coli* growth within 14.6mm of the test sample

**Topics for future study:**

- What types of bacteria usually grow on hands?
- Is *E. coli* one of the 0.01% that alcohol does not kill?
- Since bar soap does not appear to have any long-lasting bacteria-killing properties, is it effective in some other way? How?
- Is there a correlation between bacteria-free hands and good health?

**Bibliography:** see separate notebook

**What was controlled:**

- Amount of agent – volume and concentration
- Size, shape and thickness of sample coupons
- External contaminants (used distilled water instead of tap water to eliminate chlorine, etc.)
- Uniform inoculation of plate surface
- No cross-plate contamination (same agent used on all 4 quadrants of each test plate in final run)
- Consistent measurement
  - Used dark-field illumination to highlight surface features
  - Photographed with accurate measurement scale

**Experimental Procedure:**

- Prepare sterile nutrient agar plates (Petri dishes)
- Prepare known concentration solutions of test agents
- Inoculate plates evenly with *E. coli*
- Apply test coupons saturated with 10µL agent
- Incubate culture plates at 37°C
- Periodically observe, photograph, measure plates
- Collect, analyze and plot data

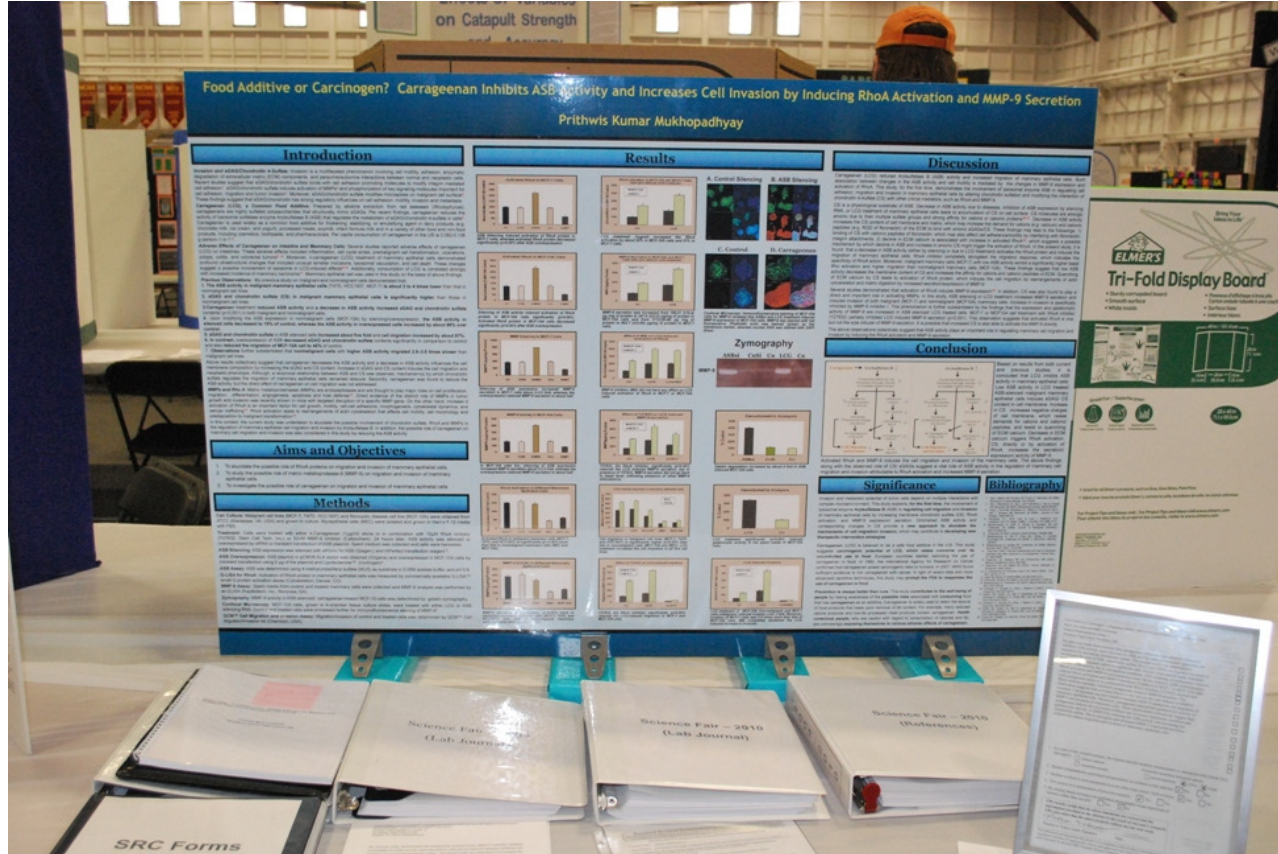
**Data Analysis:**

**SUMMARY: Average Inhibition Radius**

Agent	Original Experiment (mm)	Follow-up Experiment (mm)
Control (Water)	14.6	14.6
Antibacterial Soap	14.6	14.6
Hand Sanitizer	14.6	14.6
Conventional Soap	14.6	14.6

This board is quite attractive. It's easy to read and applies strong visual images to communicate the work. The Purpose and Hypothesis are clear and easy to find. The results, discussion and conclusions are all in bulleted lists, which make reading them easier. And the area addressing future work is quite clear. The two things I would suggest they could have done a little differently would have been to put the Abstract in a photo frame on the table, instead of on the board. And the Background section has a lot of text. They did a great job on the rest of the board summarizing information in abbreviated bullets. Maybe they could have considered that in the background section as well.

