Proposing Biological Engineering Projects

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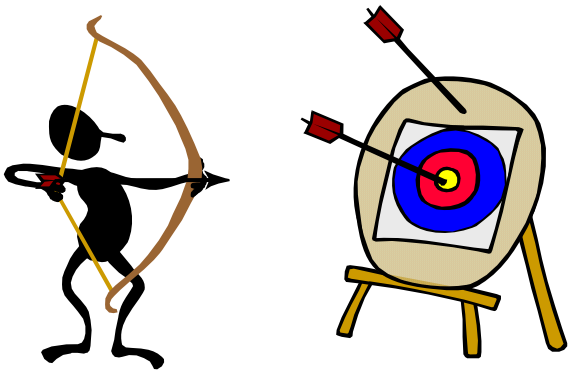
Lecturer, Writing across the Curriculum

December 2009

With special thanks to work previously done by my colleague, Atissa Banuazizi

Key components of the talk

- Goals, content and structure
- Slide design
- Team presentations



Goals, Content and Structure

What should the proposal say and how should it be put?

Why Propose?

- Advancing merit of an original research concept
  - Exposing your idea to a professional audience
  - Learning their assessment of its merits
  - Obtaining support, financial or otherwise, for your idea
- Increasing your understanding of your project
- Expanding universe of professional peers

What about the audience?

- Usually reviewers are experts
  - May be seasoned professionals in your field
  - May be generalists or professionals from other fields
  - May have direct knowledge of some aspects of your field
- They need to believe in the project
  - Work ***must*** be perceived as having merit
  - Time for project must be right
  - Your team must stand out as the best one for the job
- Respect expertise of multidisciplinary reviewer teams

What goes in the proposal?

- Contents vary and are often specified in detail by a funding or contracting agency

- For your assignment, the specification is:
  - Brief project overview
  - Background information to improve audience access
  - Statement of research problem and goals
  - Project details and methods
  - Predicted outcome range (all or nothing works as planned)
  - Needed resources (e.g.., time, funds, staff, equipment)
  - Societal impact of a successful project

Labor division and content: 50:50

1st Partner

- Brief project overview
- Background information
- Research problem statement
- Project goals statement

2nd Partner

- Project details and methods
- Predicted outcome range
- Resources required by work
- Societal impact if all goes as planned

Each partner's material should be of approximately the same length

Labor division and content:

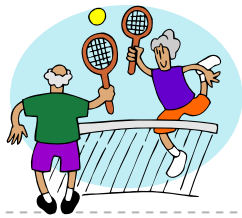
1st Partner -- Bread

- Brief project overview
- Background information
- Resources required by work
- Societal impact if all goes as planned

2nd Partner -- Filling

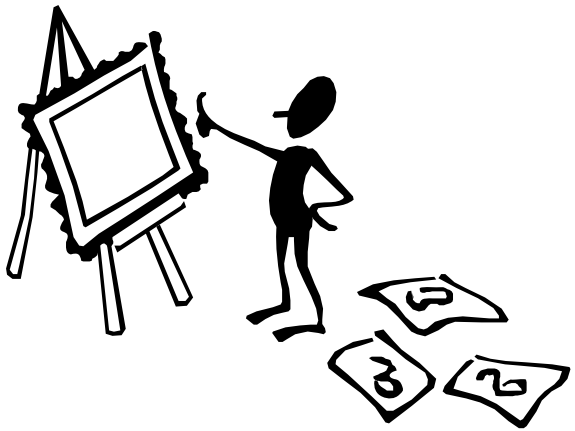
- Research problem statement
- Project goals statement
- Project details and methods
- Predicted outcome range

Labor division and content:



1st Partner	⟷	2nd Partner
Brief project overview		Background information
		Research problem statement
Project details and methods		Project goals statement
		Resources required by work
Predicted outcome range		Societal impact if all goes as planned

Beware of the “tennis match” syndrome



Slide Design

Plan each slide for content and aesthetics

Recall design principles

- Remember less can be more
  - Balance type, graphics and white space
  - Make each word count
  - Unseen messages do not help your cause
- Exploit audience reading habits
- Develop and sustain a consistent design for each partner’s contribution
  - Avoid changing colors, font styles and capitalization
  - Keep language formality consistent

