Effective Conference Posters

Tim Ritter

UNC Pembroke Undergraduate Research and Creativity Center

Effective Poster Presentations

- Goals of a poster presentation
  - Get your main point(s) across to as many people as possible.
  - Stimulate interest and discussion
  - Receive feedback on research
  - Source of information
  - Summary (advertisement) of your work
- How to be effective
  - Focused on a single message.
  - Lets graphs and images tell the story; uses text sparingly.
  - Keeps the sequence well-ordered and obvious.

Effective Poster Presentations

- Address questions related to a specific topic:
  - What is it about?
  - Why is this topic important?
  - Why is this topic unique?
  - How does this relate to other topics?
  - What comes next?

Plan the Poster

- Make it easy to understand
- Make it easy to read
- Poster should stand alone
  - Verbal explanations should supply details, not essentials
- Decide on one concept or question
- Determine poster size
  - (UNCP: 3 ft. high by 4 ft. wide)
- Choose poster orientation
  - Portrait
  - **Landscape**

Overall

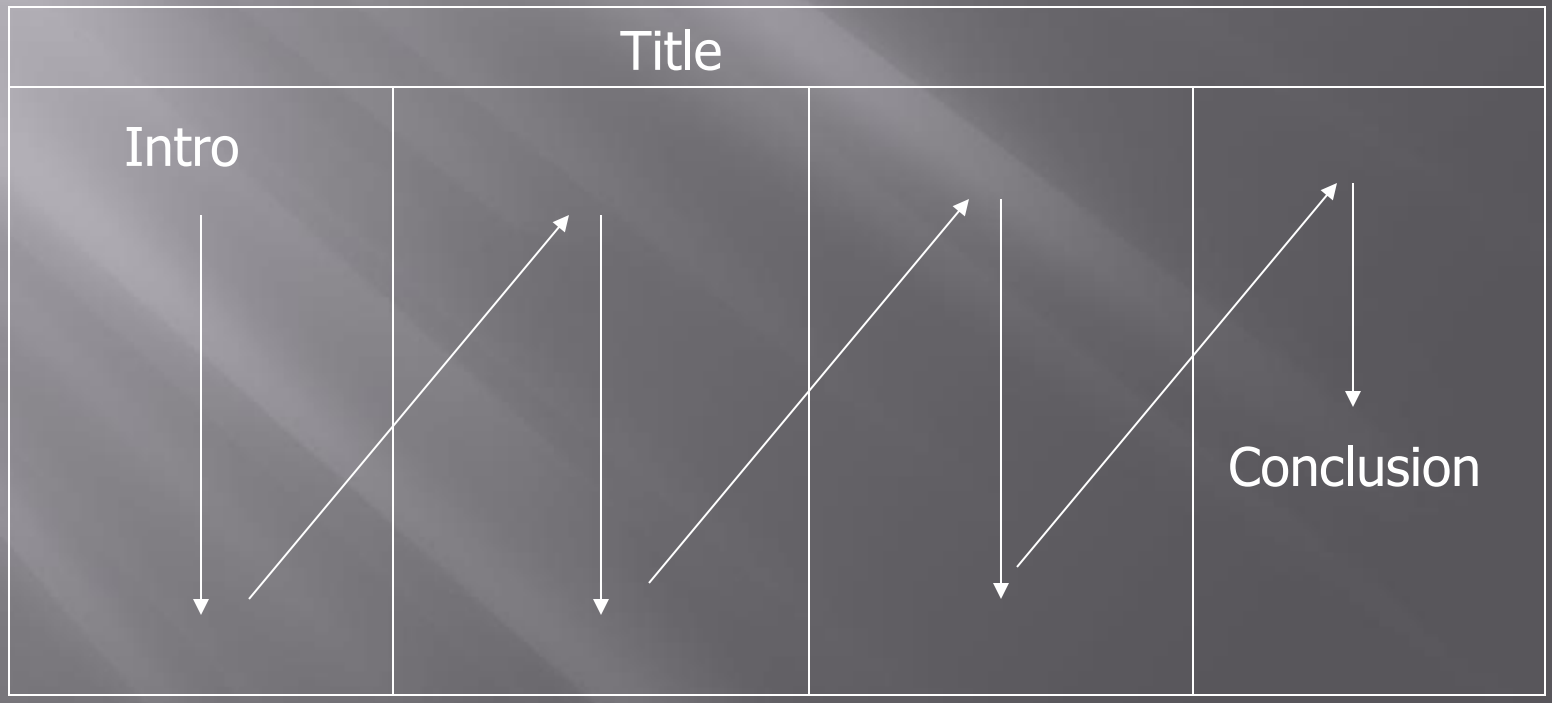
- Keep it short and simple
- Remove all non-essential information
- Attract visual attention: use graphics
- Consider having handouts
  - Miniatures of poster
  - Additional details not included in poster
  - Paper that has been published

Poster Layout

- Determine logical sequence for material
- Organize material into sections
  - I have seen sections numbered to make flow obvious
- Typically, use 3 (to 5 columns)
- Arrange material vertically from top left corner to bottom right corner
  - This makes it easier for people to read, without having to move back and forth
- Aim for:
    - 40% text
    - 60% graphics
    - 20% empty space

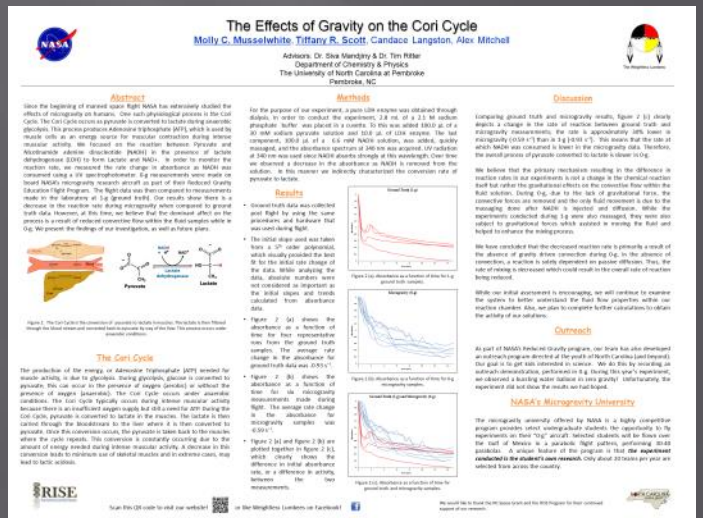
Poster Layout

- Sketch your layout and flow early in the process



Content should include:

