Bioe 183F/L

Assignment 3

Summary/Abstract

General Instructions:
- Write your Summary.
- Read all of the instructions below before you start.
- email all summaries to instructor by 5PM the day before class.
- Bring to class:
  - Your outline. (with any hand-written changes, arrows, etc.)
  - The first draft with hand-written corrections.
  - 5 printed copies – all double spaced (because we will edit them by hand)

NOTE:
To do this effectively, consult your research advisor (even if you are not starting your project until next quarter) so that you are clear about what you are undertaking.

Summaries are normally written after the rest of the paper or proposal. We this class, we do this first in this class to develop your writing skills and understanding of your project.

Summary Format:
Write one paragraph: 6-8 sentences with the following flow (5 mini-sections)
- Set out the general problem.
- What is your organism(s) or research system and why/how does it address #1?
- State what you are testing: your hypothesis (or your question).
- In very general terms, what method(s) will you use (experimental, observational, mathematical)?
- Provide a general summary statement (how the details of your project address part 1, the general problem)

Turn in:
- Outline (can be all by hand; if on computer, show your hand edits or computer edits in ‘track changes’.)
- At least one preliminary draft of your summary, showing your hand edits
- Final draft: Maximum = 200 words
- All drafts of your summary ➔ Double spaced
- Email to instructor the day before it is due in class
- Bring to class: 4 printed copies (for peer reviewing)

How to write:
1. Plan Ahead, don’t just write: start with an outline or list that includes only essentials such as key words or bullet points).
  - Make sure you cover all the points in the guidelines.
  - This is the place to edit for structure and content (and more efficient than doing this after you start to write).
2. **Write:**
   - amplify your outline (draft 1)
   - edit your first draft 1 (or more) times

3. **Instructions for writing, style and editing:** see EEB Writing Guidelines

In the following weeks you will:
   - edit each other’s summaries;
   - polish your summaries based on the comments you receive (to 150 wds max); and
   - expand the summary into a short introduction to a proposal or paper (1.5 pg max).

On the next page, you will find an annotated way to write a summary published by the journal “Nature” – a general science journal published in England. Since you don’t have data yet, you can ignore the middle section – but it will very useful when you write a summary for your report and/or thesis.

The arrows indicate the sections that I want you to include in your assignment. For the last section I’ve indicated, note that you put your particular study into a general context, not your results.
How to construct a *Nature* summary paragraph


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**. 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. Hypotheses for bipolar spindle formation include the 'push-pull mitotic muscle' model, in which kinesin-5 and opposing motor proteins act between overlapping microtubules. 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*. 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 inter-polar 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.