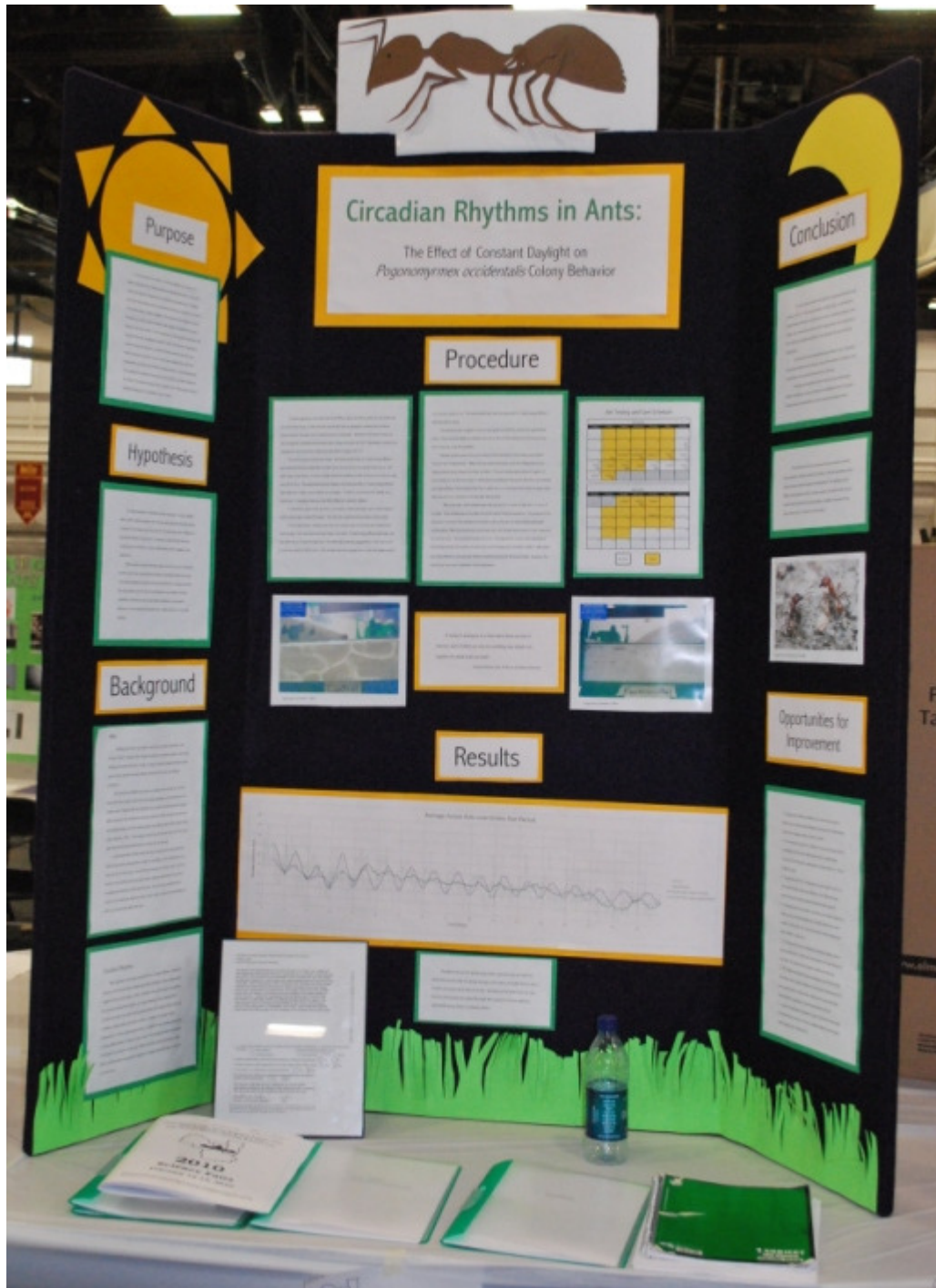
## Example #2



Like the previous example, this board is also quite attractive. You will note all the folders on the table detailing his SRC forms, lab journal, references and research paper. He also has his abstract in a vertical photo frame that is not on the board. Things I think he could do to enhance his board include:

