How To Make An Effective Poster

Slides from Matthew Stuckey, UC Davis

Some parts edited by Bilal Gökce

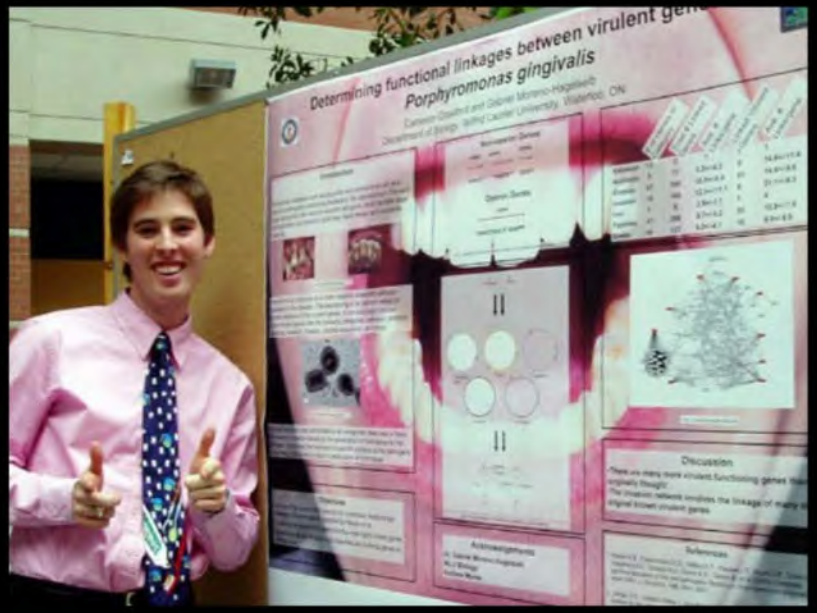
"The more strikingly visual your presentation is, the more people will remember it. And more importantly, they will remember you."

— Paul Arden

What is the purpose of an academic poster?

"...to display information in a clear, concise manner, while generating interest to engage in a discussion"

NO


Determining functional linkages between virulent
Porphyromonas gingivalis
Discussion

≠


JDR
JOURNAL OF DENTAL RESEARCH

YES


Determining functional linkages between virulent
Porphyromonas gingivalis

=


I'm Mike
ILLUSTRATOR
PHOTOSHOP GURU
PIE EATER
mikeloveland.com
check out my better half
I'm Alma
DESIGNER
ILLUSTRATOR GURU
PIE MAKER
almaloveland.com
check out my better half

The implications, please…

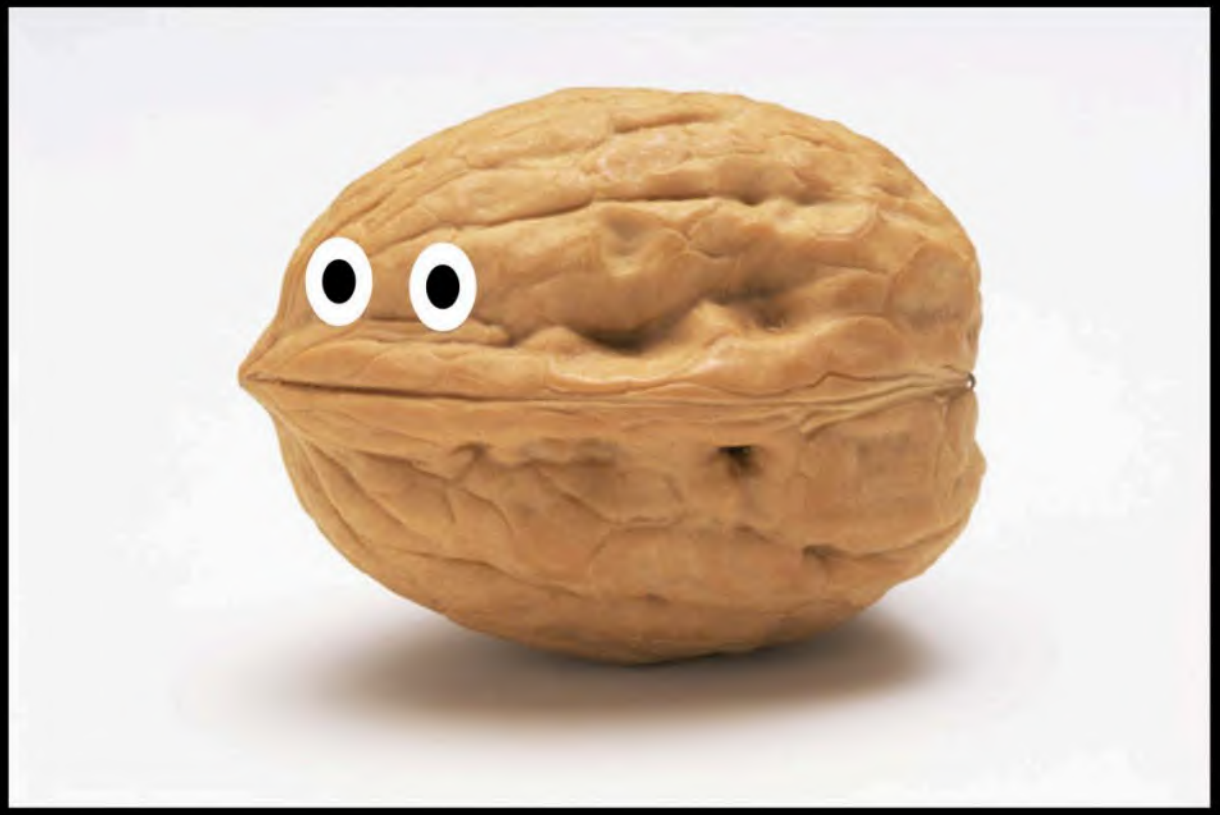
HERETICAL STATEMENT #1:

conference posters don't really have that much to do with the research.

HERETICAL STATEMENT #2:

in reality, conference posters are pretty much all about networking and shameless self-promotion.

IN A NUTSHELL:



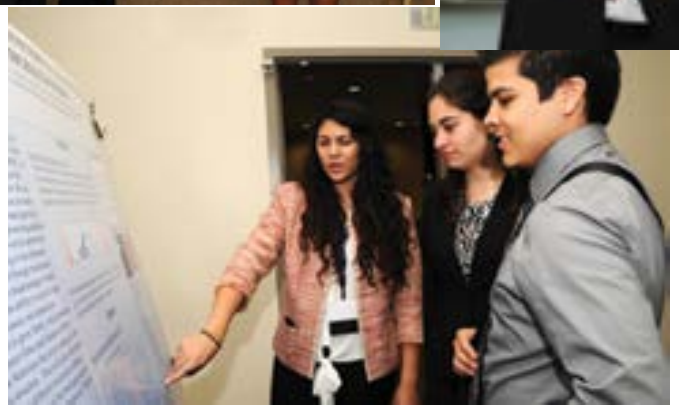
YOUR POSTER MUST GRAB EYEBALLS.

What is an Academic Poster?

- A form of Academic Expression
- Summary of Research (5 – 10 minutes)
- Visually augmented discussion/interaction
- At conferences viewers come to you (or you can invite)
    - People search published abstracts
    - Posters may be grouped by field & folks may wander
- New Information
- Characteristic Fields
- Appearance/Content varies by Field or Lab

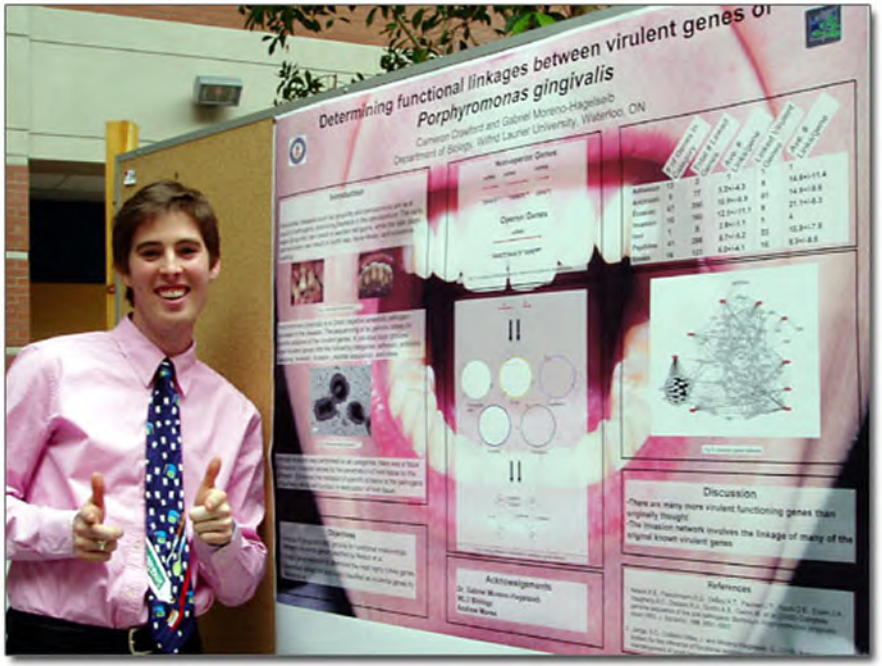
Why are Academic Posters Important?

