# General Microbiology Current Events Poster Presentation Assignment Description and Point Breakdown

*Microbiology is a rapidly growing field with very applied social and cultural interfaces. From studies of the human microbiome to antibiotic resistance, current literature about microbiology is prevalent. We will form groups of between 5 and 7 students and groups will choose a topic of interest. Groups will monitor the news on this topic and find some additional journal references for scientific background. Research will be presented in a poster presentation at the end of the semester.*

I. On the day of the poster presentation, your product will be graded based upon the inclusion and quality of each of the following elements:

A. **Title** (2 points) - A title is a clear, concise (succinct yet informative) and meaningful summary of your project. Remember that you will be one of many in a room of posters. Your title and poster appearance are partly what set it apart from the others and draw people to your poster.

B. **Introduction** (5 points) - This should be a brief summary of the background information / literature pertinent to your project. This section should be based on pivotal referenced sources and should attempt to meld the public perspectives (at the time that you began the project) with those of the scientific community. Give your audience a feel for the events that led up to the perspectives of the time. That is, clearly explain the focus of your research and the current events / public mindset that served as the basis for your hypothesis. Establish broad interest first and then funnel your reader to your specific hypothesis. Your personal experience can serve as a starting point for inquiry (e.g. your sufferings through an infectious disease). However, this must be intertwined (compared and contrasted) with current public and scientific perspectives.

C. **Hypothesis** (2 points)

1. Hypotheses may be observational and predictive. They are developed at the beginning of the semester regarding your subject of choice. Here are some examples:
   - *Fusarium oxysporum f. sp. cubense, also known as Panama Disease Race 4, represents the single largest threat to the modern banana industry. This industry was previously devastated by an earlier form of the disease, Race 1, which effectively destroyed production of the Gros Michel banana worldwide. Due to this event the Gros Michel was replaced with the resistant Cavendish cultivar for industrial production, which is now under threat by Panama disease tropical race 4. We hypothesize that cross breading will produce a suitable Fusarium oxysporum- resistant replacement for the Cavendish cultivar before Tropical race 4 reaches the Americas.*
   - *The strain of triple negative breast cancer does not have the three most common types of receptors seen in most breast cancer cells- estrogen, progesterone and the Her-2/new-gene product receptor. As a result, triple negative breast cancer tests negative for all three of the growth factor receptors found in almost all other strains of breast cancer. This has made targeted drug cell treatments highly ineffective in curing this strain of cancer. Currently, the developing technology in genetically modified viruses has become promising in the treatment of this strain of cancer. Specifically, the vaccinia virus, belonging to the poxvirus family, is engineered to express the protein hNIS within the cancer cells, which makes them susceptible to radioactive iodide used in chemotherapy. Thus, we hypothesize that by February 2015, a human clinical trial using the vaccinia virus to fight the triple negative breast cancer strain will be conducted.*

2. Alternatively, manipulated hypotheses can be made. This type of hypothesis is used when one variable (the independent variable) is manipulated and the effects on a second variable (the dependent variable) are observed. This type of hypothesis is generally written as an *if, then* statement. It is important to note the difference between this type of manipulated hypothesis and one made in the lab where the independent variable is changed by the experimenter. Here the independent variable is likely changed by a group or a society other than (larger than) the researcher. Here are some examples:
   - *Once the FDA receives an application for a new drug they have six months to either approve its release or require further testing. Thus, **if** GlaxoSmithKline does indeed submit a request for approval of the vaccine by the end of the year, **then** we predict that within two years, the Food and Drug Administration will approve the H5N1 vaccine for use in the United States.*

- *Although biofuels promise to replace the fossil fuels of current times, tangential energy losses to excess E. coli biomass formation detract from yield potential. Likewise, yield potentials for insulin production are limited by the current processes, which often require complex, expensive, and toxic substrates that are undesirable for large-scale production processes, and complex substrates yield variable quality. Thus, we hypothesize that **if** the proper reduction of tangential energy loss due to biomass formation in biofuels synthesis and implementation of expression vectors in insulin synthesis are properly incorporated into manufacturing techniques, **then** contemporary production yield limitations will be overcome.*

The examples above were hypotheses made by previous student groups. Remember that a hypothesis should be narrow in scope (accomplishable) and testable (possible to accept, reject, modify, support or disprove). Good hypotheses are also grounded in background knowledge (reflect sufficient preliminary investigation) and clearly state the predicted results.

D. **Research Methods** (2 points) - This section should describe, briefly but thoroughly, the methods used to obtain newspaper articles and journal articles (e.g. All journal articles were found using the Web of Science database available through the University of Wyoming Library's Web site.). Please exercise good judgment when choosing research methods (see below) and make it clear how *all* information was collected. In rare cases, groups may decide to embark on original research. In those cases, experimental methods should be described here in addition to research methods. If it is not possible to fulfill the reference requirements (see below) please provide an explanation in this section.