- Title, Author(s) and affiliation(s)
- Abstract: include *only* if required by the conference
- Introduction: a brief but important overview to secure the viewer's attention
- Problem: concise statement of the problem
- Materials and Methods: brief description of the processes and procedures
- Results: outcomes, findings, data
- Conclusion & future work: summary, discussion of significance and relevance of results, a few easily remembered key conclusions, possible future research
- References
- Acknowledgments
- Contact Information
  - Web addresses
  - QR code
  - Facebook/Instagram/Twitter



The Effects of Gravity on the Cori Cycle

Molly C. Musselwhite, Tiffany R. Scott, Candace Langston, Alex Mitchell

Advisors: Dr. Siva Mandjiny & Dr. Tim Ritter
Department of Chemistry & Physics
The University of North Carolina at Pembroke
Pembroke, NC

Abstract

Since the beginning of manned space flight NASA has extensively studied the effects of microgravity on humans. One such physiological process is the Cori Cycle. The Cori Cycle occurs as pyruvate is converted to lactate during anaerobic glycolysis. This process produces Adenosine triphosphate (ATP), which is used by muscle cells as an energy source for muscular contraction during intense muscular activity. We focused on the reaction between Pyruvate and Nicotinamide adenine dinucleotide (NADH) in the presence of lactate dehydrogenase (LDH) to form Lactate and NAD+. In order to monitor the reaction rate, we measured the rate change in absorbance as NADH was consumed using a UV spectrophotometer. Eight measurements were made on board NASA's microgravity research aircraft as part of their Reduced Gravity Education Flight Program. The flight data was then compared to measurements made in the laboratory at 1-g (ground truth). Our results show there is a decrease in the reaction rate during microgravity when compared to ground truth data. However, at this time, we believe that the dominant affect on the process is a result of reduced convection flow within the fluid samples while in 0-g. We present the findings of our investigation, as well as future plans.

The Cori Cycle

The production of the energy, or Adenosine Triphosphate (ATP) needed for muscle activity, is due to glycolysis. During glycolysis, glucose is converted to pyruvate, this can occur in the presence of oxygen (aerobic) or without the presence of oxygen (anaerobic). The Cori Cycle occurs under anaerobic conditions. The Cori Cycle typically occurs during intense muscular activity because there is an insufficient oxygen supply but still a need for ATP. During the Cori Cycle, pyruvate is converted to lactate in the muscles. The lactate is then carried through the bloodstream to the liver where it is then converted to pyruvate. Once this conversion occurs, the pyruvate is taken back to the muscles where the cycle repeats. This conversion is constantly occurring due to the amount of energy needed during intense muscular activity. A decrease in this conversion leads to minimum use of skeletal muscles and in extreme cases, may lead to lactic acidosis.

Methods

For the purpose of our experiment, a pure LDH enzyme was obtained through dialysis. In order to conduct the experiment, 2.8 mL of a 2.5 M sodium phosphate buffer was placed in a cuvette. To this was added 100.0 µL of a 30 mM sodium pyruvate solution and 10.0 µL of LDH enzyme. The last component, 100.0 µL of a 6.6 mM NADH solution, was added, quickly massaged, and the absorbance spectrum at 340 nm was acquired. UV radiation at 340 nm was used since NADH absorbs strongly at this wavelength. Over time we observed a decrease in the absorbance as NADH is removed from the solution. In this manner we indirectly characterized the conversion rate of pyruvate to lactate.

Results

- Ground truth data was collected post flight by using the same procedures and hardware that was used during flight.
- The initial slope used was taken from a 5th order polynomial, which visually provided the best fit for the initial rate change of the data. While analyzing the data, absolute numbers were not considered as important as the initial slopes and trends calculated from absorbance data.
- Figure 2 (a) shows the absorbance as a function of time for two representative runs from the ground truth samples. The average rate change in the absorbance for ground truth data was $-0.85\ s^{-1}$.
- Figure 2 (b) shows the absorbance as a function of time for six microgravity measurements made during flight. The average rate change in the absorbance for microgravity samples was $-0.30\ s^{-1}$.
- Figure 2 (a) and figure 2 (b) are plotted together in figure 2 (c), which clearly shows the difference in initial absorbance rate, or a difference in activity, between the two measurements.

Discussion

Comparing ground truth and microgravity results, figure 2 (c) clearly depicts a change in the rate of reaction between ground truth and microgravity measurements, the rate is approximately 38% lower in microgravity ($0.53\ s^{-1}$) than in 1-g ($-0.85\ s^{-1}$). This means that the rate of which NADH was consumed is lower in the microgravity data. Therefore, the overall process of pyruvate converted to lactate is slower in 0-g.

We believe that the primary mechanism resulting in the difference in reaction rates in our experiments is not a change in the chemical reaction itself but rather the gravitational effects on the convective flow within the fluid solution. During 0-g, due to the lack of gravitational force, the convective forces are removed and the only fluid movement is due to the massaging done after NADH is injected and diffuses. While the experiments conducted during 1-g were also massaged, they were also subject to gravitational forces which assisted in mixing the fluid and helped to enhance the mixing process.

We have concluded that the decreased reaction rate is primarily a result of the absence of gravity driven convection during 0-g. In the absence of convection, a reaction is solely dependent on passive diffusion. Thus, the rate of mixing is decreased which could result in the overall rate of reaction being reduced.

While our initial assessment is encouraging, we will continue to examine the system to better understand the fluid flow properties within our reaction chamber. Also, we plan to complete further calculations to obtain the activity of our solutions.

Outreach

As part of NASA's Reduced Gravity program, our team has also developed an outreach program directed at the youth of North Carolina (and beyond). Our goal is to get kids interested in science. We do this by creating an outreach demonstration, performed in 0-g. During this year's experiment, we observed a bursting water balloon in zero gravity! Unfortunately, the experiment did not show the results we had hoped.