- Represents you and your group's research at:
  - Conferences
  - Symposia
  - Hallways
  - Informational Days
- Demonstrate expertise
- Demonstrate attention to detail
- Practice public speaking
- Learn about most current results in field
- Deepens understanding of topic
- Opportunity for teaching and learning
- Share ideas
- Create collaborations



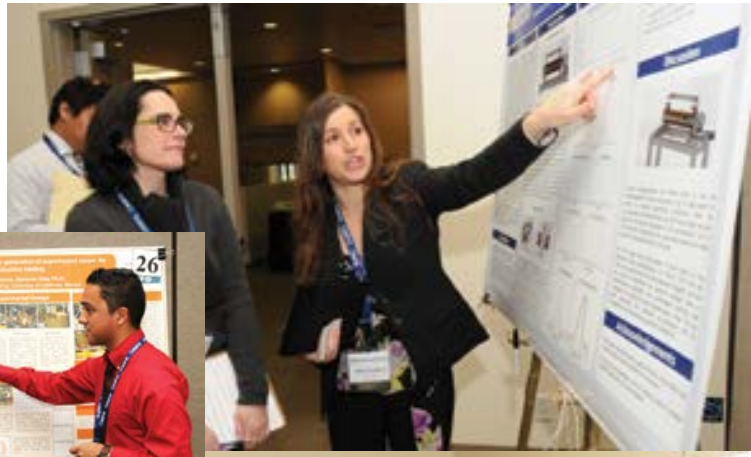
Preparing Your Poster
Keep in Mind:

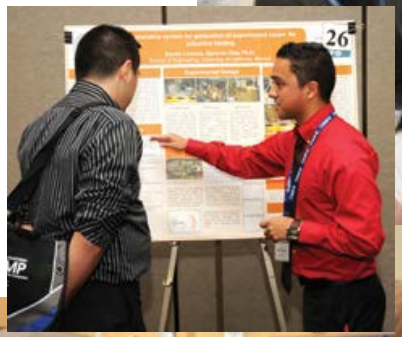
- Characteristic sections with expected information
- Consult rules of conference/rubrics
- Work in collaboration w/ research sponsor
- Decide on experiments that will be presented
- Create a storyboard/plan
- Visually appealing
- Primarily image driven but stand alone
- Simply and tightly written
- Know what to say for each figure
- Transitions between sections
- Practice for your audience
- KNOW all details of project
- Master questions

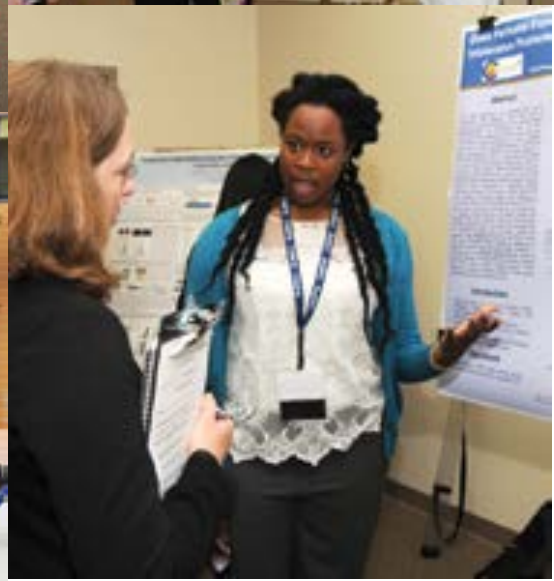


Your Audience will be??

- Researchers in your field will read even if bad
- Researchers in related fields easily persuaded to view
- Previously uninterested passers by can be attracted by a good poster
- ***You want to attract these people!***



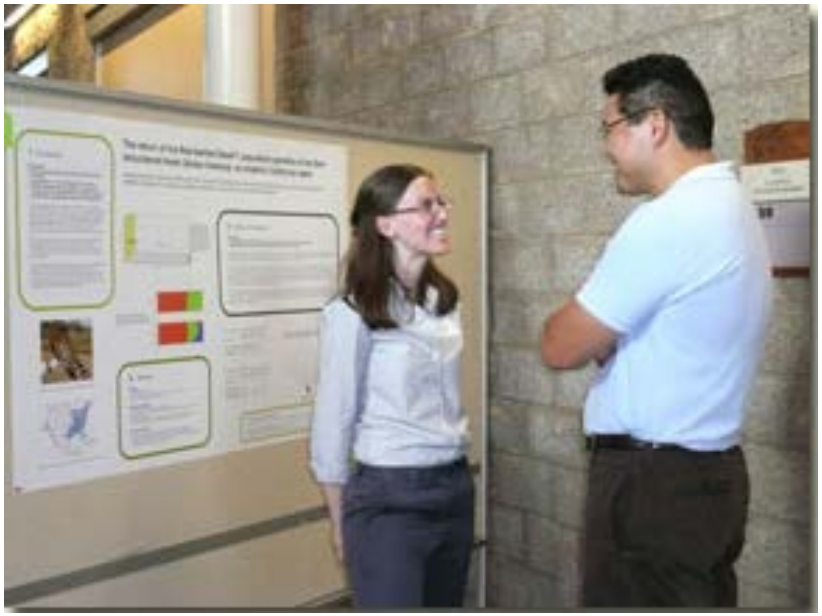




Main Elements of a Poster

- Title (same as submitted abstract)
- Name and Campus
- Core Technical Content
  - Abstract
  - Introduction
  - Results
  - Discussion
  - Literature cites/Resources
  - Acknowledgements
- Visuals
- Font should be legible fonts like:
  - Times New Roman
  - Arial
  - Garamond
  - Berkeley UC Davis Medium

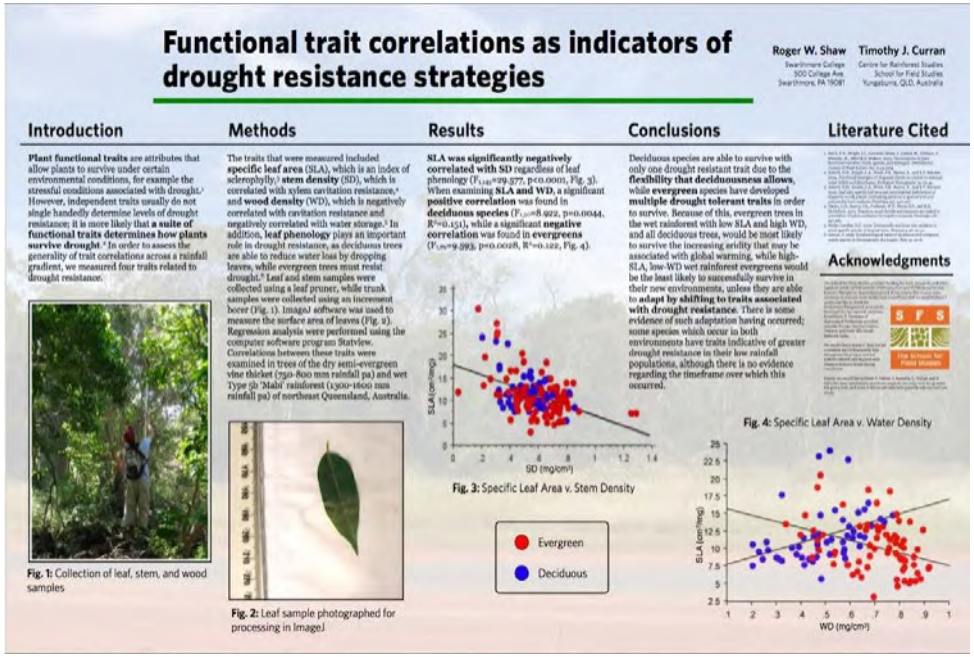
- **Do not** use illegible fonts like:
  - *Brush Script*
- Use the same font type throughout your poster
- No smaller than 16 pt. font



Poster Appearance

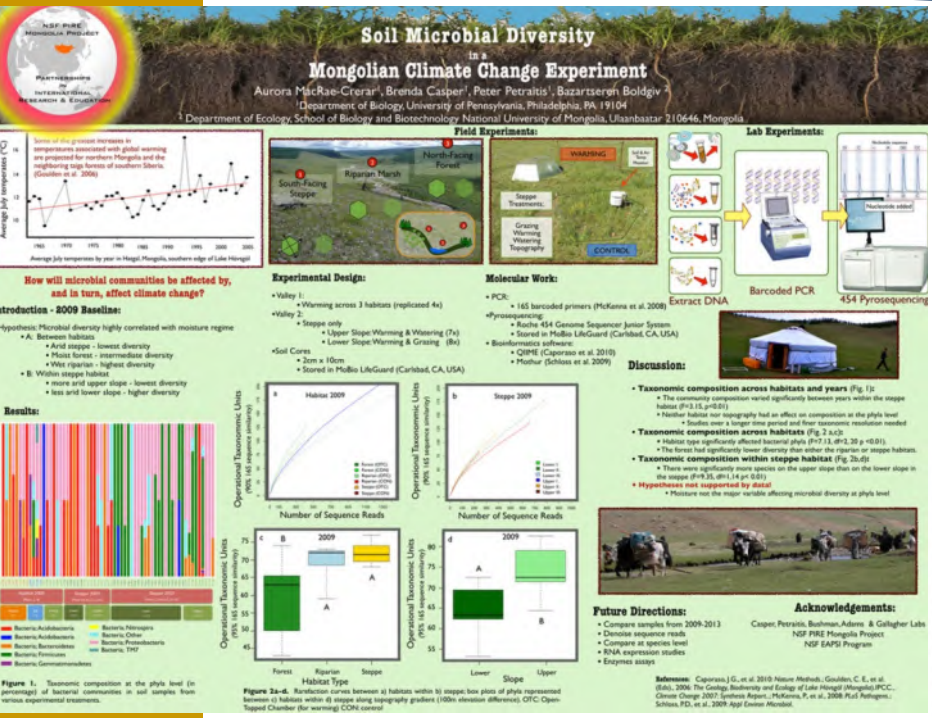
- Make rough plan of your poster
- Will have "standard" headings
- Poster provides visual aids as you talk
- Picture worth 1K words
- Carry information with colorful images and figures
- Estimate space that will be needed –
- How many experiments reported
- How many figures needed?
- What types of figures?
- How much text to explain
- Space for text

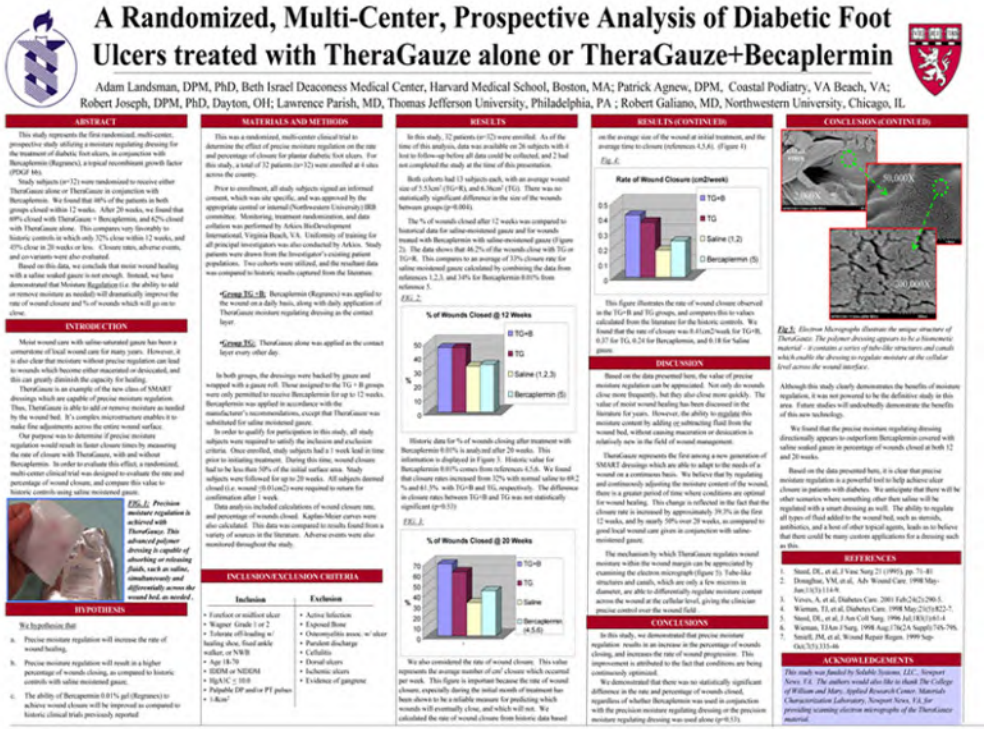
- Poster must be "stand alone" (understandable in halls, unstaffed)
- Has to have words
- Word amount varies with field
- Balance your text and images



Poster's Appearance

Which do you prefer?





what is a visual hierarchy?