E. **Summary and Discussion** (10 points) -

1. This section should summarize your findings as they relate to the stated hypothesis. For observational, predictive hypotheses, this may be predominately a summary of the relevant events that have occurred, throughout the semester. It is often effective to summarize these events using a timeline or a monthly event summary. Often data can be presented as clear illustrations and tables that can stand-alone. For manipulated hypotheses, this section should relate a discussion regarding the *if, then* statement. If the former *if* portion of the statement came to pass, did the latter *then* statement occur as predicted? As in the introduction, this section should incorporate pertinent referenced papers from every month of the semester. If possible, please site at least three public perspective articles and three scientific journal articles.
2. In addition to your summary, tie your poster to the introduction by discussing how current thinking has changed as a result of these events. How did these events allow you to support, accept, reject, modify or disprove your hypothesis? Please remember that hypotheses are never proved. They can be supported / substantiated but because it is impossible to test every case, they are never proved. Discuss future directions anticipated in this area. For some topics it may even be appropriate to put forth a new hypothesis that has been appropriately modified based upon your findings.

F. **Citations** (4 points) -

1. We will use the reference format used by authors publishing in the *Journal of Bacteriology*. Format descriptions and examples can be found on the instructions for authors web site at http://jb.asm.org/misc/ifora.shtml . After downloading the PDF file, it will be necessary to scroll down to the section labeled references. *NOTE - In addition to the year, please also include the month for all journal and public perspective articles.

Here is an example showing where to insert the month:

**Kwong, P.D., R. Wyatt, J. Robinson, R.W. Sweet, J. Sodroski, and W. A. Hendrickson.** (insert month here) 1998. Structure of an HIV gp120 envelope glycoprotein in complex with the CD4 receptor and a neutralizing human antibody. Nature. **393**:648-59.

- *If you are unable to determine citation format for a particular source using these instructions for authors, refer to the citation guidelines on the General Microbiology web site: http://www.uwyo.edu/molb2210%5Flect/lecture/info.html
- Remember, when in doubt, include more information rather than less. Your goal is to ensure that readers can access the source you have referenced. On this note, if you are unsure of the abbreviation for a journal article, just write out the name in its entirety.

2. If a journal article is accessed online, the original journal article and not the web site at which it was accessed must be cited! It is always appropriate to cite the original source!!

3. All sections of your poster must include in-text citations. Every statement that relies upon outside information must acknowledge a source! The *Journal of Bacteriology* uses the citation-sequence system. This means that references are cited in numerical order as they appear in the text. Reference numbers are placed in parentheses. An example is given below (example from: Rianne N. Esquivel, Rachel Xu and Mechthild Pohischroder *J. Bacteriol*. 2013, 195(17):3808. DOI: 10.1128/JB.00572-13. Published Ahead of Print 21 June 2013.):

   Biofilms are considered a natural state for most microbes and allow protection from environmental stresses (1–3). Biofilm formation begins with attachment of cells to a surface. As organ- isms accumulate, they begin to spread along the surface and aggregate, forming microcolonies while at the same time producing a thick exopolysaccharide matrix (EPS) and eventually developing into the macrocolonies that are found in a mature biofilm (4).

   Bacterial type IV pili are thin, multifunctional, filamentous protein complexes that can extend from the cell surface, attach to a foreign surface, and retract. Thus, pili facilitate adherence to abiotic surfaces, the formation of close intracellular associations, and twitching motility, all functions that are critical to biofilm formation (5–9).

## REFERENCES


1. **Tyson GW, Chapman J, Hugenholtz P, Allen EE, Ram RJ, Richardson PM, Solovyev VV, Rubin EM, Rokhsar DS, Banfield JF.** 2004. Commu- nity structure and metabolism through reconstruction of microbial genomes from the environment. Nature **428**:37– 43.
2. **Matz C, McDougald D, Moreno AM, Yung PY, Yildiz FH, Kjelleberg S. 2005**. Biofilm formation and phenotypic variation enhance predation- driven persistence of *Vibrio cholerae*. Proc. Natl. Acad. Sci. U. S. A. **102**: 16819 –16824.
3. **Hansen SK, Rainey PB, Haagensen JA, Molin S**. 2007. Evolution of species interactions in a biofilm community. Nature **445**:533–536.
4. **Monds RD, O'Toole GA**. 2009. The developmental model of microbial biofilms: ten years of a paradigm up for review. Trends Microbiol. **17**:73– 87.
5. **O'Toole GA, Kolter R**. 1998. Flagellar and twitching motility are necessary for *Pseudomonas aeruginosa* biofilm development. Mol. Microbiol. **30**:295–304.
6. **Higashi DL, Lee SW, Snyder A, Weyand NJ, Bakke A, So M**. 2007. Dynamics of *Neisseria gonorrhoeae* attachment: microcolony development, cortical plaque formation, and cytoprotection. Infect. Immun. **75**:4743– 4753. 7. Jurcisek JA, Bookwalter JE, Baker BD, Fernandez S, Novotny LA,
7. **Munson RS, Bakaletz LO**. 2007. The PilA protein of non-typeable *Haemophilus influenzae* plays a role in biofilm formation, adherence to epithelial cells and colonization of the mammalian upper respiratory tract. Mol. Microbiol. **65**:1288 –1299.
8. **Varga JJ, Therit B, Melville SB**. 2008. Type IV pili and the CcpA protein are needed for maximal biofilm formation by the gram-positive anaerobic pathogen *Clostridium perfringens*. Infect. Immun. **76**:4944 – 4951.
9. **Burrows LL**. 2012. *Pseudomonas aeruginosa* twitching motility: type IV pili in action. Annu. Rev. Microbiol. **66**:493–520.