Cut and paste from wiki

Amino acid	Letter code	Residue Mass (Da)
Alanine	A	71.04
Arginine	R	156.10
Asparagine	N	114.04
Aspartate	D	115.03
Cystine	C	103.01
Phenylalanine	F	147.07
Glutamine	Q	128.06
Glutamate	E	129.04
Glycine	G	57.02
Histidine	H	137.06
Isoleucine	I	113.08
Leucine	L	113.08
Lysine	K	128.09
Methionine	M	131.04
Proline	P	97.05
Serine	S	87.03
Threonine	T	101.05
Tryptophan	W	186.08
Tyrosine	Y	163.06
Valine	V	99.076

See “Peptide Mass Spec Data,” http://openwetware.org/wiki/Peptide_Mass_Spec_Data, accessed Nov. 19, 2009.

Excel table with lines

Amino Acid	Letter Code	Residue Mass (Da)
Alanine	A	71.040
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Cystine	C	103.010
Phenylalanine	F	147.070
Glutamine	Q	128.060
Glutamate	E	129.040
Glycine	G	57.020
Histidine	H	137.060
Isoleucine	I	113.080
Leucine	L	113.080
Lysine	K	128.090
Methionine	M	131.040
Proline	P	97.050
Serine	S	87.030
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Tryptophan	W	186.080
Tyrosine	Y	163.060
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Excel table no lines, but shading

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Excel table shading, larger fonts

