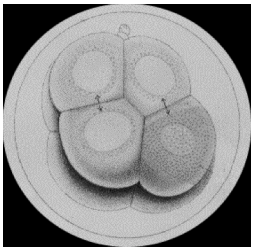

DEVELOPMENTAL BIOLOGY
LABORATORY WRITING PRACTICUM
BIOSC 1531
SYLLABUS SPRING 2018

Instructor

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Course Objectives

This course is designed to improve your ability to write in a clear, concise, structured, well-reasoned manner on scientific topics. Your primary goal is to be able to read appropriate materials on a given topic in developmental biology and extract from this material relevant facts and hypotheses that can then be used to compose an essay on this topic. At this stage of your academic career you should be reasonably proficient in the basics of the English language; any deficiencies in this regard will be pointed out early on and efforts should be made to improve these during the course.

Course Format and Grades

Three essays will be assigned for this course, the titles can be found below. Your goal is to write a clear, concise, well-argued essay on each topic.

For each essay, you will:

- Read papers posted on CourseWeb; if necessary, find and read papers yourself on the essay topic. Take notes on each of the papers you read.
- Write an essay plan and post on CourseWeb.
- Meet as a group to discuss the essay topic. Take notes at the meeting.
- Revise plan, write first draft of essay.
- Take first draft to the Writing Center to have it critiqued.
- Revise first draft and post it on CourseWeb.
- Your first draft will be graded.
- Meet individually with me to discuss your first draft.
- Write a revised, final version and post it on CourseWeb.
- Your revised essay will be graded.

Your grade will be based on a combination of your grades for your first drafts and final drafts of the three essays. You will be given a mark out of 10 for each essay (both first effort and revision) and the total for the six will be used to determine your final grade. Obviously, expectations will be much higher for a revision.

The essays

Before starting

- Read the title of the essay very carefully and decide what information might be required to answer the essay.
- Read the title of the essay again. An essay is not necessarily a simple review of a particular topic, but you will need to review the topic in the essay.
- These are scientific essays and so will differ stylistically from an essay you might write, for example, on a topic in English Literature. You should be familiar with scientific writing, but read a review article on anything to get a feel for the kind of style that is appropriate. For example, direct quotes are rarely used.

Reading material

- Determine where you can find the information you need for your essay.
- Have you covered the topic before in lecture or in the lab class?
- Your text book should provide some basic information that may help but do not use this as a reference.
- You must read additional papers. You should be aware that there are two types of papers you will find in journals – 'review' articles and 'research' papers or primary literature. Review articles can be a good introduction to a particular topic (assuming you can find an appropriate review), but you must also read some primary literature – i.e. the papers that actually document specific experiments.
- For each essay you will be provided with some papers to read. You must read all of these, but you must realize that not everything in a paper may be relevant to your topic at hand, so you may not have to read all of the paper in fine detail.
- You should also find additional material yourself. Relevant papers may be referenced in the papers I provided for you. In addition, you can search for other papers. A simple Google search can sometimes be productive. Two more specific places to do this are:

  PubMed http://www.ncbi.nlm.nih.gov/sites/entrez?db=pubmed
  Google Scholar http://scholar.google.com/advanced_scholar_search?hl=en&lr=

- Finding appropriate papers can be a somewhat daunting task given the quantity of papers available, but doing this is another skill you need to acquire. If you have never used PubMed there are some resources you can access, including an introductory tutorial: https://www.nlm.nih.gov/bsd/viewlet/search/subject/index.html
- You should be able to determine whether a paper might be relevant just from its title, a quick perusal of the abstract will indicate if you should bother reading any more. In general there are less review articles than primary literature so it is sometimes easiest to find two or three good reviews and then look for good primary literature that is referenced in these reviews. However, you should always look for recent primary literature that has been published after the most recent review you are using. The introduction section to research papers may also provide a good short review of a subject.
- Pitt has a subscription to almost all of the journals that you will need access to so you will be able to download the papers from a Pitt computer or if your own computer is on Pitt WiFi.

Read and take notes

- When reading papers you obviously need to identify important points and experiments that are relevant for your essay. Highlight important sections so you can come back and read them again.
- Make notes while you read. To prevent plagiarism, be very careful when you do this, you need to make very clear in your notes when you are copying directly from a source and when you are summarizing and using your own words. An excuse that is almost always made in cases of plagiarism is that the plagiarist

used notes they thought were their own words but in fact were copied directly from a source. This is not an excuse that is accepted by anyone.