NASA's Microgravity University

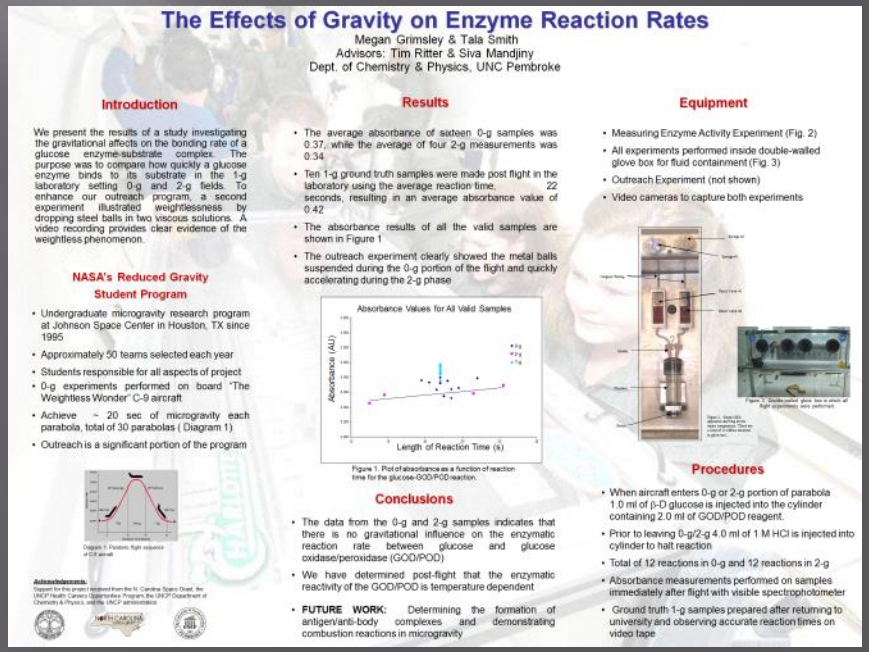
The microgravity university offered by NASA is a highly competitive program provides select undergraduate students the opportunity to fly experiments on their "dog" aircraft. Selected students will be flown over the Gulf of Mexico in a parabolic flight pattern, performing 30-40 parabolas. A unique feature of the program is that ***the experiment conducted is the student's own research.*** Only about 30 teams per year are selected from across the country.

RISE

Scan this QR code to visit our website! or like Weightless Wonders on Facebook!

Poster Title

- Make it interesting but don't run on
- You want to lure people from a distance
- Should be easy to read from 15 feet
- If title is too long, shorten it
  - Don't reduce the font size



The Effects of Gravity on Enzyme Reaction Rates

Megan Grimsley & Tala Smith
Advisors: Tim Ritter & Siva Mandjiny
Dept. of Chemistry & Physics, UNC Pembroke

Introduction

We present the results of a study investigating the gravitational affects on the bonding rate of a glucose enzyme-substrate complex. The purpose was to compare how quickly a glucose enzyme binds to its substrate in the 1-g laboratory setting 0-g and 2-g fields. To enhance our outreach program, a second experiment illustrated weightlessness by dropping steel balls in two viscous solutions. A video recording provides clear evidence of the weightless phenomenon.

NASA's Reduced Gravity Student Program

- Undergraduate microgravity research program at Johnson Space Center in Houston, TX since 1995
- Approximately 50 teams selected each year
- Students responsible for all aspects of project
- 0-g experiments performed on board "The Weightless Wonder" C-9 aircraft
- Achieve ~ 20 sec of microgravity each parabola, total of 30 parabolas (Diagram 1)
- Outreach is a significant portion of the program

Results

- The average absorbance of sixteen 0-g samples was 0.37, while the average of four 2-g measurements was 0.34
- Ten 1-g ground truth samples were made post flight in the laboratory using the average reaction time, 22 seconds, resulting in an average absorbance value of 0.42
- The absorbance results of all the valid samples are shown in Figure 1
- The outreach experiment clearly showed the metal balls suspended during the 0-g portion of the flight and quickly accelerating during the 2-g phase

Absorbance Values for All Valid Samples

Absorbance (AU)

Length of Reaction Time (s)

Figure 1. Plot of absorbance as a function of reaction time for the glucose-GOD/POD reaction.

Conclusions

- The data from the 0-g and 2-g samples indicates that there is no gravitational influence on the enzymatic reaction rate between glucose and glucose oxidase/peroxidase (GOD/POD)
- We have determined post-flight that the enzymatic reactivity of the GOD/POD is temperature dependent
- **FUTURE WORK:** Determining the formation of antigen/anti-body complexes and demonstrating combustion reactions in microgravity

Equipment

- Measuring Enzyme Activity Experiment (Fig. 2)
- All experiments performed inside double-walled glove box for fluid containment (Fig. 3)
- Outreach Experiment (not shown)
- Video cameras to capture both experiments

Procedures

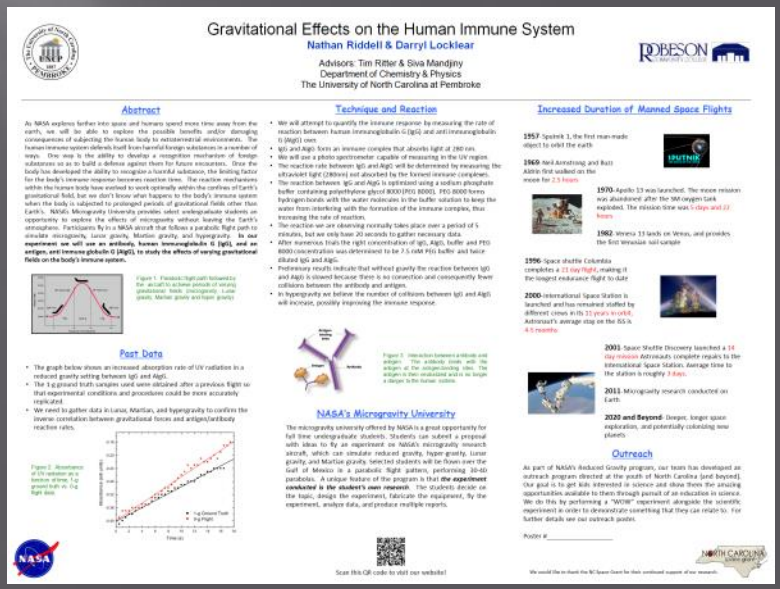
- When aircraft enters 0-g or 2-g portion of parabola 1.0 ml of β-D glucose is injected into the cylinder containing 2.0 ml of GOD/POD reagent.
- Prior to leaving 0-g/2-g 4.0 ml of 1 M HCl is injected into cylinder to halt reaction
- Total of 12 reactions in 0-g and 12 reactions in 2-g
- Absorbance measurements performed on samples immediately after flight with visible spectrophotometer
- Ground truth 1-g samples prepared after returning to university and observing accurate reaction times on video tape

Poster Text

- Left align or justify text
- One and one-half to double space
- Pick one font and stick to it
  - Serif font actually easier to read!
- Use larger/colored font for emphasis
- Use bulleted points rather than paragraphs
  - Keeps poster from becoming too text heavy
  - Try reading your own poster…how long required?