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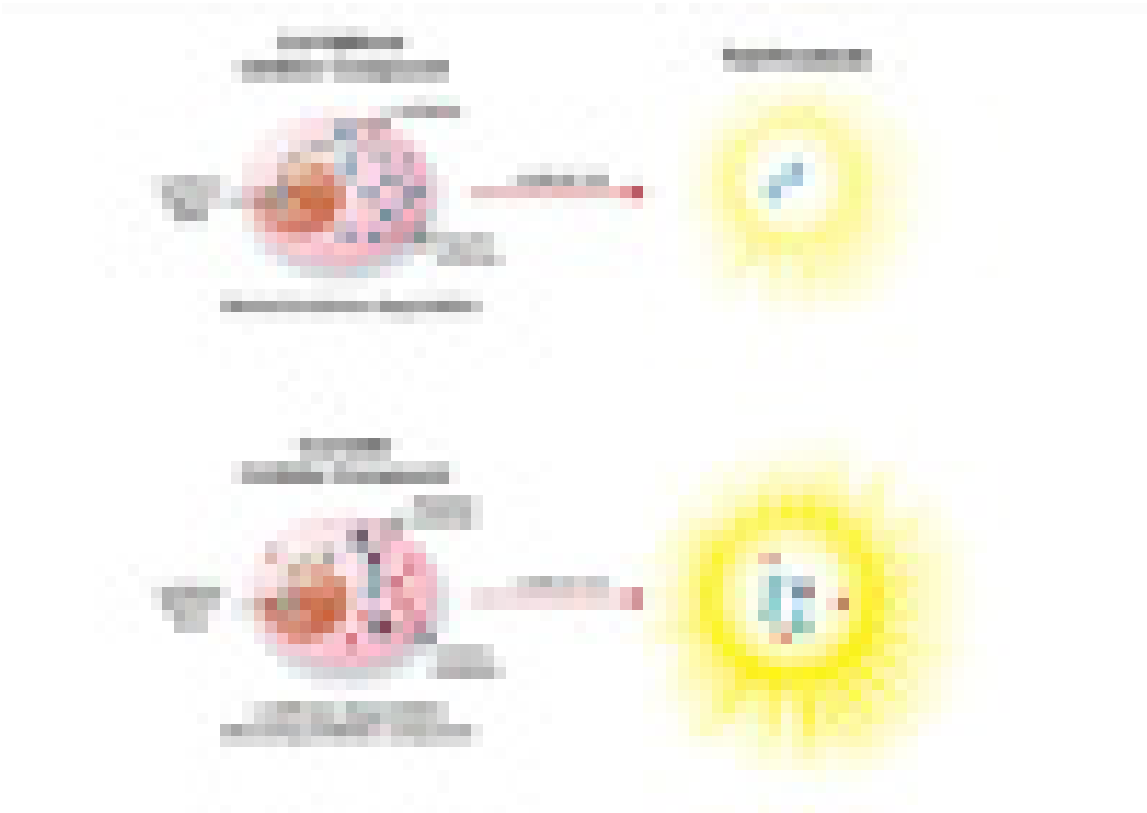
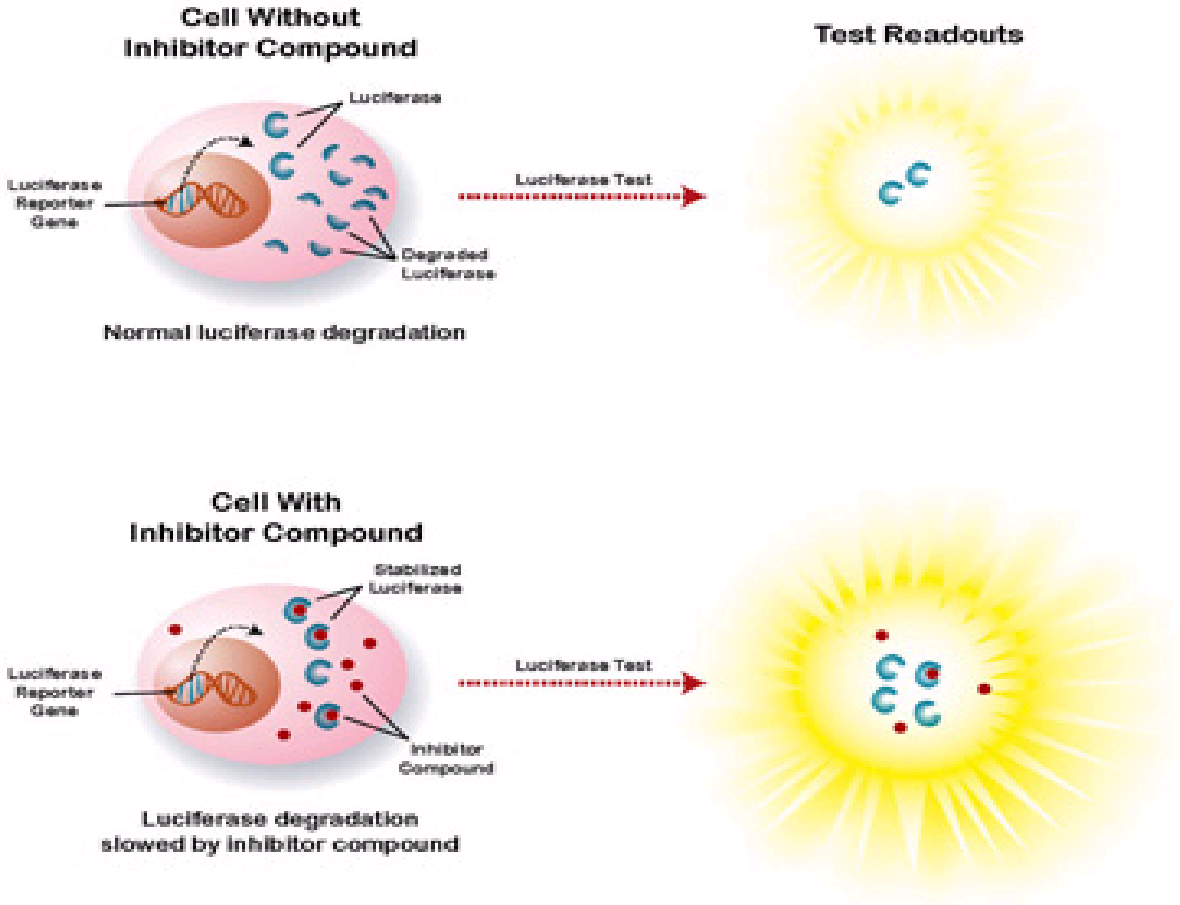
Graphic copied and enlarged from Web



National Human Genome Institute, “Firefly Luciferase Degradation Slowed by Inhibitor Compound,” National Institutes of Health, Jan. 21, 2009, Accessed Nov. 23, 2009 <http://www.genome.gov/17516876>.