"The visual organization of elements within a design format to establish focal points based on their importance to the message to be communicated"

"The organization and prioritization of content as a means to communicate a message"

"Using color, contrast, texture, shape, position, orientation, and size to organize elements in a way that gives users a sense of visual importance"

why use a visual hierarchy?

- humans are primarily visual creatures
- we tend to focus on **differences,** not similarities, when making comparisons
- this is a key consideration for designing an effective poster

POSTER = COMMUNICATION,
and
DESIGN = COMMUNICATION,

so…

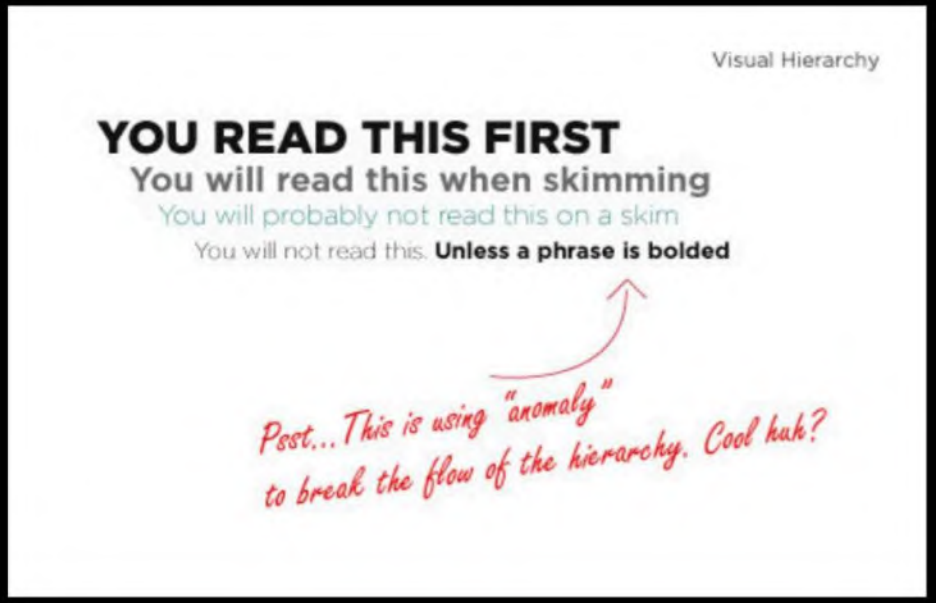
GOOD DESIGN = EFFECTIVE POSTER

(assuming that your data isn't crap – but there are ways to get around that as well)

elements of a visual hierarchy

a visual hierarchy is constructed using some combination of the fundamental principles of graphic design

- negative/positive space
- contrast
- repetition
- proximity
- color
- alignment
- typography (not really a principle)

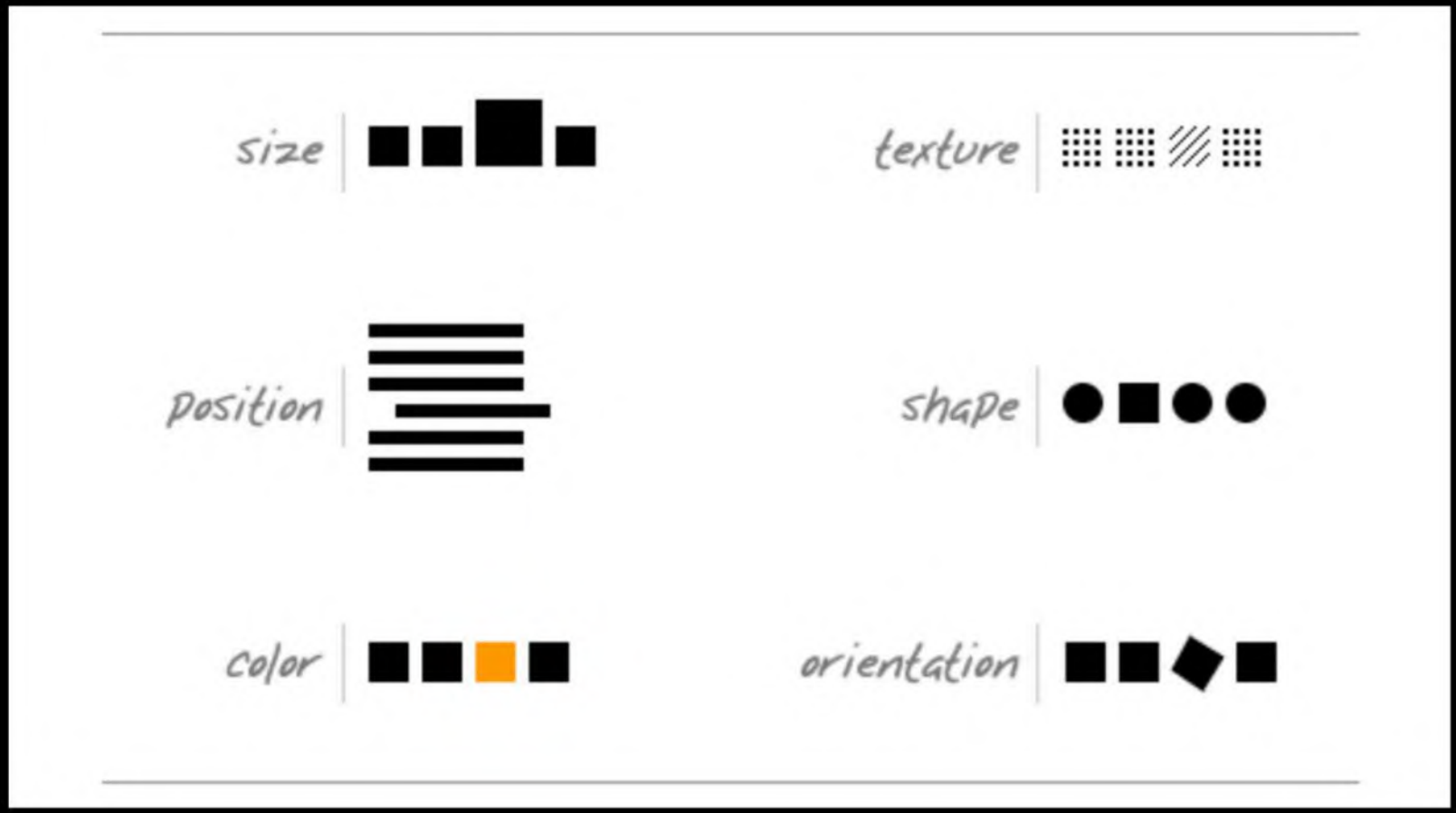


negative/positive space

- the balance between negative (background) and positive (foreground) space in a composition is very important
  - too much negative space = incomplete or disassociated appearance
  - too little negative space = busy, cluttered, and difficult to read

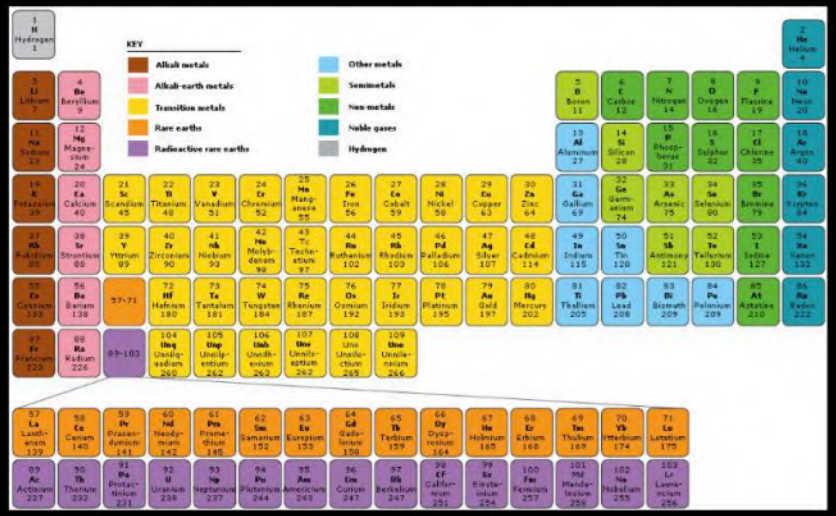
cramming too much information into too small of a space is far and away the number-one mistake in academic poster designs

types of contrast



color

- color theory is an extremely complicated topic that could take up an entire class on its own
- for our purposes we will focus on two aspects:
  - color as an emotional tool
  - color as an organizational tool



color temperature – warm or cool?

color temperature – warm or cool?