Suggested Font Sizes

- Title: 72 pt
- Authors: 48 pt
- Affiliations: 36 pt
- Section headings: 40 pt
- Text: 32 pt
- Acknowledgements: 20 pt



Gravitational Effects on the Human Immune System

Nathan Riddell & Darryl Locklear

Advisors: Tim Ritter & Siva Mandjiny
Department of Chemistry & Physics
The University of North Carolina at Pembroke

Abstract

Technique and Reaction

Increased Duration of Manned Space Flights

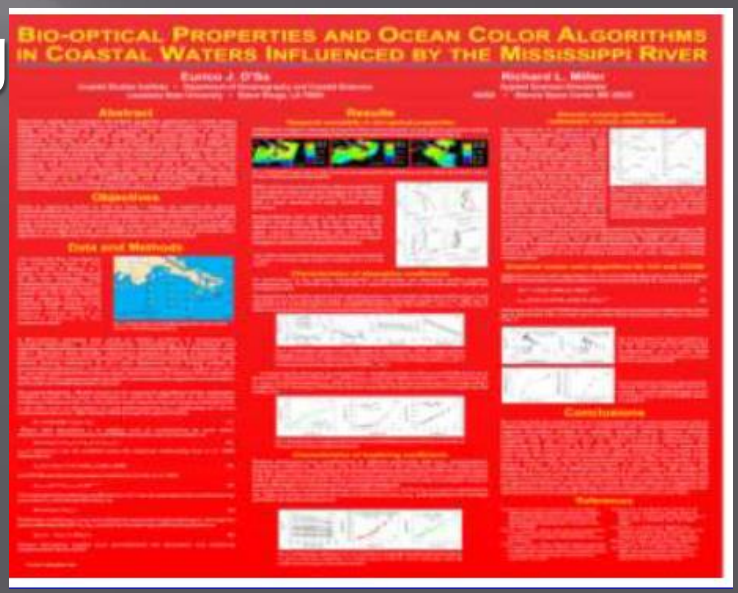
Past Data

NASA's Microgravity University

Outreach

Color

- One background color to unify poster
- Stick to muted colors
- Avoid red/green combinations
  - Red/green color blindness is common
- Avoid overusing or under-using color
  - Can compete with text and graphics
- Be consistent



Graphics

- Make large enough for viewing from at least 3 feet away
- Text should support graphics, not vice versa
- Use heavier lines in tables and graphs for easier viewing

Graphics

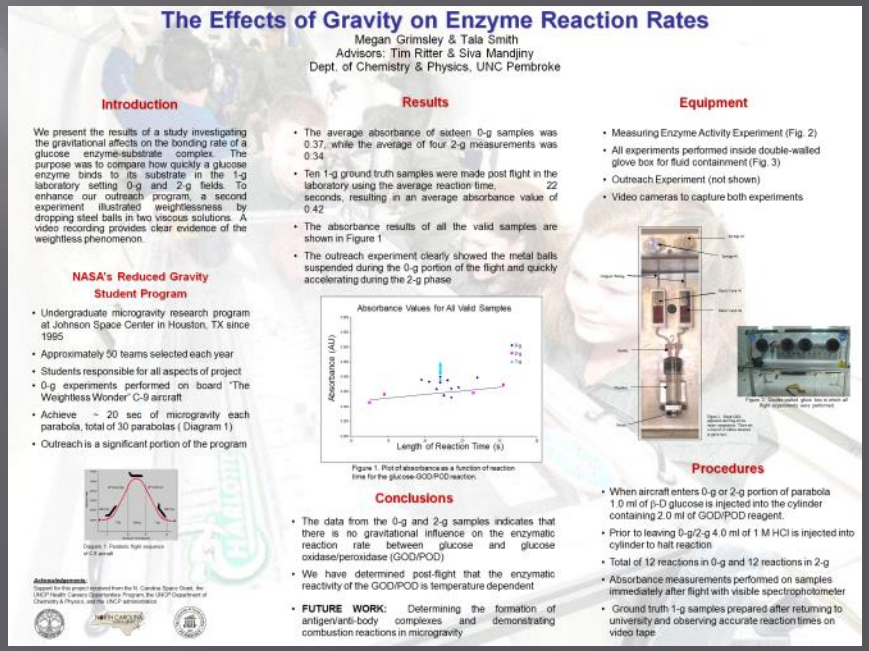
- No figures should be smaller than
- 5” x 7”.
- All figures should have captions.
- Photographs
  - – At least 300 dpi at final size
  - – Avoid web captures—they are usually of low
- Resolution
  - – Crop photos to highlight the important feature
  - – Put a thin outline around photos to help them
- Stand out from the background

Images

- • Public Domain images do not *require* attribution, but it is good practice to attribute anyway.
  - (Usually a work enters the public domain 70 years after the death of creator—but there are exceptions. Some creators designate works to be in the public domain during their lifetime.)
- Creative Commons images permit reproduction as long as proper attribution is given.
  - (Available through Flickr, free stock photos archives)
- Royalty/Subscription images provide high quality images for a single image fee or membership—expensive!
  - Copyright Protected images
- can be used under the fair use doctrine for educational purposes including as part of a display or presentation at professional symposia. Proper attribution should be given.

Background

- Keep the background in the background
- Avoid full page graphics, even if subdued



Southern Flounder Exhibit Temperature-Dependent Sex Determination

J. Adam Luckenbach*, John Godwin and Russell Borski

Department of Zoology, Box 7617, North Carolina State University, Raleigh, NC 27695

Introduction

Southern flounder (*Paralichthys lethostigma*) support valuable fisheries and show great promise for aquaculture. Female flounder are known to grow faster and reach larger adult sizes than males. Therefore, information on sex determination that might increase the ratio of female flounder is important for aquaculture.

Objective

This study was conducted to determine whether southern flounder exhibit temperature-dependent sex determination (TSD), and if growth is affected by rearing temperature.

Methods

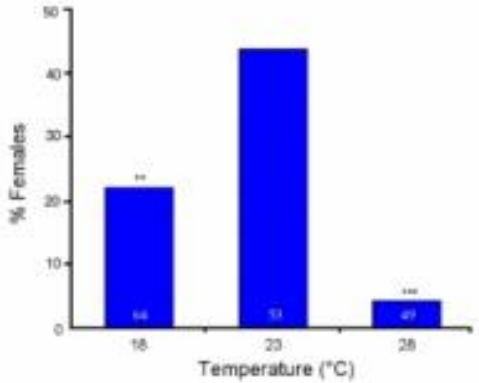
- Southern flounder broodstock were strip spawned to collect eggs and sperm for *in vitro* fertilization.
- Hatched larvae were weaned from a natural diet (rotifers/*Artemia*) to high protein pelleted feed and fed until satiation at least twice daily.
- Upon reaching a mean total length of 40 mm, the juvenile flounder were stocked at equal densities into one of three temperatures 18, 23, or 28°C for 245 days.
- Gonads were preserved and later sectioned at 2-6 microns.
- Sex-distinguishing markers were used to distinguish males (spermatogenesis) from females (oogenesis).