- You do not necessarily need to read the whole of a paper in detail. One skill you must acquire is the ability to determine whether what you are reading is relevant for your task at hand. This can be difficult, especially if you do not fully understand what you are reading, but gets easier with experience. So only part of a paper may be relevant for the essay you are writing. Just because I recommend you read a paper, does not mean that everything or even most of what is in the paper is directly relevant to your essay.
- In your essay you must present examples of real experiments to support any arguments you make (and reference these appropriately), so be aware of this when you read.
- If you feel that you just do not understand what you have been reading, you should set up an extra meeting with me to get help.
- If you come across a word that you do not understand, do not just ignore it, search on-line for a definition.
- You must post your notes on CourseWeb.

Make a plan

- Before you begin to write your essay, you must make a plan of what you are going to say, outlining each paragraph or group of paragraphs – these will break the main body of the essay into sections (and possibly sub-sections). Decide on titles for each of these sections and sub-sections. There should be a logical progression between the sections, so that adjacent ones are related and so the essay is not a random assortment of topics. You will submit this plan before each group meeting to discuss the essay topic.
- Your plan will consist of your list of sections and sub-sections, with possibly a sentence in each section.
- Your essay must start with an introductory paragraph and end with a concluding paragraph, so write 'Introduction' as a title at the beginning and Conclusion as title at the end.
- List your references (all the ones I gave you plus additional ones you have found and read yourself).

Diagrams and Figures

As they say: 'a picture is worth a thousand words' and this very true for science. You have two options: draw your own diagrams or import relevant ones from the papers you have read. For the former, your best option would be to draw the figure in Powerpoint, and save it as a jpeg. The latter option should be considered 'fair use' and not infringe copyright laws assuming this is the only place you will use the image, and the source is properly acknowledged (if you are worried about copyright you can get in touch with the publisher).

Some advice on acquiring figures from journals inserting figures into your essays:

- These can be acquired either from the pdf of the paper or from the 'full text' HTML version of the paper on the internet.
- For a pdf, you can simply select and copy the relevant figure in Acrobat and then insert it into your Word document (see below).
- For an HTML full text paper, find the paper on the website of the journal and then simply click on the image enough times to get the version with the best resolution then right-click, select 'Copy Image' and then insert into your Word document.

Insertion of images into your Word file

- To insert an image you have copied into your Word document, go to a new line, go to Edit>Paste Special>choose'Picture'. You can resize the image by clicking on it once and using your cursor to move the box in or out. To position the image how you want it you may want to modify the Wrapping – click on the image once, go to the Formatting Palette, and choose the Wrapping style that is most appropriate (it

would take too long to explain all this, just experiment yourself, if you have problems, just come and see me).

Additional information on figures:

- Figures must be numbered and be referred to in the text as (Fig. 1).
- You must provide a legend below the figure – your own legend, not just a copy of the one that came from the original paper.
- At the end of the legend you must cite where the figure came from, unless you drew it yourself.
- Figures do not count towards the length requirements of the essay.

References

- You must reference your sources of information. The references should be listed at the end of the essay.
- There are different formats for listing, but as there are no space limits for your references (they do not count towards the word limits) you should use the full reference with the title along with the authors and journal name, issue and page, e.g.:

Wehn, A. and Campbell, G. (2006). Genetic interactions between scribbler, Atrophin and groucho uncover links in transcriptional repression. *Genetics* **173**, 849-861.

- Within the essay refer to the references as is done in most published papers with the authors and date in parentheses, e.g., (Wehn and Campbell, 2006), as the source for something you have just stated.
- In general it is not a good idea to refer to a web page.
- You should not refer to discussions with me or to lectures or lecture notes as sources of your information: any source should be published.

Format and length of Essays

Each essay should be double spaced with 1 inch margins top bottom and side using Arial 11 point (around 320 words per page). The length should be around 1600-2000 words, but not longer than 2500. The essays must be posted to CourseWeb before the deadline. Label your files with 'yourlastname1531-#' (where # = essay number) + 'original' or 'revised'.

Write your essay

- **Write the full title of the essay at the top of the first page, i.e. the title I have provided below for each essay**
- Number the pages, put your name in the footer along with Essay number and 'original' or 'revised'.
- Before you start to write your essay, in bold write down the headings of the sections you decided on in your plan. Then write 'Introduction' and 'Conclusion' as headings at the beginning and end of your essay – your essay must start with an introductory paragraph(s) and end with a concluding paragraph.
- You should probably write the introduction first – but do not forget to revise it when you have finished. The Introduction tells the reader what you are going to do in the essay (so that they can determine whether they want to read the rest of it), briefly mention the main points of your different sections, or what these sections are trying to say. You do not need to give your opinion here (if one is asked for in the title), but you can if you like.
- Fill out the different sections.
- Go through your text and make sure that everything you say is backed up by a reference.
- After the Conclusion heading put the final heading: References, and list all your references as mentioned above.
- Insert diagrams/figures, give each a number and write the legend. Go through the text and insert the figure number wherever you refer to it, as (Fig #).