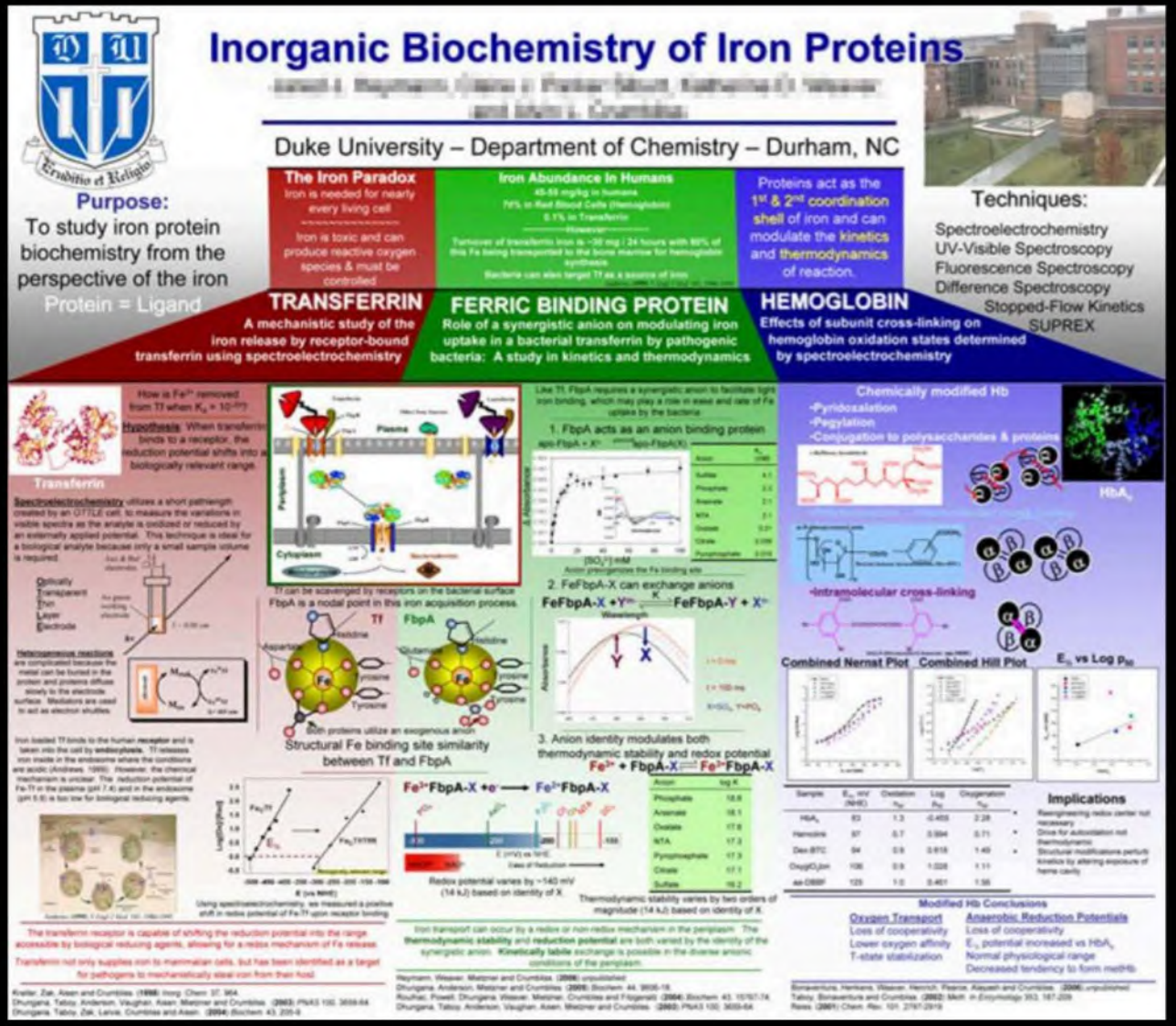
color temperature

warm vs. cool colors

- warm
  - hues from red through yellow, including browns and tans
  - seem to advance or appear more active; often evoke feelings of happiness, optimism and energy, but can be visually overwhelming

- cool
  - cool = blue-green through blue-violet, including most grays
  - appear to recede into the background; usually calming and soothing, but can also express sadness

color as an organizational tool



a final word about color...

- color is an extremely powerful tool – use with caution!
  - using too much and/or too many colors drastically reduces effectiveness
  - a limit of 3 colors is usually recommended
    - but not always possible (think pie charts and the like)
  - however, it is possible to substitute pattern for color
    - also avoids potential problems with colorblindness in your audience (it's much more common than you may think)

proximity

- moving elements closer or farther apart to achieve a more organized look
- based on the idea that related items in close proximity will be perceived as a unified group
- your audience will respond by:

  a) tending to naturally group similar items that are near to each other into a single unit, and

  b) assuming that items that are not near each other in a design are not closely related to one another

alignment

- arranging elements so that they line up
  - creates order
  - organizes page elements; links disparate groups into a unified whole
  - satisfies the subconscious human desire to line things up (I'm not kidding, this is an actual thing)
  - creates imaginary visual connections

ignore alignment at your own peril!

this poster has some serious alignment issues...

Salvage Archaeology at the Snake River Sandspit Site in Nome, Alaska

Concurrence of No Historic Properties:

- March 10, 1998 – The Corps sent a letter to the SHPO requesting concurrence that their project to improve the harbor at Nome, Alaska "does not have the potential to affect cultural resources."
- April 29, 1998 – The Corps received a letter from the SHPO, in which she concurred that "there are no historic properties in the area of potential effect."

Despite this, the Corps thought it was a good idea to have an archaeological monitor on site during the groundbreaking. A private archaeologist familiar with the area was subcontracted to monitor the initial construction during May 2005.

First evidence of the second house pit (Locus B), discovered by Corps archaeologist Morgan Grover and bulldozer operator Mike Hahn

Proposed Mitigation (as agreed upon in the draft MOA):

1) Write a site report (Data Recovery Report)
2) Provide for an accredited museum conservator to visit the City's Carrie M. McLain Memorial Museum and assist in the conservation and curation of the site artifacts on display
3) Assist with the accessioning of site artifacts and archaeofauna (bagging, cataloging, and if appropriate photographing)
4) Provide a museum-quality display case to the City's Carrie M. McLain Memorial Museum
5) Present information learned from the site in a series of public lectures in Nome
6) Prepare a manuscript on information learned from the site that can be utilized by Nome teachers (grades 5-12)
7) Present information learned from the site to a conference of peers
8) Submit an article about the site for publication in a peer-reviewed journal (if not accepted, publish elsewhere)

Discovery of the Site (Locus A):

- 1st week of May, 2005 – The subcontracted archaeologist identified the remnants of a semi-subterranean house pit while monitoring the construction.
  - The archaeologist took photographs and recovered approximately 25 artifacts, then decided that the house pit was ineligible for inclusion on the National Register of Historic Places and allowed the bulldozers to push the remains into the ocean.
- May 14, 2005 – The Corps received a letter from the subcontracted archaeologist mentioning the discovery and subsequent destruction of the semi-subterranean house pit.
- May 26, 2005 – The Corps sent a letter to the SHPO stating that the house pit is "not eligible for the National Register for Historic Places" because it "has lost integrity of design, materials, workmanship, and association."
- September 27, 2005 – The Corps sent a letter to Nome Eskimo Community (tribe), apologizing for not consulting after the discovery of the site and stating that they will continue to work with the tribe to mitigate the damage done.
- October 28, 2005 – The SHPO sent a letter to the Corps in which she concurred with the "finding that the house pit no longer retains sufficient integrity to be eligible" and agreed that "appropriate mitigation could include the development of interpretive signs that discuss the Native history of the Nome area."

Nome Eskimo Community tribal Elder Al Tahlin and Corps archaeologist Helen Lindemuth, excavating house pit B while construction of the revetment rock continues nearby.

Excavating the midden: Corps employees Helen Lindemuth, Aaron Wilson, Guy McConnell, Mark Cassell, and Morgan Grover, Nome Eskimo tribal Elder Al Tahlin, Kawerak employees

The Excavation:

- Occurred from July 26, 2006 to August 26, 2006.
- Involved over 25 community volunteers, including:
  - City of Nome employees
  - Nome Eskimo Community (tribe) employees, members, and tribal Elders
    - Mr. Karlin Ilchouk, the tribe's Historic Preservation Representative, participated in the excavation every day
  - Kawerak, Inc. (regional non-profit Native corporation) employees
  - Interested Nome citizens
- Involved 6 Corps employees, including biologists and chemists as well as archaeologists and archaeology interns

Excavating house pit B while heavy machinery runs nearby: Nome Eskimo Community employee Karlin Ilchouk and City of Nome employee Meghan Ten Eyck

Discovery of the hunter's cache at the midden: Nome Eskimo Community employee Karlin Ilchouk, Corps archaeologist Aaron Wilson, and others

Excavating the midden: Corps employees Mark Cassell, Guy McConnell, Morgan Grover, Nome Eskimo Community tribal Elder Al Tahlin, Kawerak employees

Continued Discovery of the Site (Loci B and C):

- July 2006 – the Corps sent one of its own archaeologists, Morgan Grover, to monitor the continued project construction.
- July 26, 2006 – Morgan identified the remains of a second semi-subterranean house pit. She called the SHPO and left a telephone message about the discovery of the house pit, along with her contact information. She also contacted the City of Nome, Nome Eskimo Community (tribe), and Bering Straits Native Corporation. She called the SHPO again and spoke with a Review and Compliance Archaeologist at the SHPO's office, who agreed that she should excavate a test pit and do some shovel skimming to identify the boundaries of the feature.
- July 27, 2006 – Morgan called the SHPO again and left another telephone message about the site.
- July 28, 2006 – Morgan called the SHPO again and talked with a Review and Compliance Archaeologist at the SHPO's office. Morgan told the SHPO archaeologist that she was assuming the site was eligible for the National Register, and that she was going to excavate at least 50% of the site.
- August 3, 2006 - A meeting was held in Nome between the Corps, the Nome Eskimo Community, and the City of Nome, with the SHPO participating via teleconference, to discuss the discovery of the site and what to do about it.

Excavating house pit B: Nome Eskimo Community members Roggie Johnson, Karlin Ilchouk, and Al Tahlin, Corps archaeologists Helen Lindemuth and Mark Cassell, City of Nome employee Meghan Ten Eyck

Corps archaeologist Morgan Grover and King Island Native Community tribal Elders at a public viewing of site artifacts

Corps archaeologist Morgan Grover, Nome Eskimo Community tribal Elders Al and Margaret Tahlin, and King Island Native Community tribal Elders at a public viewing of site artifacts

Public Outreach in Nome:

- Public viewing at Old St. Joe's Cathedral (August 10, 2006).
  - Over 200 people attended
- Viewing of artifacts at Nome Eskimo Community's building, for tribal members (August 2006)
- Viewing of artifacts at Kawerak's building during the regional shareholders meeting (August 2006).
- Another public viewing event at Old St. Joe's Cathedral (September 16, 2006)
  - Over 150 people attended
- Morgan Grover gave a public lecture at the National Park Service's building (November 2006)

Public viewing of the site artifacts at Old St. Joe's Cathedral

Where We Are Today:

- Multiple drafts of the MOA have been sent out to signatories and concurring parties (on the following dates):
  - November 22, 2006
  - September 22, 2008
  - April 13, 2009
  - August 10, 2009
  - December 14, 2009
- After a stalemated meeting among the signatories to the MOA on December 15, 2009, and numerous unproductive meetings afterwards, advice was informally requested from the Advisory Council on Historic Preservation. On March 19, 2010, the ACHP sent the Corps an edited draft of the MOA.
- A new draft of the MOA is currently under discussion.
- Artifact and faunal analyses are being undertaken by Corps archaeologist Kelly Eldridge, and the Data Recovery Report is being drafted.

letter size

Q: how large should you make your type?