Graphic copied and pasted as bitmap

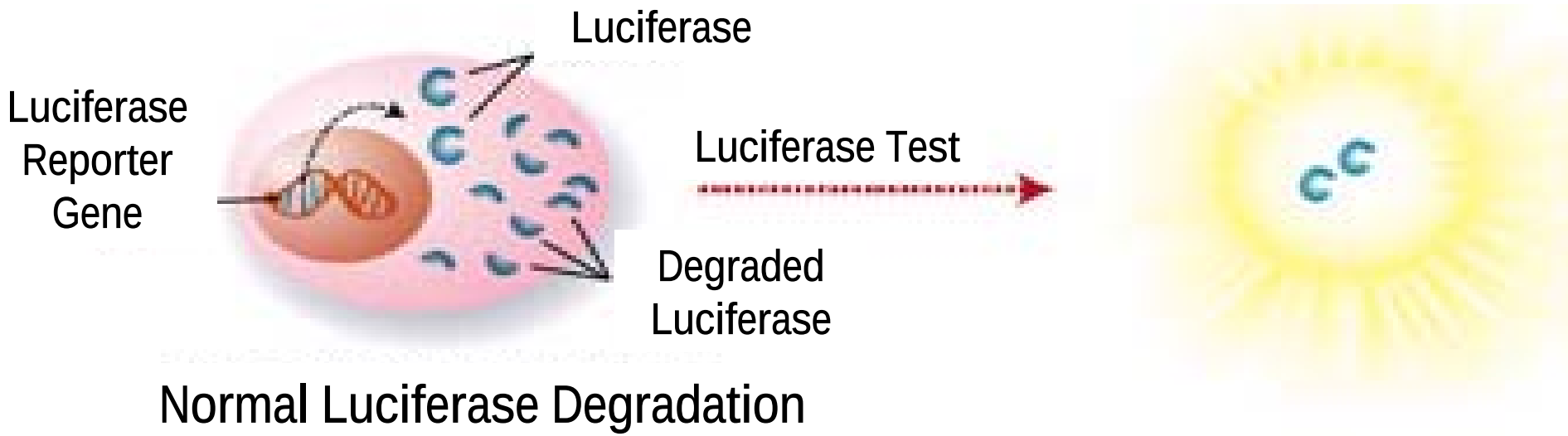


National Human Genome Institute, "Firefly Luciferase Degradation Slowed by Inhibitor Compound," National Institutes of Health, Jan. 21, 2009, Accessed Nov. 23, 2009 <http://www.genome.gov/17516876>.

Graphic cropped and enlarged

Cell without Inhibitor Compound

Test Readout



Normal Luciferase Degradation

Adapted from National Human Genome Institute, “Firefly Luciferase Degradation Slowed by Inhibitor Compound,” National Institutes of Health, Jan. 21, 2009, Accessed Nov. 23, 2009 http://www.genome.gov/17516876 .