Histological Analysis

Male Differentiation

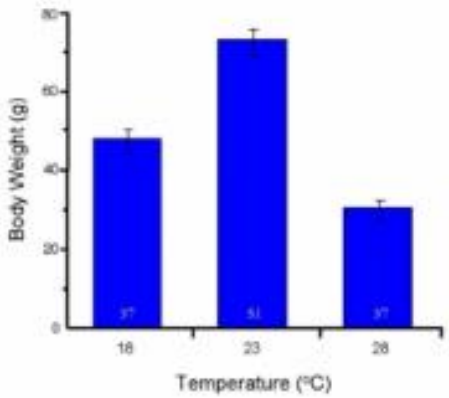
Female Differentiation

Temperature Affects Sex Determination

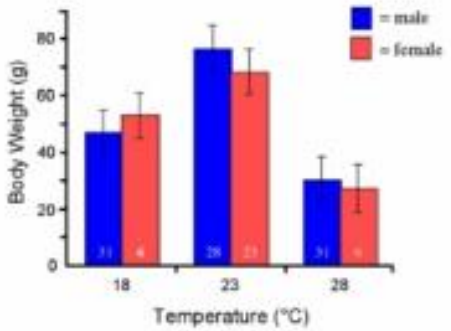


(**P < 0.01 and ***P < 0.001 represent significant deviations from a 1:1 male:female sex ratio)

Rearing Temperature Affects Growth



Growth Does Not Differ by Sex



Results

- Sex was discernible in most fish greater than 120 mm long.
- High (28°C) temperature produced 4% females.
- Low (18°C) temperature produced 22% females.
- Mid-range (23°C) temperature produced 44% females.
- Fish raised at high or low temperatures showed reduced growth compared to those at the mid-range temperature.
- Up to 245 days, no differences in growth existed between sexes.

Conclusions

- These findings indicate that sex determination in southern flounder is temperature-sensitive and temperature has a profound effect on growth.
- A mid-range rearing temperature (23°C) appears to maximize the number of females and promote better growth in young southern flounder.
- Although adult females are known to grow larger than males, no difference in growth between sexes occurred in age-0 (< 1 year) southern flounder.

Acknowledgements

The authors acknowledge the Saltonstall-Kennedy Program of the National Marine Fisheries Service and the University of North Carolina Sea Grant College Program for funding this research. Special thanks to Leo Ware and Beth Shamps for help with the work.

Easy application of Maggot Debridement Therapy to treat chronic abscesses in laminitic horses

Daisy Bicking

Daisy Haven Farm, Parkesburg, PA 19365

Introduction

Hoof infections are often the cause of euthanasia in the chronically laminitic horse, especially those whose immune systems are compromised by Cushing's syndrome or insulin resistance. Maggot Debridement Therapy (MDT) can be an effective treatment for such infections (Jorge and Morrison 2004, Sherman et al. 2007), but unfortunately the procedure is underutilized because it is perceived as difficult and expensive.

This poster displays the ease with which MDT can be applied, and summarizes the effectiveness of the procedure.

Materials and methods

"PW" was a 19 year-old mare with chronic hoof infections in both front feet. Infections were exposed, then subjected to the protocol detailed in the photographs below. Larvae (*Phaenicia sericata*) were obtained from Monarch Labs in Irvine, CA.

After a second course of maggots, she was kept covered until it had dried and keratinized, approximately 6 weeks from start of treatment.

Results

As illustrated by the images here, MDT aided in the removal of the necrotic and infected tissue, and new healthy tissue was able to grow.

Including "PW," our hoof-care practice has used MDT to successfully resolve conditions in 15 horses since November 2009.

Conclusions

Maggot Debridement Therapy is an incredibly useful tool when fighting hoof infection in the chronically laminitic horse. The availability of a less expensive, easier method means Maggot Debridement Therapy is more accessible for more animals and can also be applied in the field by the veterinarian, hoof-care provider, or the animal's other care-givers when prescribed.

1. Medical maggots (Monarch Labs)

2. Supplies needed

3. Place maggots into wound

4. Cover with chiffon gauze creating window

5. Secure with Elastikon

6. Composite rim shoe adds height above dressing

7. Attach composite rim shoe with Elastikon

8. Leave window in gauze accessible

9. 4x4" gauze and diaper absorb exudate

10. Change 4x4" gauze and re-wrap daily

11. Secure diaper with vet tape

12. Not too tight or constrictive!

13. Wrap with duct tape

14. Within 3-5 days maggots mature

15. Flush maggots out with CleanTrac

Literature cited

Jorge T. and S Morrison. 2004. *Maggot debridement therapy. Hoofcare & Lameness* 76:28-31.

Sherman, R.A., R. Stevens, D Ng, and E Iverson. 2007. Treating wounds in small animals with maggot debridement therapy: a survey of practitioner knowledge. *Journal* 175:134-41.

Acknowledgements

I would like to thank Tina Jorge for her support and encouragement, and the Penn Vet Laminitis Institute for hosting this conference and opening the poster forum to allow me the opportunity to present this information to my peers. I would also like to thank Dr Karen Oddoux, Dr Judith Shoemaker, Stacie Shain, and Terry Boswell for reviewing my poster. Photograph of dark green bottle fly courtesy John Talbot.

Further information

Please visit www.daisyhavenfarm.com for more information, or contact me at 610-476-5000 or daisyhavenfarm@gmail.com.

DAISY HAVEN FARM

Humanities Poster Example

UH-Downtown

Variations on the Service Course

Alternative Needs and Ends of Basic Technical Writing Classes

CPTSC 2005
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University of Houston-Downtown
kendalla@uhd.edu

Overview:

This poster examines the basic technical writing course–a.k.a., Business and Technical Writing, Professional Writing, and/or Technical Writing–from three perspectives: **(1)** from the eyes of **professional writing scholars** defining the field, **(2)** from the vantage point of **university administrations** interested in academic standards, and **(3)** from **an expecting workplace** eager to recruit the course's undergraduate students. All three stakeholders see the course slightly differently; they ascribe to the course different needs, expectations and desired ends, which, in turn, inspire instructors who design and teach the course to rethink our assignments, standards and content.