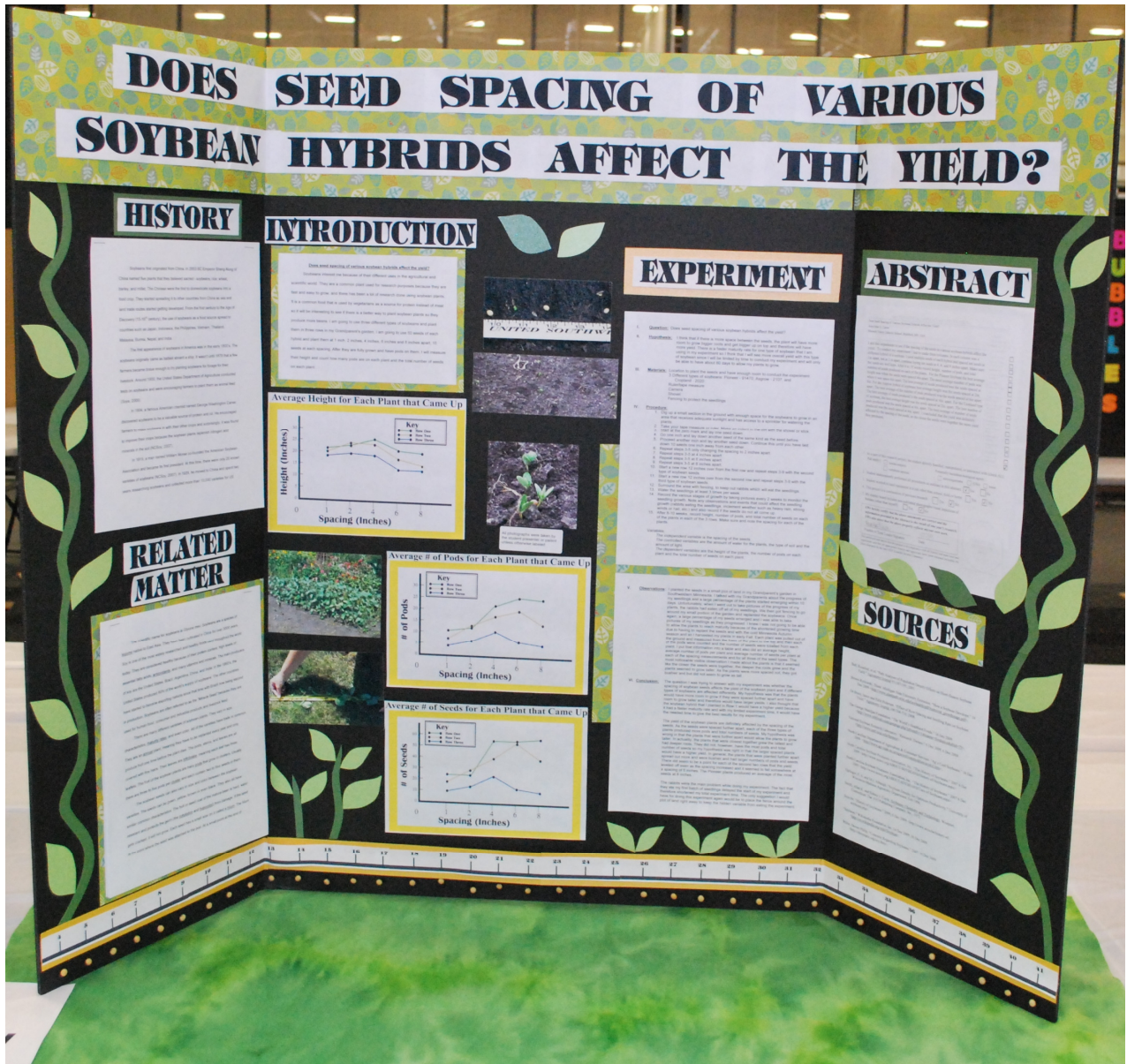
- Make the text easier to read. Right now there is too much information and the font size is too small
- Use more images. The board, while attractive, could be more engaging.
- Increase the visual appeal of the various notebooks. He could try for better use of color on his title pages, or some theme that would be consistent with his board. For example, he could make title pages for his notebooks that are based on the same color theme as his board with the same Title headings (font and color).
- Use a tri-fold board to allow for more space. By adding sides and possibly even height, it would allow him to retain much of his current information, but express it over an increased surface area.