- *rule of thumb:* the smallest text on your poster should be clearly legible from 2 to 3 meters away
  - *at a **minimum**, type should be approximately:*
    - **72 points for titles**
    - **48 points for headings**
    - **24 points for body copy**

REMEMBER – THESE ARE MINIMUM VALUES!
BIGGER IS ALMOST ALWAYS BETTER
(within reason, of course)

Poster Overview- 36” by 48”

Sponsoring logo

Title: Should be seen from 4-5 feet away. Times New Roman or Arial, Bold, at 60-80 point text

Name: in 44 pts., bold
Department: 40 pts., bold
Institution: 40pts., bold

Title Line 1
Title Line 2
Name Line (First, MI, Last)
Department of ?
University of California, Davis, 95616

Institution Logo

INSERT ABSTRACT

Abstract: No more than 250 words

INTRODUCTION

INSERT TEXT

Heading: Legible font, bold, 44pts.
Section: Legible font, bold, 36 pts

INSERT FIGURE

Figure 1: 32 pts, bold

RESULTS

INSERT TEXT

Heading: Legible font, bold, 44pts.
Section: Legible font, bold, 36 pts

METHOD

INSERT TEXT

Heading: Legible font, bold, 44pts.
Section: Legible font, bold, 36 pts

INSERT FIGURE

Figure 2: 32 pts, bold

DISCUSSION

INSERT TEXT

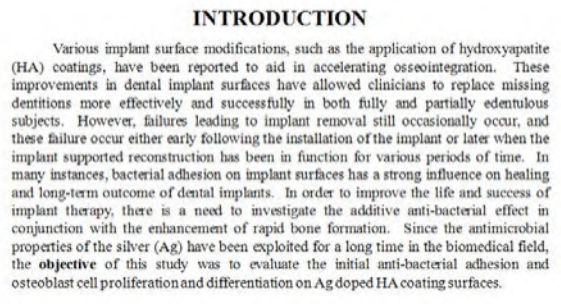
Heading: Legible font, bold, 44pts.
Section: Legible font, bold, 36 pts

ACKNOWLEDGEMENTS
Legible font, 36 pts., bold

REFERENCES
Legible font, 36 pts., bold

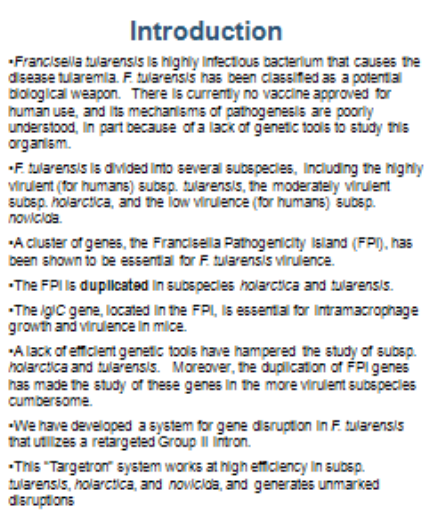
Introduction

- Or Background
- This is separate from your abstract!
- State the research question and significance of the study
- Include related current investigations
- If you are there, they won't read it so SAY IT!
- Get viewers interested
- Reason you chose to study
- Foundation for your work (Models)
- General topics to specific
- Equivalent to 1 double spaced 12 pt page
- Usually contain citations/references (cite!)
- May have Purpose and Hypothesis embedded
- Generally completes first column



INTRODUCTION

Various implant surface modifications, such as the application of hydroxyapatite (HA) coatings, have been reported to aid in accelerating osseointegration. These improvements in dental implant surfaces have allowed clinicians to replace missing dentitions more effectively and successfully in both fully and partially edentulous subjects. However, failures leading to implant removal still occasionally occur, and these failure occur either early following the installation of the implant or later when the implant supported reconstruction has been in function for various periods of time. In many instances, bacterial adhesion on implant surfaces has a strong influence on healing and long-term outcome of dental implants. In order to improve the life and success of implant therapy, there is a need to investigate the additive anti-bacterial effect in conjunction with the enhancement of rapid bone formation. Since the antimicrobial properties of the silver (Ag) have been exploited for a long time in the biomedical field, the **objective** of this study was to evaluate the initial anti-bacterial adhesion and osteoblast cell proliferation and differentiation on Ag doped HA coating surfaces.



Introduction

•Francisella tularensis is highly infectious bacterium that causes the disease tularemia. *F. tularensis* has been classified as a potential biological weapon. There is currently no vaccine approved for human use, and its mechanisms of pathogenesis are poorly understood, in part because of a lack of genetic tools to study this organism.

•*F. tularensis* is divided into several subspecies, including the highly virulent (for humans) subsp. *tularensis*, the moderately virulent subsp. *holarctica*, and the low virulence (for humans) subsp. *novicida*.

•A cluster of genes, the Francisella Pathogenicity Island (FPI), has been shown to be essential for *F. tularensis* virulence.

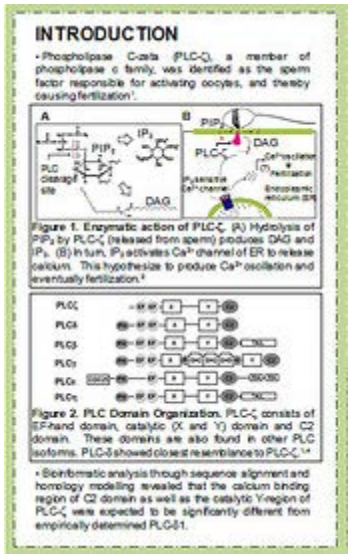
•The FPI is **duplicated** in subspecies *holarctica* and *tularensis*.

•The *igiC* gene, located in the FPI, is essential for intramacrophage growth and virulence in mice.

•A lack of efficient genetic tools have hampered the study of subsp. *holarctica* and *tularensis*. Moreover, the duplication of FPI genes has made the study of these genes in the more virulent subspecies cumbersome.

•We have developed a system for gene disruption in *F. tularensis* that utilizes a retargeted Group II intron.

•This "Targetron" system works at high efficiency in subsp. *tularensis*, *holarctica*, and *novicida*, and generates unmarked disruptions



INTRODUCTION

•Phospholipase C-zeta (PLC-ζ), a member of phospholipase c family, was identified as the sperm factor responsible for activating oocytes, and thereby causing fertilization[1].

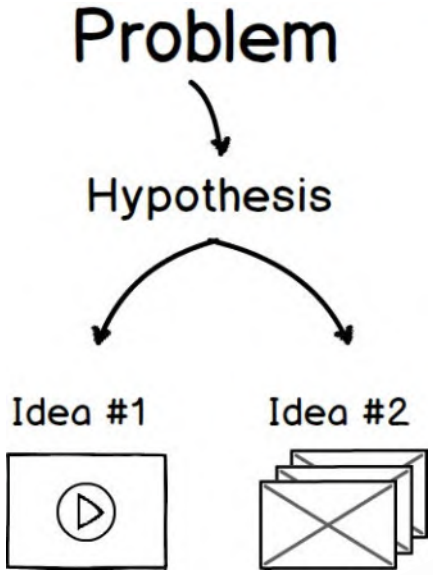
Figure 1. Enzymatic action of PLC-ζ. (A) Hydrolysis of PIP_2 by PLC-ζ (released from sperm) produces DAG and IP_3. (B) In turn, IP_3 activates Ca^{2+} channel of ER to release calcium. This hypothesize to produce Ca^{2+} oscillation and eventually fertilization.[4]

Figure 2. PLC Domain Organization. PLC-ζ consists of EF-hand domain, catalytic (X and Y) domain and C2 domain. These domains are also found in other PLC isoforms. PLC-δ showed closest resemblance to PLC-ζ.[1,4]

• Bioinformatic analysis through sequence alignment and homology modelling revealed that the calcium binding region of C2 domain as well as the catalytic Y-region of PLC-ζ were expected to be significantly different from empirically determined PLC-δ1.

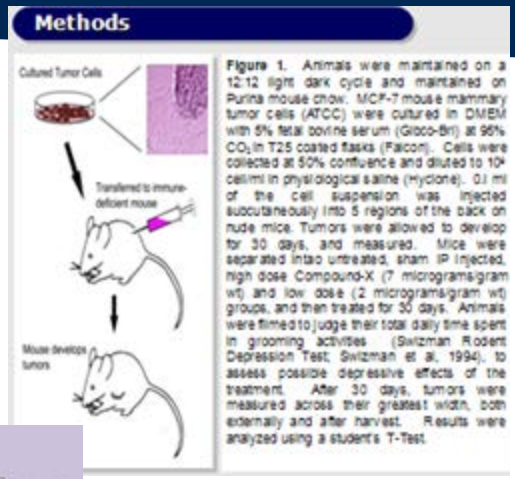
Purpose and Hypothesis

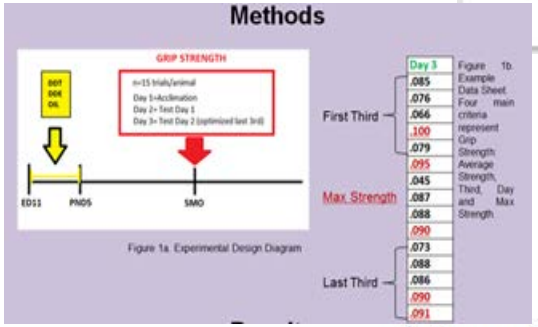
- Can be embedded in Introduction, but
- Sometimes a separate section, to emphasize
- Purpose or Objective, Aim, Goal, etc.,
- Why you did experiment?
- "The purpose of this project…"
- Good for Student Conference
- (Promotes solid judging)
- Hypothesis
- Same as for abstract



Methods

- Describe procedures and methods in detail to allow observer to understand how, when, where data was obtained.
- Describe challenges and lessons learned
- Text with subheadings
- Can include a flow chart to summarize
- May include citations
- Make sure to include:
  - subjects
  - experimental design
  - drugs and equipment used
  - statistical methods
  - why you chose the method





MATERIALS

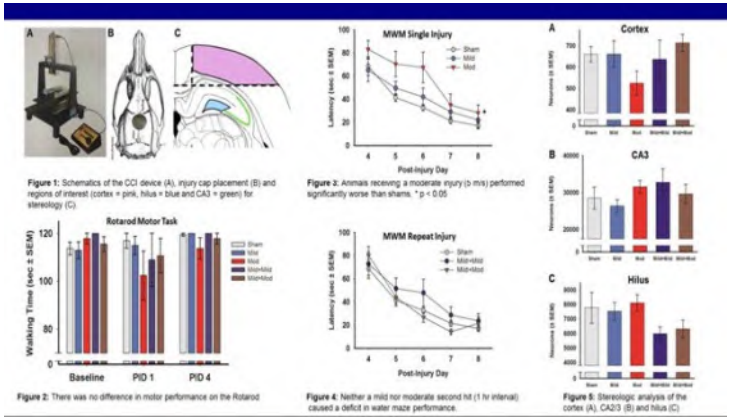
***Coating process by Sol-gel methods*:** Commercially pure titanium (Ti) disks of (15 mm diameter and 2.0 mm thick) were used as substrates. All disks were wet ground with 240, 400 and 600 grit silicon carbide papers, followed by ultrasonic degreasing using acetone and ethanol for 10 minutes each. Deionized water was used for rinsing the disks between applications of each solvent. A passivation procedure was then conducted by exposing the Ti disks to a 40% volume nitric acid solution at room temperature for 30 minutes (ASTMF86-91).