4. It is often effective to include pictures. However, it is essential to give credit for that pict/fig to the appropriate source!!! Please include this citation information as a caption next to the figure! If figures are copyrighted, please obtain written permission from your source. If the figures are of your own making, please note that and credit yourself.
   - Figures should also be referenced in text. Put them in parentheses after pertinent in-text statements. (e.g. Shingles is characterized by a rash that is usually restricted to an area supplied by the branches of the involved sensory nerve (Fig. 1)).

5. If possible, references must include at least 1 journal article and at least one public perspective (newspaper or magazine article) from each of the first three months of the semester. If this is not possible, due to limited information regarding the topic, please state this in the research methods section! At least one textbook must also be used as a resource.

6. Please use good judgment as to the quality of your online sources. Many types of online sources may be valuable. However, it is essential to assess these sources. One good way to search for articles is using the University's online access to the EBSCO Host, Academic Search Premier database, the Web of Science/Knowledge and LexisNexis Academic. The URL for all of these sources is http://www-lib.uwyo.edu/find/articles.cfm. Web sites provided by the Centers for Disease Control (http://www.cdc.gov/) and the World Health Organization (http://www.who.int/en/) are also useful. Again, if using a journal article provided on one of these sites, please site the original article rather than the web site.

*NOTE - There are many ways to present the required elements at your poster presentation. It is not necessary, and not even desirable, to have only text on your poster. Be creative with your presentation. Feel free to have additional handouts available or even to have a full-text article to accompany your poster.

II. Presentation description

Posters will be presented in the foyer of the AS/MB building during the regularly scheduled final exam time (10:15 am – 12:15 pm Monday, May 11th). All groups will need to set up their posters prior to the presentation time. An easel type board (~ 6 feet wide and 4 feet tall) and table will be provided. Half of the groups will present their posters from 10:15am-11:15am. The groups that are not actively presenting will visit the posters of those students who are presenting. The groups that do not present from 10:15am-11:15am will present from 11:15am-12:15pm. Thus, all students will have the opportunity to be both the assessor and assessed. The environment is very relaxed and often students bring handouts, demonstrations, cookies, candy etc... to make their posters "come to life".

III. In order to ease the process of poster production, there will be earlier submissions of group member names, topic, hypotheses and an abstract. Here are descriptions (where necessary) and a schedule of due dates for these earlier submissions (these dates are also included on the syllabus itself - there is some flexibility in these dates but each element should be submitted no later than the week on which the due date is listed):

On Tuesday, Feb. 3rd, we will select **group members** during lab.
Between Wednesday, Feb. 4th and Wednesday, Feb. 11th, E-mail me with your **topic**.

Between Wednesday, Feb. 18th and Wednesday, Feb. 25th, E-mail me with a rough but complete draft of your **hypothesis**. Be certain to first read the hypothesis description on page 1 of this document.

Between Wednesday, April 8th and Friday, April 17th, E-mail me with a rough but complete draft of your **abstract**

(An abstract is a 1 paragraph statement (~ 200-300 words) of the hypothesis and the pertinent findings used to accept/reject, disprove or modify that hypothesis. An abstract should summarize the major points of the results, research methods and discussion.)

**The general structure of an abstract:**

1. Background information / justification of hypothesis (1 to 2 sentences)
2. hypothesis (1 to 3 sentences)
3. Methods (1 sentence)
4. Pertinent findings (1 to 3 sentences)
5. Hypothesis accepted/rejected/disproved or modified (1 to 3 sentences)
6. Conclusion / future direction (1 sentence)

(Please also see: http://www.csupomona.edu/~jcclark/classes/old/bio190/abstract.html )

Between Monday, April 27th and Monday, May 4th E-mail me with a rough but complete draft of your **poster** (Power Point often works well – A template is available for those desiring this structure)

IV. Point distribution (It is possible to earn a total of 50 points on this assignment.)

Poster presentation grade =

15 points for submitting group member names, topic, hypothesis and abstract on time and in a perfected format.

+ 25 points for the required poster elements (title, introduction, hypothesis, summary, discussion and references as described above)

+ 5 points (You will assign a grade to every member of your group, including yourself. These points reflect an average of these grades.)

+ 5 points (Every person viewing the poster, will grade the presenters. These points reflect an average of these grades).

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**50 points**