### Example #3



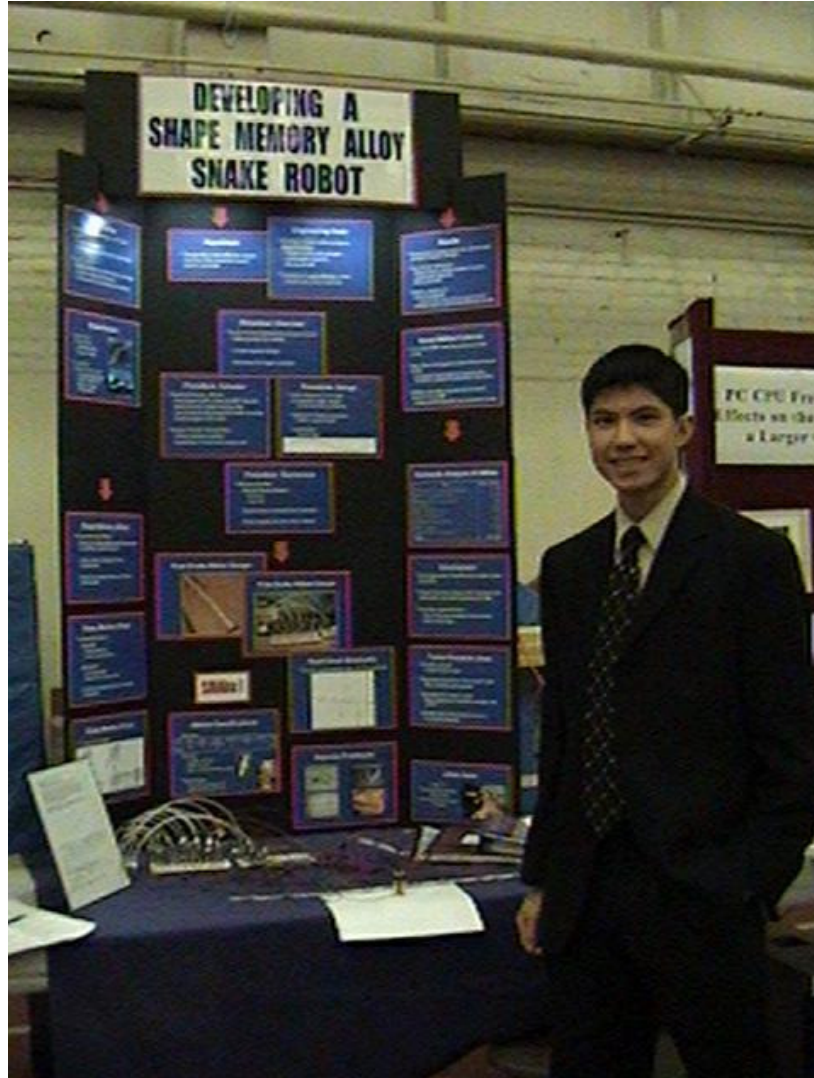
I love the creativity displayed by this student. Note the use of color themes throughout. It has a logical flow of information. See the Abstract displayed horizontally in the front in a photo frame. While we may not seek to have a board that is this unique, this student certainly set themselves apart. There's a lot to be said for that ingenuity.

**Example #4**



Students always think this board is interesting when I show it to them. What makes it even more special is that it was done by a seventh grader! They did a great job of being unique, but professional. Notice also the use of a cloth under the board that ties directly to the board itself.

## Example #5



This student, Adam Hahn, was in SciMent a number of years ago. Things that I really like about his board include:

- Adam had an attractive color scheme of blue and red that he used consistently with his slides, arrows and even down to the cloth he used under his board!
- His use of lights really added to the board's visual appeal.
- He has a model of what he built, which really helps with communication
- Note that his slides are passed on the board in straight lines, but bunched in groups of including slides of different sizes. Our eye actually prefers that break from monotony.
- Notice also that he has his abstract off to the side in a photo frame.

# Example #6

## Role of PKC $\lambda$ in Carrageenan-Induced Inflammatory Pain Response

Charles Morris + 2009-10

### Introduction

Chronic pain is the third most common medical condition... Carrageenan-induced inflammatory pain is a model of acute inflammation... PKC  $\lambda$  is a member of the PKC family of enzymes... PKC  $\lambda$  is a member of the PKC family of enzymes... PKC  $\lambda$  is a member of the PKC family of enzymes...

### Background

PKC  $\lambda$  is a member of the PKC family of enzymes... PKC  $\lambda$  is a member of the PKC family of enzymes... PKC  $\lambda$  is a member of the PKC family of enzymes...

### Goals & Hypotheses

The PKC family of enzymes... PKC  $\lambda$  is a member of the PKC family of enzymes... PKC  $\lambda$  is a member of the PKC family of enzymes...

### Methodology

#### Immunohistochemistry

#### Western Blot

#### Western Blot Staining

### Results

Figure 3 shows immunohistochemistry results in the left dorsal horn of the spinal cord (L4) PKC  $\lambda$  is expressed in neurons and outer lamina II and in lamina II of spinal cord tissue subjected to carrageenan-induced inflammation. PKC  $\lambda$  is expressed in neurons and outer lamina II and in lamina II of spinal cord tissue subjected to carrageenan-induced inflammation. PKC  $\lambda$  is expressed in neurons and outer lamina II and in lamina II of spinal cord tissue subjected to carrageenan-induced inflammation.

Figure 4 shows Western blot results of PKC  $\lambda$  protein levels in the spinal cord tissue of the spinal cord (L4) PKC  $\lambda$  is expressed in neurons and outer lamina II and in lamina II of spinal cord tissue subjected to carrageenan-induced inflammation. PKC  $\lambda$  is expressed in neurons and outer lamina II and in lamina II of spinal cord tissue subjected to carrageenan-induced inflammation. PKC  $\lambda$  is expressed in neurons and outer lamina II and in lamina II of spinal cord tissue subjected to carrageenan-induced inflammation.

Figure 5 shows Western blot staining results of PKC  $\lambda$  protein levels in the spinal cord tissue of the spinal cord (L4) PKC  $\lambda$  is expressed in neurons and outer lamina II and in lamina II of spinal cord tissue subjected to carrageenan-induced inflammation. PKC  $\lambda$  is expressed in neurons and outer lamina II and in lamina II of spinal cord tissue subjected to carrageenan-induced inflammation. PKC  $\lambda$  is expressed in neurons and outer lamina II and in lamina II of spinal cord tissue subjected to carrageenan-induced inflammation.