- Write the Conclusion – remind the reader what you have talked about, bring everything together, what does it all mean, what is the bigger picture, what is your opinion and why?
- Make sure your essay conforms to the format and length described below.
- Reread your essay. Make changes. Does it have an introductory paragraph? Is there a conclusion? Look at your plan again, does your essay include all the points you wanted to make? Is your language appropriate – would it look out of place in a published paper?
- Spell check.
- Proof read.
- Do a word count (excluding the title and the references and the legends) and put this at the end of the essay: after the last reference write ' Word count: ='. This should not be above 2500 words.
- Get someone else (anyone) to read your essay, they do not have to understand it.
- Take it to the Writing Center and ask them to look it over with you.
- Download the Essay Checklist from CourseWeb. Fill this in and insert in your essay file after the last page.
- Make sure the name of your essay file is 'yourlastname1531-#' and then post it to CourseWeb before the deadline.
- Post to CourseWeb before deadline

The Writing Center at the University of Pittsburgh

Additional assistance is available from the Writing Center at the University of Pittsburgh. A statement from their website is as follows:
'The Writing Center is a free tutorial service for Pitt students. Writing Center consultants can help you with your academic, professional, or creative writing. They can help you learn how to generate ideas, organize your writing, and understand assignments. They can help you deal with any sentence-level problems that you have, too. It's a great place to go in order to have a thoughtful reader for your work. For more information about the Center or to make an appointment, visit the website: www.writingcenter.pitt.edu. '

It is essential that you take advantage of this service:

YOU MUST GO TO THE WRITING CENTER AFTER YOU HAVE WRITTEN THE FIRST DRAFT OF EACH OF YOUR ESSAYS TO DISCUSS THEM WITH A CONSULTANT BEFORE YOU SUBMIT THEM FOR GRADING.

You can make an appointment online to see a consultant either at the O'Hara Student Center or Hillman Library. Drop-ins are also available at the OSC. Meetings last 25 minutes, and you can have a maximum of two in one week (so you could go before completing your plan and after completing your first draft, but before submitting it).

Plagiarism

Avoid! Read the informative page from the Department of English at Pitt:
http://www.english.pitt.edu/undergraduate/understand-and-avoid-plagiarism
Note, for our scientific essays, direct quotation is not usually appropriate, so you must paraphrase (and obviously reference your source). The above site has good example of bad and good paraphrasing (bad paraphrasing basically meaning plagiarism).

Turnitin will be used to examine your essay for plagiarism.

CourseWeb
The site will be used by the instructor to post announcements, reading materials, and grades and you will post your plans, notes and essays there. If you have any problems entering the site or if this course is not listed you should get in touch with the help desk (624-HELP).

GRADES
You will be given a mark out of 10 for each essay (both first effort and revision) and the total for the six will be used to determine your final grade. Obviously, expectations will be much higher for a revision.

Schedule

January 11, 12:00 pm: Group introduction meeting. To discuss what is outlined in this syllabus. Schedule individual meeting times. Read syllabus before meeting.
January 18, 12:00 pm: Group meeting. Discussion of how to write plans and essays. No preparation required.
January 24: Plan for 1st Essay due by 11:59 pm. Plan must demonstrate that you have read relevant parts of each paper in the Reading List.
January 25, 12:00 noon: Group meeting to discuss the 1st essay before you write it.
Feb 1, 12:00 noon: Office hours. Optional meeting time to discuss any issues about the first essay**.**
February 4: 1st essay draft due by 11:59 pm.
Week of February 5-9: Individual meeting to discuss 1st essay.
February 15, 12:00 noon: Office hours. Optional meeting time to discuss any issues about the first essay revision**.**
February 18: Revision of 1st essay is due by 11:59 pm.
February 21: Plan for 2nd Essay due by 11:59 pm. Notes and plan must demonstrate that you have read relevant parts of each paper in the Reading List.
February 22 12:00 pm: Group meeting to discuss the 2nd essay before you write it.
March 1, 12:00 noon: Office hours. Optional meeting time to discuss any issues about the second essay**.**
March 4: 2nd essay, 1st draft due by 11:59 pm.
Week of March 12-16: Individual meeting to discuss your 2nd essay.
March 22, 12:00 noon: Office hours. Optional meeting time to discuss any issues about the second essay revision**.**
March 25: Revision of 2nd essay is due by 11:59 pm.
March 28: Essay notes and plan for 3rd Essay due by 11:59 pm. Notes and plan must demonstrate that you have read relevant parts of each paper in the Reading List.
March 29, 12:00 pm: Group meeting to discuss the 3rd essay before you write it.
April 5, 12:00 noon: Office hours. Optional meeting time to discuss any issues about the third essay**.**
April 8: Third essay due by 11:59 pm.
Week of April 9-13: Individual meeting to discuss your 3rd essay.
April 19, 12:00 noon: Office hours. Optional meeting time to discuss any issues about the third essay revision**.**
April 22: Revision of 3rdessay due by 11:59pm.