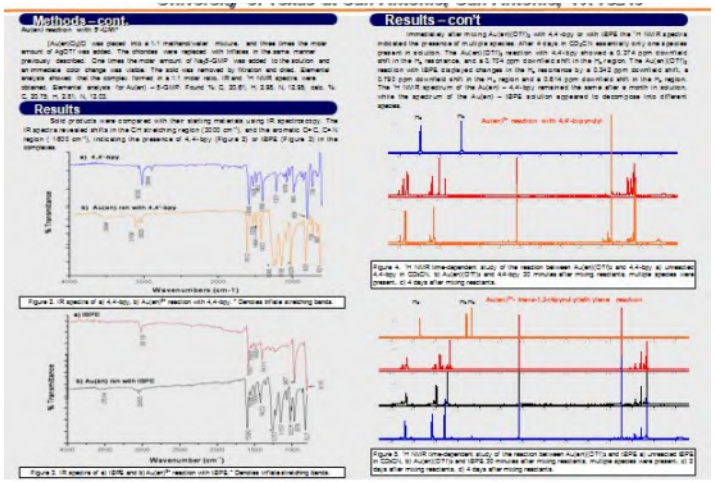
Prior to coating on the passivated Ti surfaces, hydroxyapatite (HA) and 1 wt% silver (Ag)-doped HA (HA-AG) sol were produced. The HA sol was prepared by reacting calcium nitrate tetrahydrate [$Ca(NO_3)_2{\cdot}4H_2O$] with methyl alcohol to produce calcium precursors. Phosphorus precursors were also prepared by reacting triethyl phosphite [$(OC_2H_5)_3P$] in 0.03 ml acetic acid (CH_3COOH). The two precursors were then mixed and 0.1 mol of DCCA (Drying Control Chemical Additive) was added to the mixture. All reactions were carried out in argon atmosphere. Similar to the HA sol, AgHA1.0 sol was produced by mixing the calcium and phosphorus precursors with 1.0 wt % silver nitrate ($AgNO_3$) and 0.1 mol DCCA. $AgNO_3$ was chosen for Ag doping because of the easy decomposition of nitrates during heating.

The prepared HA and HA-AG sol were then coated on passivated Ti surfaces by spin coating at 5,000 rpm for 50 seconds. The coated-Ti surfaces were immediately dried at 70°C for 12 hours, followed by a heat treatment at 650°C for 3 hours. The HA-coated surfaces were used as controls in this study. All samples were autoclaved prior to materials characterization and all culture experiment.

Results

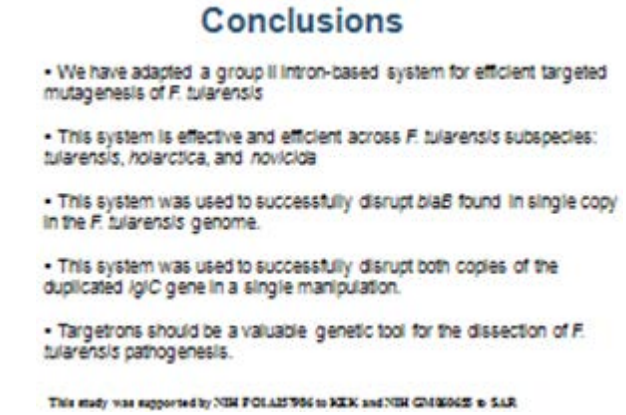
- Largest section
- Vary with field
- Often two middle columns
- Summarizes the data and reports results of statistical tests and analyses (- or +)
- Draw implications and considerations
- Don't present raw data
- Make Image-based; use few words
- Maximize use of Figures
  - Make them simple
  - Must be easily seen
  - Make all lines wide enough
  - All text large enough!
  - Consistent axes across poster
- Minimize use of tables
  - Difficult to grasp quickly
- Use figure legends/captions as text
- Put text near figure it's describing
- ~1 paragraph per image/image group





Conclusions/Discussion

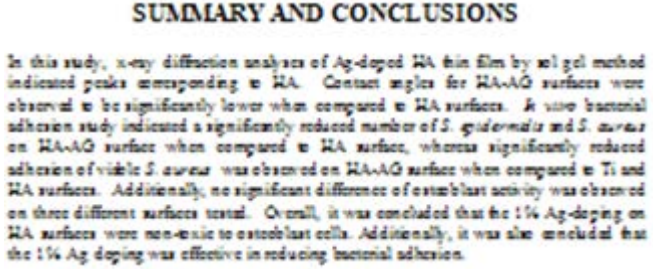
- Or discussion or summary
- Very few words
- Bullets good
- Bigger font if needed
- *Summarize "take home" results
  - Interpret the meaning or implications of your results
  - Mention any alternative explanation for results or unanticipated results
- *How did hypothesis work out?
- *Tie back to real world problem
- *Why Important/Implications
- Aim for:
  - Reasonable conclusions were given and strongly supported with evidence
  - Conclusions were compared to hypothesis and their relevance in a wider context was discussed



Conclusions

- We have adapted a group II intron-based system for efficient targeted mutagenesis of *F. tularensis*
- This system is effective and efficient across *F. tularensis* subspecies: *tularensis*, *holarctica*, and *novicida*
- This system was used to successfully disrupt *blaB* found in single copy in the *F. tularensis* genome.
- This system was used to successfully disrupt both copies of the duplicated *iglC* gene in a single manipulation.
- Targetrons should be a valuable genetic tool for the dissection of *F. tularensis* pathogenesis.

This study was supported by NIH FOLAI7956 to KEK and NIH GM80602 to SAR

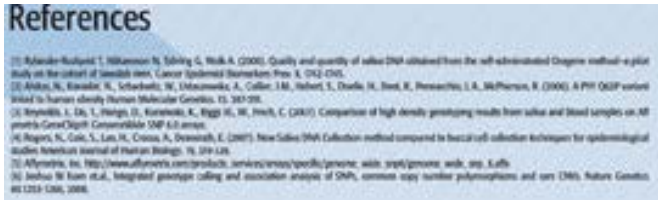


SUMMARY AND CONCLUSIONS

In this study, x-ray diffraction analyses of Ag-doped HA thin film by sol gel method indicated peaks corresponding to HA. Contact angles for HA-AG surfaces were observed to be significantly lower when compared to HA surfaces. *In vitro* bacterial adhesion study indicated a significantly reduced number of *S. epidermidis* and *S. aureus* on HA-AG surface when compared to HA surface, whereas significantly reduced adhesion of viable *S. aureus* was observed on HA-AG surface when compared to Ti and HA surfaces. Additionally, no significant difference of osteoblast activity was observed on three different surfaces tested. Overall, it was concluded that the 1% Ag-doping on HA surfaces were non-toxic to osteoblast cells. Additionally, it was also concluded that the 1% Ag doping was effective in reducing bacterial adhesion.

References/ Literature Cited

- Include sources/resources that supported your work
- If someone's work is cited (usually in introduction), you must include a reference
- Generally "short" (title optional)
- Can use smaller font if needed



References:

1.Capitman, John Amson. (2007). *Growing a Healthier San Joaquin Valley*. Fresno, CA: Central Valley Health Policy Institute.

2.Riordan, Deborah (2007, June). *Health Professional Shortages in the San Joaquin Valley: The Impact on Federally Qualified Health Clinics*. Presented at California State University Fresno, Fresno, CA.

Images borrowed from:

1. Merced County. (2007). Merced County Supervisional Districts. Retrieved September 20, 2008, from http://www.co.merced.ca.us/bos/district3.html.
2. Wikimedia Commons. (2006). Map of California highlighting Merced County. Retrieved September 20, 2008, from http://commons.wikimedia.org/wiki/Image:Map_of_California_highlighting_Merced_County.svg.

Acknowledgements

- Acknowledge the faculty and staff who supported you.
- Thank people
  - Mentor
  - Research group
  - Technical assistance, etc.
- Reveal possible conflicts of interest
- Identify funding utilized
  - CAMP, LSAMP-NSF, NIH, etc.
- Font can be smaller than rest of text

Acknowledgements

We would like to thank Mr. Angus Rhododendrum and Suzanne McPerkins for their technical assistance.

Funded by NIH Grant #94-90082, the MBRS-RISE program (NIGMS #22205587), and the American Tobacco Association.

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Acknowledgements

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Acknowledgements

✧We would like to thank:

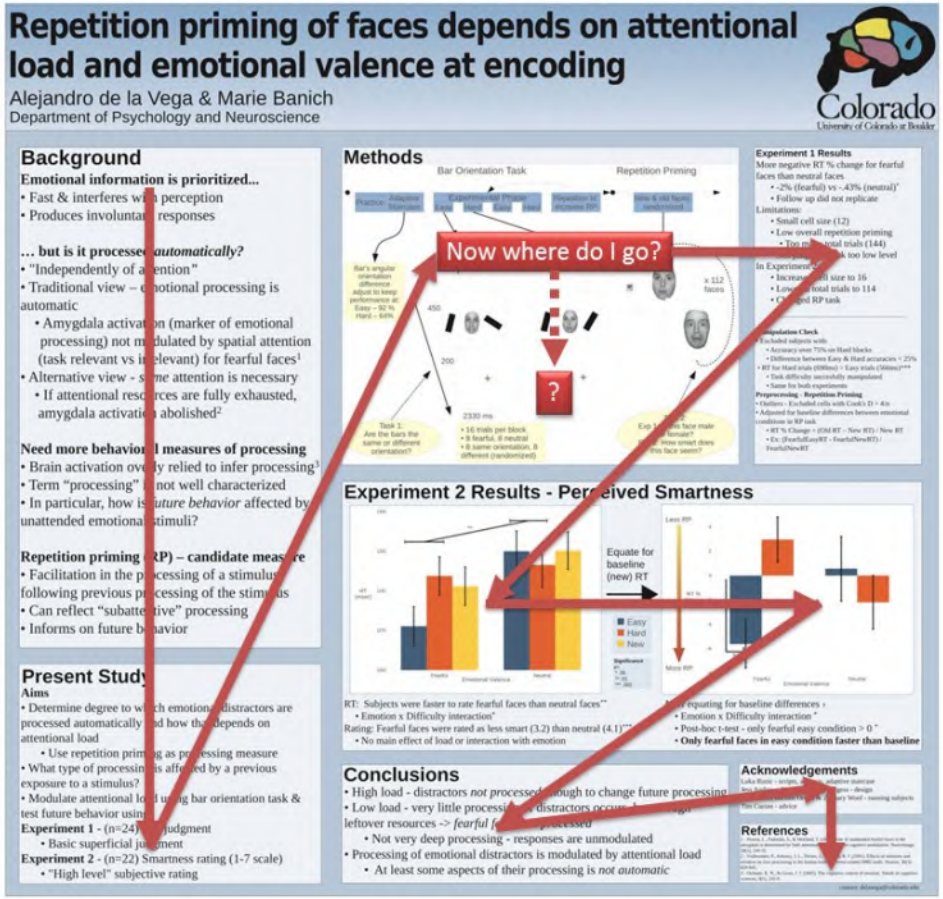
✧Our mentors Dr. Stergios Roussos and Dr. Maria G. Pallavicini for their support during the long and strenuous journey of establishing ITCH.