### Discussion

Results show that PKC  $\lambda$  is primarily found only in the dorsal horn of the spinal cord... PKC  $\lambda$  is a member of the PKC family of enzymes... PKC  $\lambda$  is a member of the PKC family of enzymes...

### Limitations

There were some limitations to my study... PKC  $\lambda$  is a member of the PKC family of enzymes... PKC  $\lambda$  is a member of the PKC family of enzymes...

### Future Work

Immediate future work should include... PKC  $\lambda$  is a member of the PKC family of enzymes... PKC  $\lambda$  is a member of the PKC family of enzymes...

### Significance

More effective analgesic drugs for chronic pain are needed... PKC  $\lambda$  is a member of the PKC family of enzymes... PKC  $\lambda$  is a member of the PKC family of enzymes...

### Works Cited

1. ... PKC  $\lambda$  is a member of the PKC family of enzymes... PKC  $\lambda$  is a member of the PKC family of enzymes...

This board was designed with a layout that allows the reader to flow logically from the Introduction and Background, read the Purpose and Hypothesis, study the Methodology, review the Results and then learn from the Discussion, Sources of Error, Future Work and Conclusions. This example also does a good job of integrating a series of diagrams and images throughout. By breaking the text into a two-column format, this student does make it easier for someone to read. They could possibly enhance review of what they've written by using bulleted lists, but instead he has chosen is to highlight certain statements by bolding the text.

# Example #7

## Expanding a Gene Expression Profile for Theiler's Virus as a Diagnostic Tool for Multiple Sclerosis

Ava Mokhtari and Addison Weiler • 2010

### Introduction

**Purpose**  
Currently, there are no genetic tests that can detect Theiler's virus (TV) infection in people worldwide. TV infection is a neurological disease that leads to the formation of the amyloid plaques that cause nerve damage. The amyloid plaques are made of protein deposits that are deposited along the length of the nerve. The amyloid plaques are generally not seen, but disease progression, loss of myelin, loss of axons, and loss of nerve fibers can be seen. The purpose of this research was to develop a genetic test for TV infection. The test will be a PCR test that can be used to detect TV infection in people with MS. The test will be a PCR test that can be used to detect TV infection in people with MS.

**Current Diagnosis Tests**  
There is no single test to definitively diagnose multiple sclerosis. Doctors usually use a combination of tests to diagnose MS, including MRI scans, spinal fluid analysis, and clinical history. The purpose of this research was to develop a genetic test for TV infection. The test will be a PCR test that can be used to detect TV infection in people with MS.

### Methodology

1. MS tissue collected with Thayer's virus
2. Sample tissue from open infectious infected
3. cDNA reverse transcribed from isolated open infected
4. Prepared 48-well plate of which 27 of the 48 wells are filled (See Figure 2)
5. Quantitative polymerase chain reactions (qPCR) are run on the well plate

**Quantitative Polymerase Chain Reactions (qPCR)**

Figure 2: Forty-eight well plate prepared for quantitative polymerase chain reaction (qPCR). Columns correspond to lines on qPCR graphs.

Figure 3: Setup of qPCR analyses. cDNA levels were pointed in real time (shown below), and gene expression levels were calculated from these graphs.

Figure 4: qPCR cycle counts for replication of cDNA used to calculate expression levels of the gene class. Expression levels were calculated from graphs of all 18 genes.

### Conclusions

The purpose of this research was to develop a genetic test for TV infection. The test will be a PCR test that can be used to detect TV infection in people with MS. The test will be a PCR test that can be used to detect TV infection in people with MS.

### Limitations

The test will be a PCR test that can be used to detect TV infection in people with MS. The test will be a PCR test that can be used to detect TV infection in people with MS.

### Results

Table 2: Genes showing significant increases in expression levels in MS as related with Theiler's virus

Targeted genes	Relative expression level change (fold increase)	P-value
Hexb	1.528	0.0003
Chchd3	1.523	0.7546
Rel	1.314	0.7793
Relb	1.475	0.0011
Cd88	1.612	0.0185
Relt	1.612	0.0185
Hspa4	1.599	0.0030
Chc1	1.361	0.0006
Chc2	1.292	0.0014
Chc3	1.468	0.0001
H2-T22	1.511	5.6e-10
Chc4	1.270	0.0068
Ucp1b	1.455	0.0075
Hpa4	1.066	0.0435
Chc5	1.261	0.0224
Thy1d	1.187	0.0042
Relc	1.137	0.7362
Reld	1.137	0.8075
Relg	1.847	0.0297

Table 3: Part of the gene expression profile showing Scrape primers expression level changes and Theiler's virus expression level changes

Gene	Relative primer	q-value	Relative level	q-value
Hpa4b	1.9	0.392	-3.108	0.0003
Chchd3	1.6	0.396	-1.523	0.7546
Rel	1.8	0.37	-1.314	0.7793
Relb	1.7	0.196	-1.475	0.0011
Relt	1.6	0.158	-1.612	0.0185
Hspa4	1.6	0.415	-1.748	0.0030
Chc1	1.3	0.339	-1.000	0.0006
Hpa4c	1.5	0.391	-1.361	0.0001
Chc2	1.3	0.405	-1.292	0.0014
H2-T22	1.8	0.036	-1.455	5.6e-10
Chc4	1.4	0.262	-1.011	0.0068
Ucp1b	1.4	0.226	-1.239	0.0075
Hpa4d	1.2	0.348	-1.066	0.0435
Chc5	1.1	0.368	-1.261	0.0224
Thy1d	1.1	0.362	-1.187	0.0042
Relc	1.1	0.211	-1.137	0.7362
Reld	1.1	0.202	-1.137	0.8075
Relg	1.8	0.202	-1.847	0.0297

### Works Cited

1. ...