Gatekeeper of Professional Writing

For professional writing scholars, the service course operates as an introduction to the technical writing profession. Therefore, we who teach the course have a vested interest that its content covers basic knowledge of our field. Most textbooks we use reify a certain curriculum–generic forms, research skills, writing style, and design basics (Markel, Woolever). Others expand the formula to include progressive discussions about intercultural communications (Andrews).

> **The students still viewed the projects as artificial, even though they were provided actual clients...The clients seemed to share this perspective. (Blakeslee, 2001, p. 179)**

However, the formula has its disadvantages.

1. Some instructors consider teaching the courses inferior work (Staples).
2. Many students feel that the assignments are contrived; they often produce facsimiles of model documents rather than their own thoughtful drafts (Blakeslee, Spinuzzi).
3. Removed from the actual workplace context, generic forms often lose their meaning (Craig). Those environments are difficult to replicate--even when local businesses participate in classroom activities.
4. When students find their own topics, they find it difficult to judge its suitability.

Implications

Instructors can teach how historical and social events shaped written genre.

> **We should be able to explain not just what the habits associated with a common professional genre are, but also why those habits have historically built up and why they have evolved differently [from others]" (Spinuzzi 1996, p. 303).**

For example, discuss how formal reports evolved from flowery narratives meant to relive the lab experience in the low-tech 17th century (Shapin) into regimented IMRAD patterns (Swales, Gross) that regulate the 20th century marketplace of scientific ideas.

That way, instructors give new dimension to the writing process beyond generic forms and content, and they open space for students to revise genre for their ends. And, we firm up our discipline by remembering its past.

The Academic Equalizer

The service course usually functions as a Professional Writing Program's bread and butter. The course is required for many students from multiple disciplines, so it helps necessitate and legitimate the program in the eyes of university administration (Connors, Adams).

Accreditation organizations for colleges and universities have insisted that English departments develop quantifiable criteria by which to standardize their writing training.

Many writing handbooks and programs include a list of writing habits that they want their graduates to correct and/or master ("The Texas Ten", Lundsford). Others set exit writing exams so that a college education from their institution guarantees a certain degree of writing proficiency.

> **UT-Austin has a list of writing standards called the "Texas Ten". Among other things, the list requires students to " recognize revisions and corrections needed in your own and others' prose" and " present final versions of your writing free from [particular grammar] errors."**
>
> **Source: University of Texas at Austin**

For many non-traditional students who have either tested out of basic composition courses or taken it at other universities, the professional writing service course might actually be the only formal writing class they take at the institution from which they graduate.

> **The New England Association of Schools and Colleges 2005 Accreditation Policy 4.7:**
>
> **Students completing an undergraduate or graduate degree program demonstrate collegiate-level skills in the English language.**

Implications

Given the differences between how practitioners critique technical writing versus how scholars teach it, we should consider developing our own standards of technical style that accommodate both stakeholders.

Connaster offers possibilities for stylistic standards. For example, he recommends relaxing rules regarding whether or not to punctuate bulleted lists and he promotes bending the subject/verb and referent/antecedent agreement rules on some key nouns such as "media," "none" and "data."

> **Readers...do not care about ...word forms in the root language. They match subjects and verbs based on the notion of the subject ... They know...that the notion of data is singular, roughly equivalent to dataset. (2004, p. 266)**

Preparation for the "Real World"

Natural, applied and social science departments often depend upon English departments to train their students to write as professionals in the workforce. Further, employers themselves have strong opinions about the writing skills their prospective employees need.

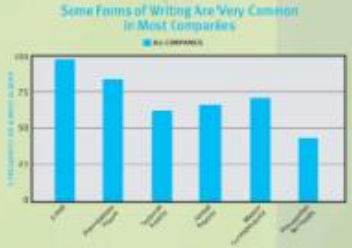
> **What gets taught in our programs is a concern not only of the multiple perspectives within academia, but of professional organizations representing practitioners, of industry managers, and various advocates of university "reform" within and outside of academia. (Savage, 2005, p. 6)**

Our service course usually contains the following major assignments: proposal, progress reports, final reports, instructions, and job materials (Markel and Wilson). We usually justify requiring these five documents because they crop up in most workplaces.

However, employers and practitioners have different standards for these deliverables than instructors.

> **[When asked to critique memos, professional] engineers and students gave more positive comments than negative (62% positive for each group), as compared to professors (33%). (Amare & Brammer, 2005, p. 187)**

And, their daily routines enlist mostly informal and visual documents.



Source: The National Commission on Writing

Implications

If mirroring actual professional writing legitimates the sequence, then we might readjust our foci to emphasize email (as remediated letters), memos, and other correspondence over technical or formal reports. We might also keep an eye on emerging genre such as white papers and disciplinary blogs.

The Effects of Gravity on the Cori Cycle

Molly C. Musselwhite, Tiffany R. Scott, Candace Langston, Alex Mitchell

Advisors: Dr. Siva Mandjiny & Dr. Tim Ritter
Department of Chemistry & Physics
The University of North Carolina at Pembroke
Pembroke, NC

Abstract

Since the beginning of manned space flight NASA has extensively studied the effects of microgravity on humans. One such physiological process is the Cori Cycle. The Cori Cycle occurs as pyruvate is converted to lactate during anaerobic glycolysis. This process produces Adenosine triphosphate (ATP), which is used by muscle cells as an energy source for muscular contraction during intense muscular activity. We focused on the reaction between Pyruvate and Nicotinamide adenine dinucleotide (NADH) in the presence of lactate dehydrogenase (LDH) to form Lactate and NAD+. In order to monitor the reaction rate, we measured the rate change in absorbance as NADH was consumed using a UV spectrophotometer. 0-g measurements were made on board NASA's microgravity research aircraft as part of their Reduced Gravity Education Flight Program. The flight data was then compared to measurements made in the laboratory at 1-g (ground truth). Our results show there is a decrease in the reaction rate during microgravity when compared to ground truth data. However, at this time, we believe that the dominant affect on the process is a result of reduced convective flow within the fluid samples while in 0-g. We present the findings of our investigation, as well as future plans.

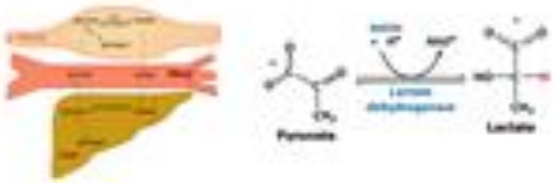


Figure 1. The Cori Cycle is the conversion of pyruvate to lactate in muscles. The lactate is then filtered through the blood stream and converted back to pyruvate by way of the liver. This process occurs under anaerobic conditions.