✧ All participating ITCH members whose hard work has made this organization a possibility.

✧All community leaders, community professionals, and UCM faculty whose devoted time and patience has been greatly appreciated and has helped with the establishment of ITCH.

Remember to check that:

- All expected components are present, clearly laid out, and easy to follow in the absence of presenter
- The text is concise, legible, and consistently free of spelling or typographical errors; the background is unobtrusive
- The figures and tables are appropriate and consistently labeled correctly
- Photographs/tables/graphs improve understanding and enhance the visual appeal
- For ideas can go to Pimp My Poster: http://www.flickr.com/groups/688685@N24/



High Resolution Reconstructions of Sea Surface Temperatures from Pacific Geoduck Growth Increment Chronologies

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[2] Oregon State University, Hatfield Marine Science Center, Newport OR 97365, USA.

National Science Foundation Research Experience for Undergraduates
Hatfield Marine Science Center, Oregon State University
March 2008 Ocean Sciences Meeting, ASLO

Introduction

- The Pacific geoduck clam (*Panopea abrupta*) - ranges from Kodiak to California
- Found in the sandy mud of lower intertidal and subtidal zones
- Burrows into sediment ~ 3 feet
- Filter feeds through siphon (left)
- Form annual growth increments
- Width relates to sea surface temperatures (SST)
- Long-lived: Up to 150+ years; excellent chronometers of past environmental variability

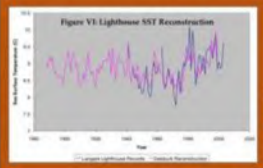
Abstract

We demonstrate the potential for reconstructing sea surface temperatures along coastal British Columbia, Canada, using four chronologies developed from the growth increment widths of Pacific geoduck clams (*Panopea abrupta*). The four geoduck chronologies range from the southernmost to northernmost borders of British Columbia and were developed using standard tree-ring (dendrochronology) techniques, including crossdating. Although each geoduck chronology significantly correlated with local records of sea surface temperatures (SST), correlations were unstable over time. In every chronology, the relationship with SST would occasionally dissolve for a period lasting approximately ten years. The timing of these climate-growth breakdowns was inconsistent and varied among the chronologies. For any one chronology, inconsistent climate-growth relationships represented a significant complication for developing accurate SST reconstructions. However, when geoduck chronologies were combined via simple averaging, irregularities in climate-growth relationships canceled out one another to yield strong and highly stable SST reconstructions. Final SST reconstructions captured more than 60% of the variance in the instrumental record and extended more than 120 years, capturing the historical range of variability and providing context for current climatic trends.

Discussion

- Sea surface temperatures are recorded at nine lighthouses off the coast of British Columbia
- Geoduck chronologies strongly correlate with SST records
- Potential tool for SST reconstructions

- However, correlations with SST are inconsistent over time (Figure V)
- Solution: average multiple chronologies
  - Cancels out irregularities and forms more stable climate-growth relationships
  - Example: Average of Tree Nob and Puget Sound is much more stable (Figure V)

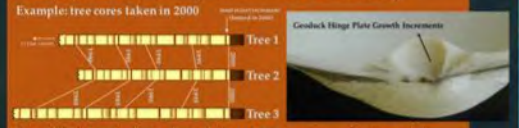


- Due to geoduck longevity, sea surface temperature reconstructions substantially predate instrumental records (Figure V)
- Example: Average of Tree Nob and Strom chronologies explains 50% of the variance in the SST record at Langara Lighthouse (left), using linear regression
- SST reconstructions provide context for interpreting current climatic trends
- Geoduck chronologies can be further combined with those from trees, mussels, and fish (right)
- Potential applications:
  - Compare diverse ecosystems
  - Multiproxy reconstructions

Methods

- We apply crossdating, a technique used in tree-ring data to ensure that all growth increments have correctly been identified, ensuring annual resolution of the final chronology

Example: tree cores taken in 2000



- Crossdating is based on the tendency of climate to synchronize growth patterns of all samples from a site (poor climate year = narrow ring; favorable year = wide ring)
- Growth 'bar codes' are crossmatched among all samples. If one sample is out of alignment with the others, then an increment was likely overlooked

1. Thin sections of geoduck hinge plates (above) are measured using digital imaging software
2. Measurements contain age-related growth declines
3. Remove declines via detrending
   3a. Fit a negative exponential function to each set of geoduck measurements (Figure I)
   3b. Divide measurements by the values predicted by the best-fit function (Figure II)
4. Master chronology: average of all detrended time series from the site (Figure III)

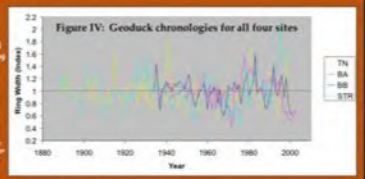
Results

- Master chronology from Brady's Beach (Figure III) spans from 2001 back to 1934

- Chronologies developed from four sites off the coast of British Columbia (below)

- Tree Nob (TN): 1888 - 2002
- Bartlett (BA): 1937- 2003
- Brady's Beach (BB): 1934 - 2001
- Puget Sound (STR)*: 1888 - 1999

- All chronologies are fully crossdated and annually resolved (Figure IV)



* Puget Sound (STR) chronology developed by: Strom et al., 2004, North Pacific climate recorded in growth rings of geoduck clams: Potential for paleoenvironmental reconstruction. Geophys. Res. Lett. 31: 1-4.

Acknowledgements

- Many thanks to…
- HMSC & OSU for hosting the REU program
- NSF for funding this project under award OCE-0648515
- Pacific Biological Research Station of the Department of Fisheries and Oceans Canada for providing our geoducks
- Ichung Cheung, Dr George Boehlert, and many others at Hatfield for shaping the REU experience
- Rose Kormanyos for developing the Tree Nob and Bartlett chronologies
- Are Strom for developing the Puget Sound chronology.
- Dr. Bryan Black for his ongoing mentorship and tremendous help with this project

- For more information, please contact Matt at mstuckey@berkeley.edu or Bryan at bryan.black@oregonstate.edu

Examples of Excellent Posters

Expression, purification, and crystallization of recombinant mouse phospholipase c-zeta (PLC-ζ)

Pang, Allan

BSc Genetics | School of Biosciences, Cardiff University, Cardiff, Wales CF10 3US

ABSTRACT

The aim of this study is to express and purify recombinant PLC-ζ protein fit for structure identification through X-ray crystallography. To date, there is no available empirical data of the 3D structure of PLC-ζ. The identification of the structure is crucial as it presents information that will facilitate understanding of the protein mechanism and regulation, both of which remained unknown. Bioinformatic analysis was also utilised to draw initial structural information, specifically on the domain differences of PLC-ζ and empirically determined structure PLC-δ1.

INTRODUCTION

- Phospholipase C-zeta (PLC-ζ), a member of phospholipase c family, was identified as the sperm factor responsible for activating oocytes, and thereby causing fertilization[1].

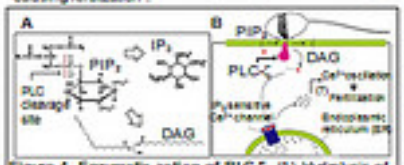


Figure 1. Enzymatic action of PLC-ζ. (A) Hydrolysis of PIP_2 by PLC-ζ (released from sperm) produces DAG and IP_3. (B) In turn, IP_3 activates Ca^{2+} channel of ER to release calcium. This hypothesize to produce Ca^{2+} oscillation and eventually fertilization.[2]

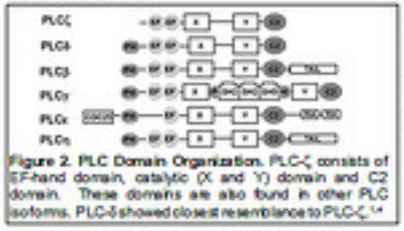


Figure 2. PLC Domain Organization. PLC-ζ consists of EF-hand domain, catalytic (X and Y) domain and C2 domain. These domains are also found in other PLC isoforms. PLC-δ showed closest resemblance to PLC-ζ.[3,4]

- Bioinformatic analysis through sequence alignment and homology modelling revealed that the calcium binding region of C2 domain as well as the catalytic Y-region of PLC-ζ were expected to be significantly different from empirically determined PLC-δ1.

EXPERIMENTAL RESULTS

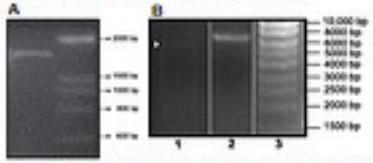


Figure 3. Molecular cloning of PLCζ124 construct. (A) Two step PCR amplification successfully produce a PLC-ζ construct with 6-HIS and 3C protease cleavage site (1813 bp in size). (B) Construct was ligated into pET102/D-TOPO vector. This is validated by restriction digest using *Cla*I. Vector alone (1) showed a lower band compared to vector with the construct (2).

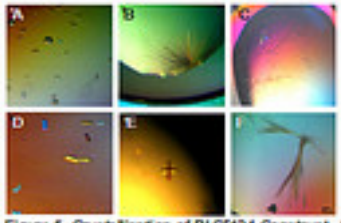


Figure 5. Crystallisation of PLCζ124 Construct. Six different screening conditions were found to be suitable for crystallizing the protein. Crystals were confirmed to be protein due to birefringence characteristic under polarised light. Protein crystals A-E were needed to be optimised to obtain larger crystal. Protein crystal F was tested for X-ray diffraction. Preliminary analysis, however, revealed that X-ray diffraction pattern was hindered by presence of high salt concentration.

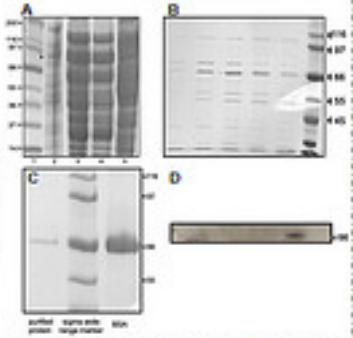


Figure 4. Protein expression and purification. (A) Molecular weight marker (lane 1). Protein bands after IPTG induction (lane 2). Protein construct migrated at 83 kDa. Nickel beads were used to capture protein (lane 3) and the beads were washed with high salt concentration (lane 4) to remove contaminants (lane 5). (B) Fractions collected after cleaved protein (by 3C protease) passed through FPLC-ion exchange method. Bands migrating at around 66 kDa (which corresponds to PLCζ124 protein) are found. (C) Further purification through FPLC-gel filtration method to obtain purified sample. (D) To verify that indeed the protein band is PLC-ζ, Western blot was employed using antibody specific to X/Y linker.