2. ...

3. ...

4. ...

5. ...

This board was created by a team. Their Methodology and Results are especially clear and easy to read. I really like how they have laid out their Methods using visual tools and arrows, helping their audience to feel an increased understanding of what their project was. Another thing they've done to make their board more interesting is that they've woven a theme into their title board that relates to their project. Their project deals with gene expression and they've used a DNA strand on their title board



# Example #8

## Effects of microbes and sodium chloride (a micronutrient) on CO<sub>2</sub> flux into the atmosphere from decomposition of plant matter

Katherine Paulsen (2010)

### Background on CO<sub>2</sub> Flux

The amount of carbon dioxide (CO<sub>2</sub>) that the atmosphere loses through decomposition of plant matter (dead and other organic matter) is nearly as large as the amount of CO<sub>2</sub> that the atmosphere gains through photosynthesis. This loss of CO<sub>2</sub> is a major component of the carbon cycle, which is a key factor in determining the Earth's climate. The amount of CO<sub>2</sub> that the atmosphere loses through decomposition of plant matter is a function of the amount of plant matter that is decomposed, the rate at which it is decomposed, and the amount of CO<sub>2</sub> that is released during the process. The amount of CO<sub>2</sub> that is released during the decomposition of plant matter is a function of the amount of plant matter that is decomposed, the rate at which it is decomposed, and the amount of CO<sub>2</sub> that is released during the process.

### Traditional View

The traditional view of the decomposition of plant matter is that it is a simple process that is controlled by the amount of plant matter that is decomposed. However, recent research has shown that the decomposition of plant matter is a complex process that is influenced by many factors, including the amount of plant matter that is decomposed, the rate at which it is decomposed, and the amount of CO<sub>2</sub> that is released during the process.

### Microbe Hypotheses

One hypothesis is that the decomposition of plant matter is controlled by the amount of microbes that are present. Another hypothesis is that the decomposition of plant matter is controlled by the amount of sodium chloride that is present.

### Micronutrient Hypotheses

One hypothesis is that the decomposition of plant matter is controlled by the amount of sodium chloride that is present. Another hypothesis is that the decomposition of plant matter is controlled by the amount of sodium chloride that is present.

### Methods

#### Laboratory Decomposition Study

Run	Substrate	Temperature	Microbes	Sodium Chloride
1	Grass	20°C	None	None
2	Grass	20°C	Microbes	None
3	Grass	20°C	None	Sodium Chloride
4	Grass	20°C	Microbes	Sodium Chloride
5	Grass	30°C	None	None
6	Grass	30°C	Microbes	None
7	Grass	30°C	None	Sodium Chloride
8	Grass	30°C	Microbes	Sodium Chloride

#### Field Decomposition Study

#### Insect Collection

### Discussion

The results of this study show that the decomposition of plant matter is a complex process that is influenced by many factors, including the amount of plant matter that is decomposed, the rate at which it is decomposed, and the amount of CO<sub>2</sub> that is released during the process. The results also show that the decomposition of plant matter is influenced by the amount of microbes that are present and the amount of sodium chloride that is present.

### Limitations

There are several limitations to this study, including the fact that the study was conducted in a laboratory setting and the fact that the study was limited to the decomposition of grass.

### Conclusion

The results of this study show that the decomposition of plant matter is a complex process that is influenced by many factors, including the amount of plant matter that is decomposed, the rate at which it is decomposed, and the amount of CO<sub>2</sub> that is released during the process.

### Works Cited

Paulsen, K. (2010). Effects of microbes and sodium chloride on CO<sub>2</sub> flux into the atmosphere from decomposition of plant matter. *Journal of Environmental Science and Technology*, 4(1), 1-10.

### Results

#### Laboratory Study Results: Sodium Ion

Run	CO <sub>2</sub> Flux (g CO <sub>2</sub> /m <sup>2</sup> /h)
Control	~1.0
NaCl	~2.5

