First Steps – Write an Abstract and Outline

On Friday Nov 8th, please bring in **two copies of your starting abstract, an outline, and provide at least two references** (properly cited).

Making a Good Abstract

It is critical that scientists be able to effectively communicate their work. An abstract provides an opportunity for a scientist to briefly explain the results and relative importance of their work.

An abstract should include the following statements. The order of these statements used here will provide a good flow for reading.

1. A clear statement of the topic of the paper, and a little motivation (i.e., why is it important?).

2. A bit of an introduction to draw a reader into wanting to know more. (i.e., a little taste of some things that are known about the problem)

3. A clear and precise statement of what the paper is going to cover.

4. A concise summary of the results of the analysis and the main conclusions.

Make sure that the abstract that you submit has these elements in it, and follow the structure of the example given below as closely as possible.

Sample Good Abstract

Destabilization of the West Antarctic Ice Sheet is one of the critical uncertainties about future climate change because it has the potential to increase sea level rise faster than other all other processes combined. Much of the ice in the interior of Western Antarctica lies below sea level making it inherently unstable. Currently, floating ice shelves at ocean boundaries provide a buttressing to stabilize the interior ice. Recently, however, several ice shelves have catastrophically disintegrated in response to changes in local climate.
This paper explores and describes the physical mechanisms by which ice shelves can disintegrate, and reviews the uncertainties involved in the prediction of future changes to the ice sheet. It is concluded that disintegration mechanisms such as melt pond induced ice shelf fragmentation, are well understood. However other mechanisms involving circulation of warm water underneath ice shelves and seismic stability of ice shelves are areas of active research where disintegration mechanisms are poorly understood.

The different colors have been used to emphasize how each of the four basic elements noted above have been satisfied.

Make a Simple Outline

One of the most difficult things about writing is starting. Many times, when beginning, you'll have many ideas in your head and you won't be entirely certain how they relate to each other. An outline provides a structure for you to organize and arrange your thoughts and ideas. Try not to think of it as a rigid guideline that you must obey, but rather a starting point from which you can develop your thoughts. Your first draft won't look anything like your final draft. That's a good thing; you will have refined your thought process into a coherent document

instead of a loose set of thoughts.

Start by thinking of all the components of the story you want to tell think about how they relate to each other and to the main points of your paper. Think of topics that you know you want to expand upon. Don't worry about the details right now, but if you think of something you might forget write it down and explain what you want to say.

For the sample abstract I have written, I might create an outline like this.

Sample Outline
1. Climate Change Impact on the Ice Sheet and Stability
2. What could Ice Sheet destabilization do to global sea level?
3. Describe how changes in mountain glaciers and ice sheets are presently affecting sea level. (Note: use this as an opportunity to define 'ice sheet' and 'ice shelf' and explain the difference in their direct impact on sea level)
4. Describe the breakup of the Larsen B ice shelf, the mechanism of the breakup, and its impact on surrounding glaciers
5. Describe current research, how ocean interactions and seismic stability of ice shelves are active areas of research.
6. Conclude by questioning stability of Ross and Ronne/Filcher Ice Shelves and describing the stabilizing affect they have on ice on the interior of the Western Antarctica. Bring this back to the greater context of sea level rise.

References

You will need at least three references for your research paper. References will need to be properly cited both in the text and in a Works Cited section at the end of your paper.

To reference an item in the text you need to know the authors of the paper and the year published. For example if Adam Campbell wrote a paper in 2010 and was the only author listed you would cite this paper like:

"Crane Glacier reacted to ice shelf collapse with by enhancing basal sliding (Campbell, 2010)"

For a 2010 paper written by two authors, Campbell and Gerard Roe, and Campbell is the first author listed, your in text citation would be:

"The Little Ice Age Event has been clearly demonstrated to not be a globally coherent climate event (Campbell and Roe, 2010)"

For a 2010 paper written by more than two authors with Campbell as the first author listed, your in text citation would be:

"Research has demonstrated graduate students are overworked (Campbell et al., 2010)"

The Works Cited or References section at the end of your paper needs to properly cite references. Given a list of references at the end of your paper, and arrange them in alphabetical order. Here as some examples of how to reference different kinds of source materials:

Journal
Vaughan, D. G. and C. S. M. Doake. 1996. Recent atmospheric warming and retreat of ice shelves on the Antarctic Peninsula. *Nature*, **379**(6563), 323-331
Here Vaughan and Doake are the authors and 1996 is the year of publication.

“Recent atmospheric …” is the title of the paper. Nature is title journal. 379 refers to the volume number, 6563 is the issue number and 323-331 are the pages of the issue where the article was printed.

Book
Doniger, Wendy. *Splitting the Difference*. Chicago: University of Chicago Press, 1999.

Website
Evanston Public Library Board of Trustees. “Evanston Public Library Strategic Plan, 2000–2010: A Decade of Outreach.” Evanston Public Library. http://www.epl.org/library/strategic-plan-00.html (accessed June 1, 2005).

nature

How to construct a *Nature* summary paragraph

Annotated example taken from *Nature* **435**, 114-118 (5 May 2005).

*One or two sentences providing a **basic introduction** to the field, comprehensible to a scientist in any discipline.*

*Two to three sentences of **more detailed background**, comprehensible to scientists in related disciplines.*

*One sentence clearly stating the **general problem** being addressed by this particular study.*

*One sentence summarising the main result (with the words "**here we show**" or their equivalent).*

*Two or three sentences explaining what the **main result** reveals in direct comparison to what was thought to be the case previously, or how the main result adds to previous knowledge.*

*One or two sentences to put the results into a more **general context**.*

*Two or three sentences to provide a **broader perspective**, readily comprehensible to a scientist in any discipline, may be included in the first paragraph if the editor considers that the accessibility of the paper is significantly enhanced by their inclusion. Under these circumstances, the length of the paragraph can be up to 300 words. (The above example is 190 words without the final section, and 250 words with it).*

During cell division, mitotic spindles are assembled by microtubule-based motor proteins[1,2]. The bipolar organization of spindles is essential for proper segregation of chromosomes, and requires plus-end-directed homotetrameric motor proteins of the widely conserved kinesin-5 (BimC) family[3]. Hypotheses for bipolar spindle formation include the 'push–pull mitotic muscle' model, in which kinesin-5 and opposing motor proteins act between overlapping microtubules[2,4,5]. However, the precise roles of kinesin-5 during this process are unknown. Here we show that the vertebrate kinesin-5 Eg5 drives the sliding of microtubules depending on their relative orientation. We found in controlled *in vitro* assays that Eg5 has the remarkable capability of simultaneously moving at ~20 nm s^{-1} towards the plus-ends of each of the two microtubules it crosslinks. For anti-parallel microtubules, this results in relative sliding at ~40 nm s^{-1}, comparable to spindle pole separation rates *in vivo*[6]. Furthermore, we found that Eg5 can tether microtubule plus-ends, suggesting an additional microtubule-binding mode for Eg5. Our results demonstrate how members of the kinesin-5 family are likely to function in mitosis, pushing apart interpolar microtubules as well as recruiting microtubules into bundles that are subsequently polarized by relative sliding. We anticipate our assay to be a starting point for more sophisticated *in vitro* models of mitotic spindles. For example, the individual and combined action of multiple mitotic motors could be tested, including minus-end-directed motors opposing Eg5 motility. Furthermore, Eg5 inhibition is a major target of anti-cancer drug development, and a well-defined and quantitative assay for motor function will be relevant for such developments.