The Cori Cycle

The production of the energy or Adenosine triphosphate (ATP) needed for muscle activity, is due to glycolysis. During glycolysis, glucose is converted to pyruvate; this can occur in the presence of oxygen (aerobic) or without the presence of oxygen (anaerobic). The Cori Cycle occurs under anaerobic conditions. The Cori Cycle typically occurs during intense muscular activity because there is an insufficient oxygen supply but still a need for ATP. During the Cori Cycle, pyruvate is converted to lactate in the muscles. The lactate is then carried through the bloodstream to the liver where it is then converted to pyruvate. Once this conversion occurs, the pyruvate is taken back to the muscles where the cycle repeats. This conversion is constantly occurring due to the amount of energy needed during intense muscular activity. A decrease in this conversion leads to minimum use of skeletal muscles and in extreme cases, may lead to lactic acidosis.

Methods

For the purpose of our experiment, a pure LDH enzyme was obtained through dialysis. In order to conduct the experiment, 2.8 ml of a 2.1 M sodium phosphate buffer was placed in a cuvette. To this was added 100.0 µL of a 30 mM sodium pyruvate solution and 10.0 µL of LDH enzyme. The last component, 100.0 µL of a 6.6 mM NADH solution, was added, quickly massaged, and the absorbance spectrum at 340 nm was acquired. UV radiation at 340 nm was used since NADH absorbs strongly at this wavelength. Over time we observed a decrease in the absorbance as NADH is removed from the solution. In this manner we indirectly characterized the conversion rate of pyruvate to lactate.

Results

- Ground truth data was collected post flight by using the same procedures and hardware that was used during flight.
- The initial slope used was taken from a 5th order polynomial, which visually provided the best fit for the initial rate change of the data. While analyzing the data, absolute numbers were not considered as important as the initial slopes and trends calculated from absorbance data.
- Figure 2 (a) shows the absorbance as a function of time for four representative runs from the ground truth samples. The average rate change in the absorbance for ground truth data was -0.93 s^{-1}.
- Figure 2 (b) shows the absorbance as a function of time for six microgravity measurements made during flight. The average rate change in the absorbance for microgravity samples was -0.59 s^{-1}.
- Figure 2 (a) and figure 2 (b) are plotted together in figure 2 (c), which clearly shows the difference in initial absorbance rate, or a difference in activity, between the two measurements.

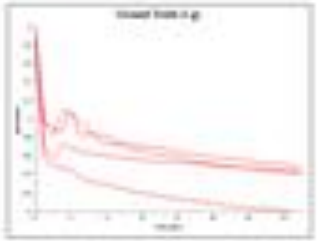


Figure 2 (a). Absorbance as a function of time for 1-g ground truth samples.

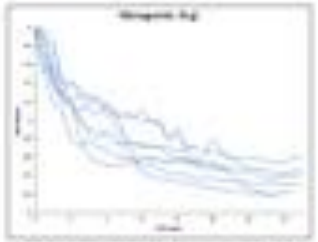


Figure 2 (b). Absorbance as a function of time for 0-g microgravity samples.

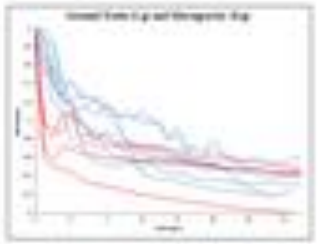


Figure 2 (c). Absorbance as a function of time for ground truth and microgravity samples.

Discussion

Comparing ground truth and microgravity results, figure 2 (c) clearly depicts a change in the rate of reaction between ground truth and microgravity measurements; the rate is approximately 30% lower in microgravity (-0.59 s^{-1}) than in 1-g (-0.93 s^{-1}). This means that the rate at which NADH was consumed is lower in the microgravity data. Therefore, the overall process of pyruvate converted to lactate is slower in 0-g.

We believe that the primary mechanism resulting in the difference in reaction rates in our experiments is not a change in the chemical reaction itself but rather the gravitational effects on the convective flow within the fluid solution. During 0-g, due to the lack of gravitational force, the convective forces are removed and the only fluid movement is due to the massaging done after NADH is injected and diffusion. While the experiments conducted during 1-g were also massaged, they were also subject to gravitational forces which assisted in moving the fluid and helped to enhance the mixing process.

We have concluded that the decreased reaction rate is primarily a result of the absence of gravity driven convection during 0-g. In the absence of convection, a reaction is solely dependent on passive diffusion. Thus, the rate of mixing is decreased which could result in the overall rate of reaction being reduced.

While our initial assessment is encouraging, we will continue to examine the system to better understand the fluid flow properties within our reaction chamber. Also, we plan to complete further calculations to obtain the activity of our solutions.

Outreach

As part of NASA's Reduced Gravity program, our team has also developed an outreach program directed at the youth of North Carolina (and beyond). Our goal is to get kids interested in science. We do this by recording an outreach demonstration, performed in 0-g. During this year's experiment, we observed a bursting water balloon in zero gravity! Unfortunately, the experiment did not show the results we had hoped.

NASA's Microgravity University

The microgravity university offered by NASA is a highly competitive program provides select undergraduate students the opportunity to fly experiments on their "0-g" aircraft. Selected students will be flown over the Gulf of Mexico in a parabolic flight pattern, performing 30-60 parabolas. A unique feature of the program is that **the experiment conducted is the student's own research.** Only about 20 teams per year are selected from across the country.

Scan this QR code to visit our website! or the Weightless Lumbees on Facebook!

We would like to thank the NC Space Grant and the RISE Program for their continued support of our research.

Title, formatted in sentence case (*Not Title Case* and *NOT ALL CAPS*), that hints at an interesting issue and/or methodology, doesn't spill onto a third line (ideally), and isn't hot pink

Colin Purrington
666 Teipai Street, Posterville, PA 19801, USA

Introduction

Your reader was mildly intrigued by the title, but you have exactly two sentences to hook them into reading more. So describe exactly what your interesting question is and why it really needed to be addressed. Gratuitous background information will cause them to walk away.

Typography research has shown that text is easier to read if you use a serif font such as Times. But use a non-serif font for title, headings, etc., to subtly tag them as different. Research has also shown that fully justified text (like this paragraph) is harder to read, so don't do this, even if it seems cool and professional looking.