#### Laboratory Study Results: Microbes

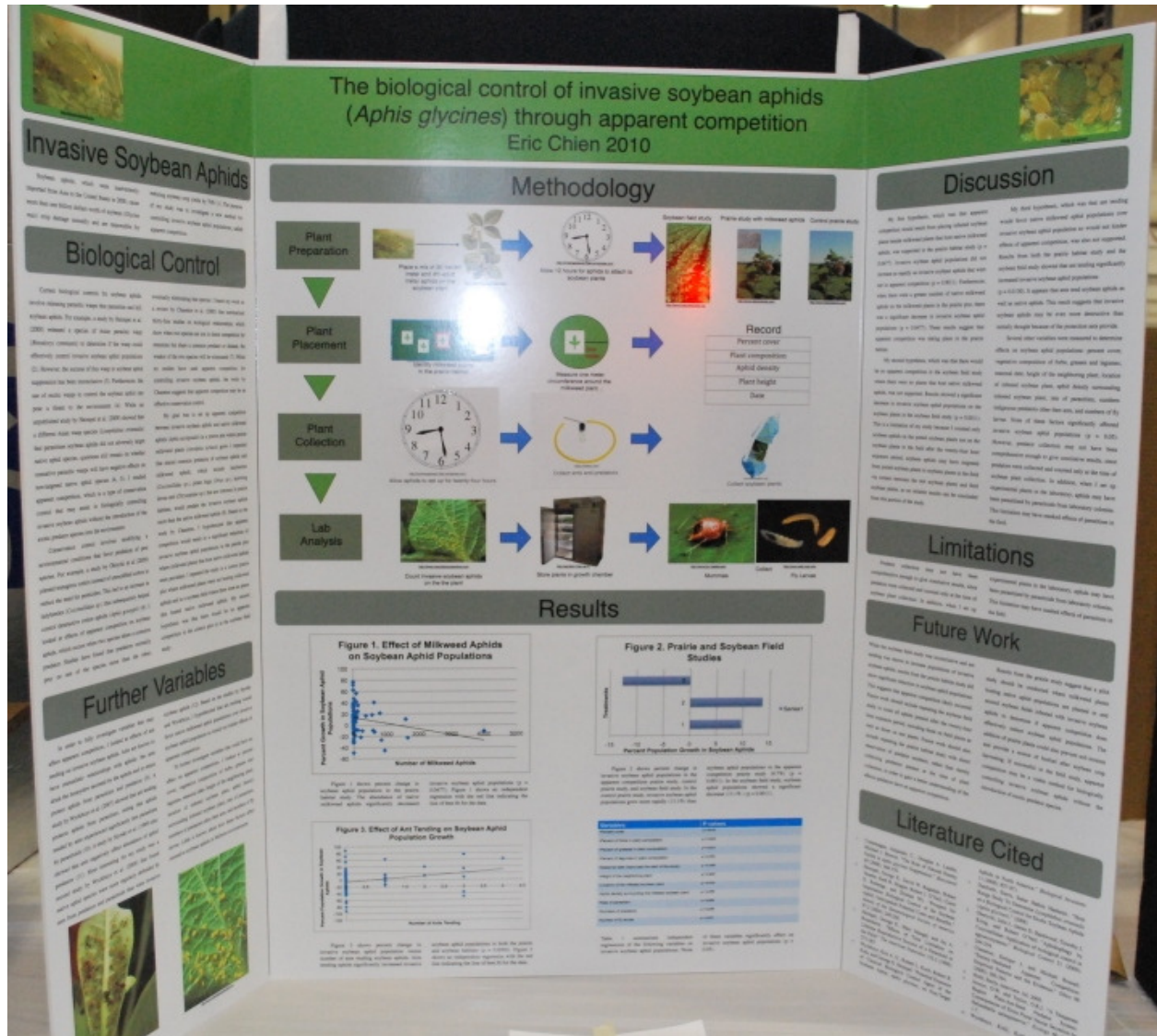
Run	CO <sub>2</sub> Flux (g CO <sub>2</sub> /m <sup>2</sup> /h)
Control	~1.0
Microbes	~2.0

#### Field Study Results: Sodium Ion

Run	CO <sub>2</sub> Flux (g CO <sub>2</sub> /m <sup>2</sup> /h)
Control	~1.0
NaCl	~2.0