Graphic cropped and enlarged

Cell with Inhibitor Compound

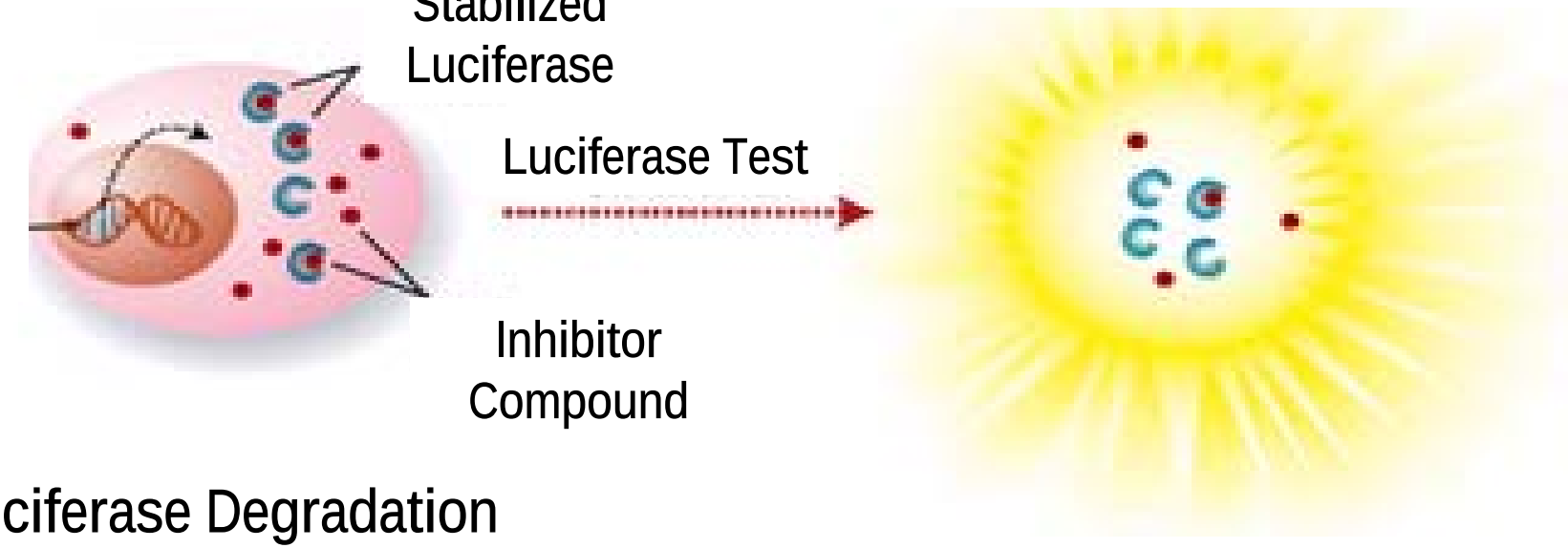
Test Readout

Stabilized Luciferase

Luciferase Reporter Gene

Luciferase Test

Inhibitor Compound



Luciferase Degradation Slowed by Inhibitor Compound

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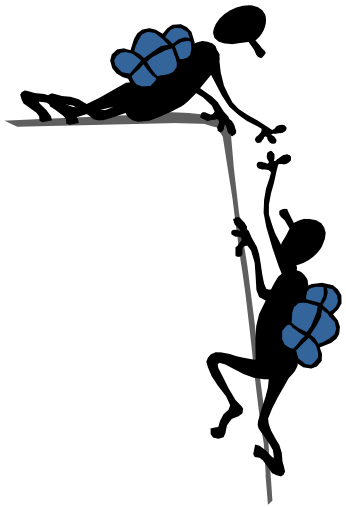

Team Presentations

Be in it together

Share pre-presentation duties

- Define a role for each partner and announce it
- Revise, revise and then revise again
  - Beware of being too invested in your own contributions
  - Accept constructive criticism graciously
- Practice together
  - Decide on whether to move each other's slides
  - Work toward similar speaking styles, especially in terms of formality
  - Be enthusiastic about what you say yourself and what your partner says
  - Test your Q&A

Be a real team onstage

- Time talk to run no more than 10 minutes
  - Watch time during partner's talk and signal if running long
- Do not upstage your partner
  - Do not move or interrupt during partner's talk
  - Plan all movement between speakers
  - Decide whether to stand or sit during partner's talk
  - If standing, maintain enough distance from speaker to avoid a split focus
- Be familiar with your partner's material
- Prepare for the unexpected

Day of talk hints

- Each team needs three copies of its slides
- Prepare for Murphy
  - If you use an Apple, bring the right adapter
  - E-mail the presentation to yourself – just in case
  - Bring your talking points
- Dress professionally
- Remember that if you get nervous, you have lots of company. Breathe, move and then resume talk

More help

- Alley, Michael, *The Craft of Scientific Presentations* (New York: Springer, 2005)
- Friedland, Andrew J. and Carol Folt, Writing Successful Science Proposals (New Haven: Yale, 2000).
- “Guide for Proposal Writing,” National Science Foundation, 18 Feb. 2004, http://www.nsf.gov/pubs/ 2004/nsf04016/nsf04016.pdf.
- Muller-Parker, Gisele, “How to get NSF funding: A view from the ‘Inside,’” Ocean Sciences of the National Science Foundation, qtd. By Western Washington University, http://www.wwu.edu/ depts/rsp/insideview.pdf.
- Tufte, Edward R., *The Cognitive Style of PowerPoint*, Cheshire, CT: Graphics Press, 2003.
- Tufte, Edward R., *Envisioning Information*, Cheshire, CT: Graphics Press, 1990.
- Tufte, Edward R., *The Visual Display of Quantitative Information*, 2nd Ed., Cheshire, CT: Graphics Press, 2001.