Meeting locations

Group meetings: 102 Clapp Hall
Individual meetings: 357 Crawford Hall
Do not come early or late.

ESSAY 1
Title:
'Multicellular animals (Metazoans) must have evolved from single-celled ancestors.
(a) What are some of the general mechanisms utilized by metazoans to achieve multicellularity, that are not strictly required by simple single-celled organisms?
(b) Is there any evidence that molecules involved in any of these mechanisms might actually have been present in the single-celled ancestors that gave rise to metazoans?'

THE FULL TITLE OF THE ESSAY IS THE FIVE LINES ABOVE, THIS IS WHAT YOU WRITE AT THE TOP OF YOUR ESSAY

Reading List
Before reading anything you should simply think about what the differences are between single celled organisms and multicellular animals. What is required to achieve multicellularity? Are any of these mechanisms already used in some way by single celled organisms?

Abedin, M. and King, N. (2008). The premetazoan ancestry of cadherins. *Science* **319**, 946.
Brunet, A and King, N (2017). The origin of animal multicellularity and cell differentiation. *Dev Cell* **43**, 124.
Gaiti, F. et al. (2017). Origin and evolution of the metazoan non-coding regulatory genome. *Dev Biol* **427**, 193.
King, N. et al (2008). The genome of the choanoflagellate *Monosiga brevicollis* and the origin of metazoans. *Nature* **451**, 783-788.
Levin, T.C. et al (2014) The *rosetteless* gene controls development in the choanoflagellate *S. rosetta. eLife* 2014;**3**:e04070. [The de Mendoza and Ruiz-Trillo paper above is a comment on this research paper).
Sebe-Pedros, A et al. (2017). The origin of metazoan: a unicellular perspective. *Nat Rev Genet* **18**, 498.

ESSAY 2
Title:
First, describe how the *hedgehog* (*hh*) gene was identified. Second, discuss how the Hedgehog signal moves within tissues and is transduced in responding cells. Finally, discuss how Sonic Hedgehog signaling can result in multiple transcriptional responses during patterning of the neural tube in vertebrates.

Reading List
Nusslein-Volhard, C. and Weischaus, E. (1980) Mutations affecting segment number and polarity in Drosophila. *Nature* **287**, 795-801.
Briscoe. J. and Therond, P.P. (2013). The mechanisms of Hedgehog signalling and its roles in development and disease. *Nat Rev Cell Mol Biol* **14**, 416- 429.
Dessaud. D., McMahon A. P., and Briscoe J. (2008). Pattern formation in the vertebrate neural tube: a sonic hedgehog morphogen-regulated transcriptional network. *Development* **135**, 2489-2503.
Cohen, M., Briscoe, J., and Blassberg, R. (2013) Morphogen interpretation: the transcriptional logic of neural tube patterning. *Cur Op Gen Dev* **23**, 423-428.
Balaskas, N., Ribeiro, A., Panovska, J., Dessaud, E., Sasai, N., Karen M. Page, K. M., Briscoe, J., and Ribes.V. (2012). Gene Regulatory Logic for Reading the Sonic Hedgehog Signaling Gradient in the Vertebrate Neural Tube. *Cell* **148**, 273-284.
Huang, P. et al (2016). Cellular cholesterol directly activates Smoothened in Hedgehog signaling. *Cell* **166**, 1176-1187.

ESSAY 3

Title: What are enhancers, what are their key features, how have they been identified and where do new ones come from?

Reading List

Glassford, W. J. et al. (2015). Co-option of an Ancestral Hox-Regulated Network Underlies a Recently Evolved Morphological Novelty. *Dev Cell* **34**, 520-531.

Long, H. K. et al (2016). Ever-Changing Landscapes: Transcriptional Enhancers in Development and Evolution. *Cell* **167**, 1170- 1187.

Rubinstein, M and de Souza, F. S. J. (2013). Evolution of transcriptional enhancers and animal diversity. *Phil Trans R Soc B* **368**, 20130017.

Schaffner, W (2015). Enhancers, enhancers – from their discovery to today's universe of transcription enhancers. *Biol Chem* **396**, 311-327.

Shlyueva, D et al (2014). Transcriptional enhancers: from properties to genome-wide predictions. *Nat Rev Gen* **15**, 272-286.