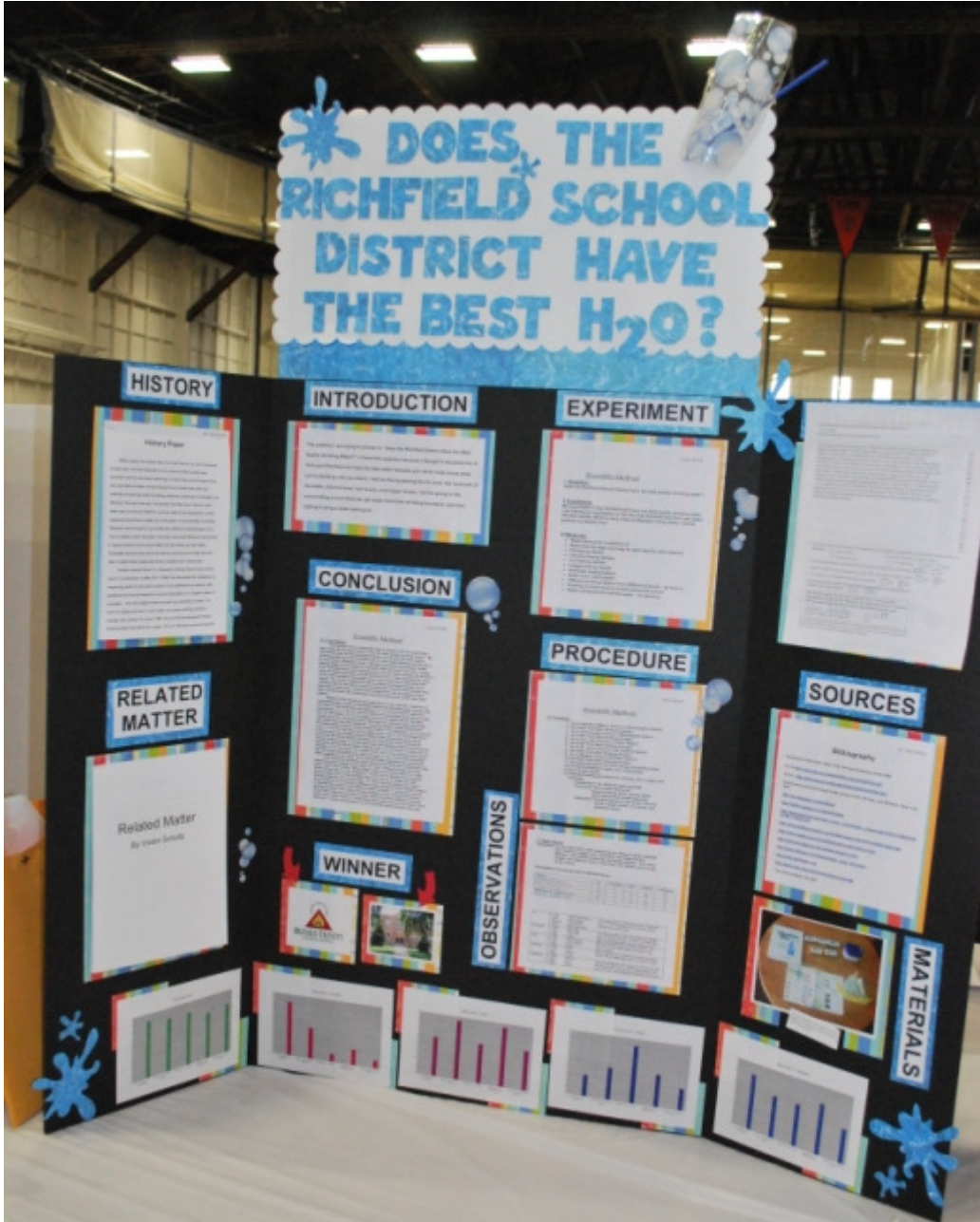
This student chose a nice color scheme that complimented her photos of vegetation very nicely. She uses many photos to articulate her work and make her research seem active. The use of arrows and photos in the Methods section also provide clarity. Throughout the board, the flow of information is logical and easy to read and navigate. While she has quite a bit of text, it doesn't seem overwhelming.

## Example #9



This student also considered their images and topic when choosing his colors. The green on his title board flows nicely from the green in the images he took. I also like that he put photos on his title board itself. What is normally boring space that students often don't use he has utilized and those photos help to tie the board together. Like many of the previous examples, he's done well at using photos, images and arrows to explain the process of his Methods. Things he could've done differently would have been to use brighter or more prominent colors in his Results section to make that work stand out. He also has a bit too much text, which can almost sap a judge's energy when looking at all that information.

## Example #10



This board is very creative. The reason I've chosen to include it as an example is because the student used water droplet images and put them all around the board. They used a consistent image in the dead space. I have seen other students do that as well, and it is a really effective tool. Consider whether you have something like that you could use strategically in 3-5 place throughout your board.

## Example #11



This student, Ummul Kathawalla, was in SciMent and went to ISEF. Her board is unlike any of the others you've seen in that it is free-standing (i.e. it doesn't use the table). She has slides that were placed on a wooden board. Notice her use of lights and photos. It is very attractive and easy to read and follow. At the Fair, students and adults alike were drawn to it because of its visual appeal and clarity.

## Example #12



This student, Akash Kumar, is also a former SciMent student. There are a few things I really like about Akash's board:

- He used Power Point for his slides, but he has a gradation of color in the background. That is slightly unique and attractive. The colors he chose also complement his photos.
- He uses arrows in the middle of his board to link his Methods with his Results. It's a very effective communication tool.
- His slides are staggered. In some cases Methods (on the left) link to two or more Results slides. And his results are a combination of text, images, graphs and tables.
- Lastly, I love how his tie matches his board color!

# Example #13



This student is Gavin Ovsak (SciMent 2010 and 2011). His board is very creative in a couple ways:

- He has built it so that his laptop is displayed in the middle of his board. He uses that to effectively show a video to judges, helping support his explanation of his work.
- The front of his board is at an angle, making it easier to read and to allow more surface area on which he can communicate his project.
- Both of these things make his project presentation very unique. That uniqueness helps to set him apart from others.
- Make note of his use of lights. They are both behind the title board and anchored on both sides of his board on the top and middle.
- See that he used a series of photos on his title board, and he also uses red construction paper cut at an angle to make his title board more interesting. Often students leave the title board as dead space, whereas there are creative things you can do with that space.
- Lastly, see that his abstract and copies of it are available vertically on the right side of his board in a clear plastic holder.