Figure 1. A catchy photograph can help lure people to your otherwise boring poster. Yes, I risked my life getting this shot.

Materials and methods

Few people really want to know the gruesome details of what you've been up to, so be brief. And be visual. Use a photograph, drawing, or flow chart if possible, supplemented with only a brief overview of your procedure.

If you can somehow attach an object, an iPad, etc., that can involve viewers in active way, do so. Refer to the companion website (see bottom right section) for more ideas if you are creatively challenged.

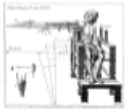


Figure 2. Hand-drawn illustrations are preferable to computer-generated ones. Just bribe or flirt with an artist to get them to help you out. A photograph of you actually doing something might be nice.

Results

The overall layout in this arena should be visually compelling, with clear cues on how a reader should travel through the components. You might want a large map with inset graphs. Or have questions on left and answers with supporting graphs on right. Be sure to separate figures from other figures by generous use of white space. When figures are too cramped, viewers get confused about which figures to read first and which legend goes with which figure. Cramped content just looks bad, too. The big thing to remember is that a Results section on a poster does not need to look like a Results section on a manuscript, so feel free to be creative.

If you can add small drawings or icons to your figures, do so — those visual cues can be priceless aids in orienting viewers. And use colored arrows or callouts to focus attention on important parts of graphs. You can even put text annotations next to arrows to tell reader what's going on that's interesting in relation to the hypothesis test. E.g., "This outlier was most likely caused by contamination when I sneezed into tube." Also, don't be afraid of using colored connector lines to show how one part of a figure relates to another figure.

Figures are preferred but tables are sometimes unavoidable, like death. If you must include one, go to great efforts to make it look professional. Look in a respected journal and emulate the layout, line types, line thickness, text alignment, etc., exactly. A table looks best when it is first composed within Microsoft Word, then inserted as an Object. Use colored text or arrows to draw attention to important parts of the table.

Paragraph format is fine, but so are bullet lists of results:

- 9 out of 12 brainectomized rats survived
- Brainectomized rats ate less
- Control rats completed maze faster, on average, than rats without brains

This sample results section is way too wordy, in case you were wondering.

Do treatments differ in their effects?

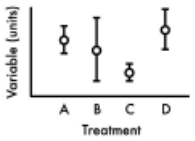


Figure 3. Legends can describe the experiment, answer the question, and even include statistics if you so choose (unlike a manuscript figure legend). And be brief.

Do As and Bs respond differently to X?

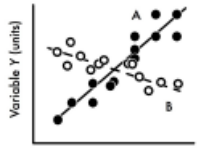


Figure 4. Label elements instead of relying on annoying keys that are defaults on most software. Add pictures of A and B if they are actually things (e.g., icons of aster and begonia flowers).

Are medians of treatment A and D different?

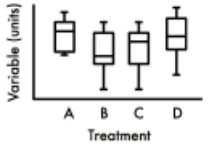


Figure 5. For the love of God, don't be tempted to reduce font size in figure legends, axes labels, etc. Your viewers are probably *most* interested in reading your figures and legends.

Conclusions

Conclusions should not be mere reminders of your results—that would be boring. You want to guide the reader through what you have *concluded* from the results, and you need to make the first several sentences understandable on their own and interesting…because many conference attendees will start reading this section first. If you don't hook them, they'll walk. These first several sentences should refer back, explicitly, to the burning issue mentioned in the introduction. (If you didn't mention a burning issue in the introduction, go back and fix that.)

A good conclusion will also explain how your conclusions fit into the literature on the topic. E.g., how exactly does your research add to what is *already* published on the topic? It's important to be humble and generous in this section, so assume that authors of previous literature may be at the conference, and further assume they are crabby and influential. You can also draw upon less formal types of context such as conversations you have had with smart and important people (God, personal communication).

Finally, you want to tell readers who have lasted this long what needs to be done next, and who should do it. E.g., are you taking the next logical step, or should another discipline follow up on your amazing result? It's OK to put a bit of personality into this ending because viewers expect posters to be personal, and if you're not actually standing there to convey your enthusiasm, your poster should be doing that for you.

If you have a graphical way to express the next iteration of your hypothesis, by all means include it. For example, you might make a graph of hypothetical data that shows an expected result in a future experiment. That's something you couldn't do in a traditional manuscript, but it's totally fine for a poster.

If you're curious, this poster has 876 words (just look in File Properties to get this statistic). Aim for 500 words. If you are above 1000 words, your poster will be avoided.

Literature cited

Bender, D.J., E.M Bayne, and R.M. Brigham. 1996. Lunar condition influences coyote (*Canis latrans*) howling. *American Midland Naturalist* 136:413-417.

Brooks, L.D. 1988. The evolution of recombination rates. Pages 87-105 in *The Evolution of Sex*, edited by R.E. Michod and B.R. Levin. Sinauer, Sunderland, MA.

Scott, E.C. 2005. *Evolution vs. Creationism: an Introduction.* University of California Press, Berkeley.

Society for the Study of Evolution. 2005. Statement on teaching evolution. < http://www.evolutionsociety.org/statements.html >. Accessed 2005 Aug 9.

[Don't just make up a format for your references — follow the standard citation format for your discipline exactly. Trust me, if you deviate from absolute perfection, the Type A citation police will be on you within a few minutes, and it won't be pretty. Note that you should not place a period after the journal name.]

Acknowledgments

We thank I. Gtor for laboratory assistance, Mary Juana for seeds, and Herb Isside for greenhouse care. Funding for this project was provided by the Department of Thinkology. [If you want to clutter your poster with annoying logos, shrink them down so that they can fit inside this area without smoothing text too much. Note that people's titles are omitted…titles are TMI.]

Further information

More tips can be found on "Designing conference posters," at http://colinpurrington.com/tips/academic/posterdesign. Note that URLs should always be stripped of any automatic hyperlink formatting (right-click, then "remove hyperlink").

References

- **Advice on designing scientific posters**
- **Colin Purrington, Department of Biology, Swarthmore College, PA**
  - **http://www.swarthmore.edu/NatSci/cpurrin1/posteradvice.htm**
- **Design of Scientific Posters**
  - **http://www.writing.engr.psu.edu/posters.html**
- **Poster Design Tips http://clt.lse.ac.uk/workshops-and-courses/Courseresources/Poster-Design-Tips.php**
- **Effective Poster Design**
  - **http://www.soe.uoguelph.ca/webfiles/agalvez/poster/**
- NC State has a very good site
  - http://www.ncsu.edu/project/posters/