CONCLUSION

- It was predicted from the bioinformatic analysis that PLC-ζ will fold in the same general topology as PLC-δ1 (without PH domain).
- Specific differences were predicted to be in the Y-region of catalytic domain and C2 domain.
- This hypothesis, however, was not tested as X-ray diffraction data collection failed. This was due to presence of high salt concentration. Future study may need to alter buffer system to obtain this structural data.
- The recombinant mouse PLC-ζ was successfully expressed, purified and crystallized. However, the expression level is low.
- It was assumed that the protein was catalytically active in bacterial cell and overproduction caused toxicity and metabolic stress.
- To obtain higher protein expression, different vector system and bacterial strain may be used.[5]
- The ultimate aim is to reveal the 3D structure of human PLC-ζ. However, the expression of the human PLC-ζ was much lower. It is possible though to construct a more accurate model if an empirical 3D structure of mouse PLC-ζ was determined and used as a template.

ACKNOWLEDGEMENTS

I would like to thank Dr A. Rossbach for the antibody used in Western blotting, Dr. LG D'Cruz for the PLCζ124 construct, 3C protease and his supervision, Mr. Peter Wilson for technical support.

EXPERIMENTAL PROCEDURE

PLCζ124 construct was generated using two-step PCR to incorporate 6-HIS and 3C protease recognition site. Construct was ligated into pET102-D/TOPO vector and transformed into *E. coli* BL21(DE3). Protein expression was induced using IPTG. Bacterial lysis was carried out using French Press. Protein construct was captured using Nickel beads and cleavage of the protein from the tags were completed by 3C protease. Further purification was carried out using FPLC (ion-exchange and gel filtration chromatography). Crystallization of protein was carried out using sitting drop vapor-diffusion method.

REFERENCES

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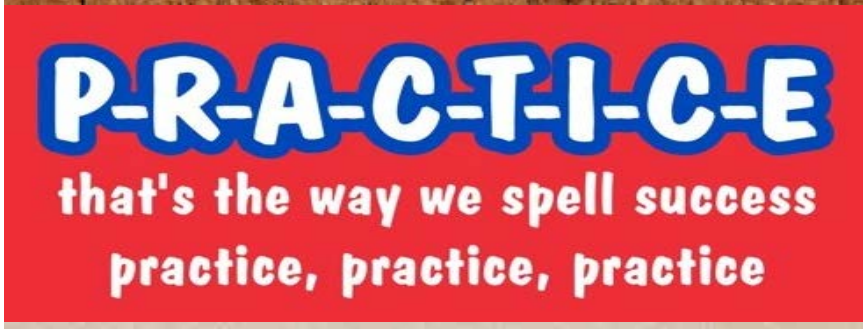
2. Parrington J, Lai FA, and Swann K. (1998) A novel protein for Ca2+ signalling at fertilization. *Curr Top Dev Biol.* 39, 215-43.
3. Dumon-Seignovert L, Cariot G, and Vuillard L. (2004) The toxicity of recombinant proteins in *Escherichia coli*: a comparison of overexpression in BL21(DE3), C41(DE3), and C43(DE3). *Protein Expression and Purification* 37, 203-206.
4. Essen LO, Perisic O, Cheung R, Katan M, and Williams RL. (1996) Crystal structure of a mammalian phosphoinositide-specific phospholipase C delta. *Nature* 380, 595-602.

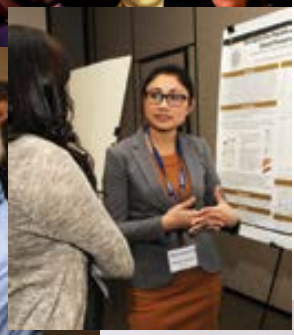
Practice Makes Perfect

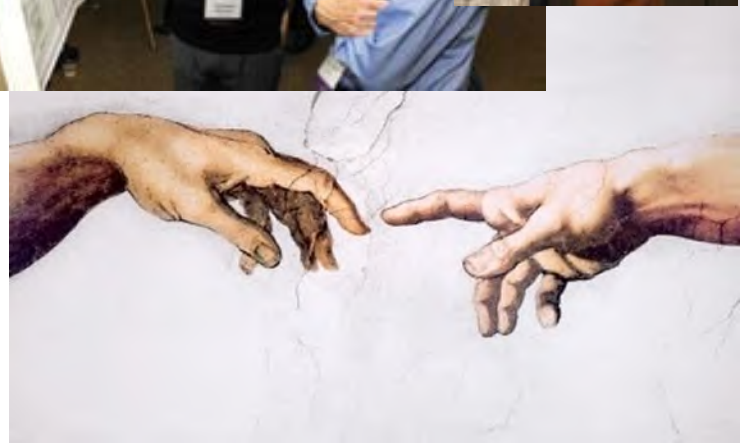
- Finish early enough to practice
- MAKE SURE TO PRACTICE!
- Develop 5 minute presentation
- Know first sentence
- What to say for each figure (3 pts…)
- Transitions between figures
- What to point at for each figure
- Practice with lab mates and laypersons
- Run through ENTIRE poster
- Be friendly
- Don't sound like you've memorized
- Be excited about your work
- Remember to refer to your poster!
- They may interrupt with questions
- Pause long enough for them look at figure
- Know what questions may be asked….
  - Can practice them



First Contact

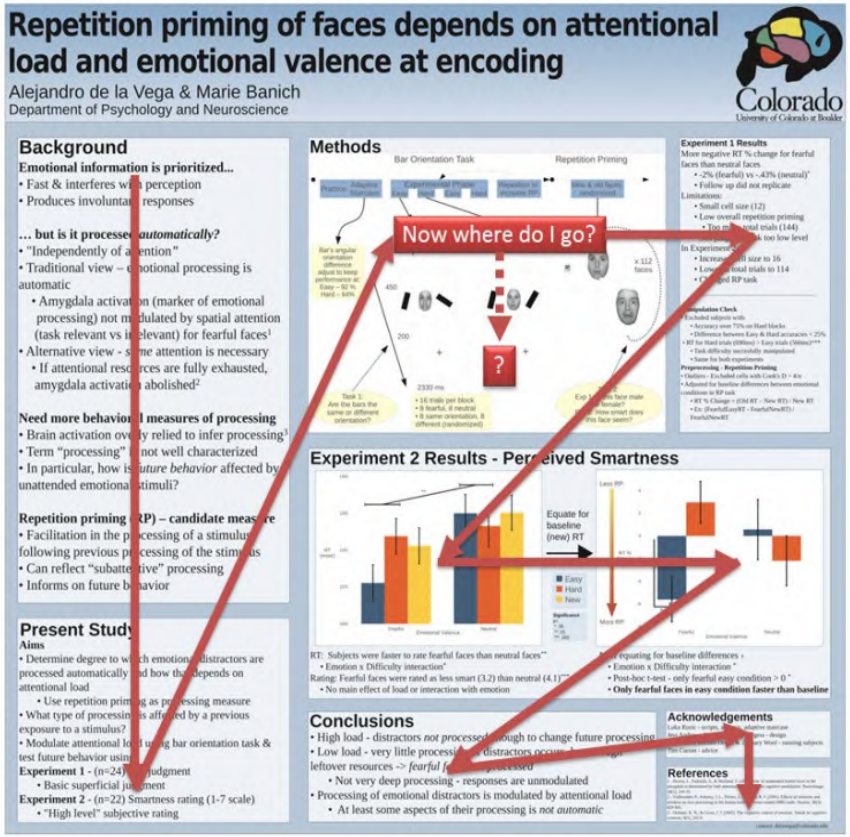
- Stand to left of poster (where start reading)
- Take initiative
- Smile, but stay near poster
- If they come closer
- Say, “Hello” and shake hands
- Give name. Get their name.
- Give level, and university (UC Davis)
- Ask if they’d like “you to walk them through your poster”
  - YES? Then GO!
- This is work that I performed this summer in the ___ program in the laboratory of Dr. _____ at UC Davis.
- (Optional) Ask if they are familiar with this field of research
  - No- More introduction, careful with acronyms
  - Yes- Can go more quickly through intro





The Flow of Things

- Start with Intro that will catch them
  - No pointing if you have no figure!
- Move to Methods
  - Briefly summarize
- Move to Results
  - Longest section
  - Indicate at beginning if did not work
  - Walk thru all figures
- Transition to Conclusions
- Say Conclusions
- Acknowledgements (optional)
- Any Questions?



The Just in Case Items:

- Carry your poster with you at all times (do not leave as checked baggage)
- Dress for situation
  - Follow culture of conference
  - Student conference – suit…or minimally khaki's
  - Comfortable shoes
- Be there on time!
- Don't leave unless it is very important to do so (if so, leave a friend there momentarily)
- Mini-poster printed out
- Pins
- Water
- Business cards (check your email!)
- Notebook
  - Networking – write down ideas and names!

Remember

- If you network please remember to email them!
- Keep promises that you've made
- Hang poster outside your lab
- Sample posters can be seen online
  - google search
- A "template" can be found at:
  - http://urc.ucdavis.edu/conference/index.html

References and Sites to Visit

- How to Write an Abstract: http://vimeo.com/3968357
- How to Present: http://www.vimeo.com/3968357
- Click here for PosterTalk helpful presentation, which was used to create parts of this presentation. Thank you Dr. Gail P. Taylor!
  - Or visit: http://r.search.yahoo.com/_ylt=A86.J7.Ct6FU_AIAj4wPxQt.;_ylu=X3oDMTByNzhwY2hkBHNlYwNzcgRwb3MDMgRjb2xvA2dxMQR2dGlkAw--/RV=2/RE=1419913218/RO=10/RU=http%3a%2f%2fwww.utsa.edu%2fmbrs%2fresources%2fcourses%2frescar%2fPosterTalk.pptx/RK=0/RS=8753.1idne73Y6qpS9cTFIPF8_0-
- Colin Purrington: Advice for designing scientific posters. http://www.swarthmore.edu/NatSci/cpurrin1/posteradvice.htm
- Knowledge Management in Health Services; HSERV 590A: Creating a Poster Using MS PowerPoint – University of Washington http://courses.washington.edu/~hs590a/weblinks/poster.html
- Creating Effective Poster Presentations – Hess and Liegel. http://www4.ncsu.edu/~grhess/posters/
- University of Buffalo- Designing effective poster presentations http://ublib.buffalo.edu/libraries/units/sel/bio/posters.html
- University of Kansas- Jeff Radel http://www.kumc.edu/SAH/OTEd/jradel/Poster_Presentations/PstrStart.html

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