

## Guide to Preparing and Defending your BMB Honors Thesis

The following guide has been prepared for BMB students who are completing an Honors Thesis. **All BMB students working towards BMB Departmental Honors MUST follow these guidelines in order for their thesis to be accepted for BMB Honors credit.** The BMB thesis organization varies somewhat from that posted by the Honors College, but is accepted by the Honors College – do not substitute any other Honors College format. Note that this format applies to all BMB students, including those completing thesis research with faculty members in other departments. This document is posted on the BMB website for reference and can be found at: XXXXXXXXXXXX

### THESIS FORMATTING

- Margins: One inch on all sides
- Font: Consistent throughout; minimum size 11 pt, 12 pt preferred.
- Spacing: Double Spacing (Exceptions: Tables, Figure legends, References)

### THESIS ORGANIZATION:

- 1) **Title Page**
- 2) **Abstract/Summary – Limit one page.** Should introduce the topic and its significance, describe the question addressed and experimental system, and briefly summarize important conclusions and note potential future directions.
- 3) **Acknowledgements** – Should include information on any grant funding that supported your work, including Honors College Research Grant and funding to your advisor.
- 4) **Table of Contents**
- 5) **List of Figures & Tables** – A guide for how Figures and Tables need to be prepared is presented at the end of this document.
- 6) **List of Abbreviations** – All abbreviations used in the text should be listed here. In addition, they should be defined the first time used in the text and then be used consistently throughout. Avoid over use of abbreviations; do not use abbreviations for terms that are used three or fewer times in the document.
- 7) **Thesis body** – Begin numbering pages. **The Thesis body, comprising parts a-d below, should be NO LESS THAN 6000 words.**
  - a) **Introduction** – Introduces the topic and reviews relevant literature relating it to the topic of the thesis. Must include the work of previous researchers. Points out how the work in the thesis relates to the information presented. Figures are encouraged to add clarity. Figures taken from the literature must be properly referenced.
  - b) **Methods** – Methods should be complete and free of jargon. All methods should be detailed sufficiently such that others could repeat the experiment. Do not simply cite work of others for methods.
  - c) **Results** – The results section includes a description of all of the experiments performed, along with corresponding data figures and/or tables. Be sure to introduce each experiment with an appropriate description of the rationale behind the data collection. All figures must be numbered consecutively, include detailed legends, and be referred to in the text (see below for more details on figure formatting).

You are encouraged to include details of experimental trials performed to optimize procedures or experiments that were not successful. These will serve as a record for others to refer to when working on the same project. Descriptions of problems and potential ways to change the experimental approach can be very valuable to future lab members.

- d) **Discussion and Future Directions** –This section interprets the results as a whole and in relation to previous work. It describes open questions and potential further experiments.
- 8) **References.** All BMB students are required to use APA (American Psychological Association) format, which is described in detail below. Literature cited should go beyond citations of work from the host laboratory and include not only review articles, but appropriate primary papers. DO NOT include extensive references that you have not read. A MINIMUM of 15 references is required, of which not more than five can be reviews, with the rest representing primary research papers. Primary research papers must include work from outside the lab of your advisor. The following pages provide a detailed description of the required in-text and reference list format.

### Guide for BMB Honors Thesis Students – APA Reference Style

**General guidelines: The reference list and citations in your text MUST conform to the author, date style; one of the most common is APA style.** The information below summarizes details for how you should format in-text citation and a reference list in APA style. If you are uncertain, please consult Purdue OWL - [APA Formatting and Style Guide \(7<sup>th</sup> edition\)](#)

**You are STRONGLY urged to implement a citation program to automate generation of your reference list/bibliography. Popular ones that are free include Zotero and Mendeley. These programs can also be used as a way to organize and annotate papers in preparation for the literature review and interpretation/discussion of the data you collect. The UMass Science library also offers workshops on using Zotero.**

#### **Brief summary of rules for APA format of reference list**

- After the first line of each entry, indent each line 0.5 inch (called hanging indentation).
- All authors names are inverted with first and middle names as initials (e.g. Smith, J.M.).
- Write out all author's names up to 20 and use a comma between authors. Before the very last author, use an ampersand (&).
- References are ordered alphabetically by first author. If there is more than one reference by the same author, list them in chronological order from earliest to most recent.
- The year of publication is listed inside parentheses, followed by a period.
- *Only* the first word of the article title (or title of a volume of a series) and proper nouns are capitalized.
- Journal titles: Written in full and *italicized*. All main words are capitalized.
- Book titles: Only the first word of the main title and subtitle are capitalized.
- Volume numbers (both journal and book) are *italicized*.
- The bibliography is labeled REFERENCES and left aligned. Line spacing is single. Put one line space between references, or, for ease of sorting references alphabetically, put 12 pt. spacing after each paragraph.

**Examples of formatting for different types of references**

Butte, A.J. (2013, February 15). Should healthy people have their genomes sequenced at this time? *The Wall Street Journal*.

<http://wsj.com/news/articles/SB10000872396390443884104577645783975993656>

News article

Chisholm, A.D., & Hardin, J. (2005). Epidermal morphogenesis. *WormBook: The online review of C. elegans biology* (J.R. Priess & G. Seydoux, eds.). The *C. elegans* research community. doi/10.1895/wormbook.1.35.1

Online book chapter with author, title and editors

Everest, D.A. (1964). The chemistry of beryllium. *Topics in Inorganic and General Chemistry*, (Vol. 1, P.L. Robinson, ed.). Elsevier.

Book with author, chapter, title, volume and editor

Hughes, T.R., ed. (2011). *A handbook of transcription factors, Subcellular Biochemistry* (Vol. 52). Springer.

Book volume with editor but no author

Kuo, T.-H., Yew, J.Y., Fedina, T.Y., Dreisewerd, K., Dierick, H.A., & Pletcher, S.D. (2012). Aging modulates cuticular hydrocarbons and sexual attractiveness in *Drosophila melanogaster*. *Journal of Experimental Biology*. 215(5), 814-821.

Journal article

<https://doi.org/10.1242/jeb.064980>

Rainey, F. (2009). *Bergey's manual of systematic bacteriology* (2<sup>nd</sup> ed., Vol. 3). Springer.

Book with author, edition and volume

Singhania, R. (2011). *Modeling protein regulatory networks that control mammalian cell cycle progression and that exhibit near-perfect adaptive responses*. [Unpublished doctoral dissertation]. Virginia Polytechnic Institute and State University.

Unpublished PhD thesis

Tembo, M. (2015). *Characterization of new familial mutants of Parkinson's disease protein  $\alpha$ -synuclein using yeast models*. [Unpublished undergraduate thesis]. Lake Forest College.

Unpublished undergraduate thesis

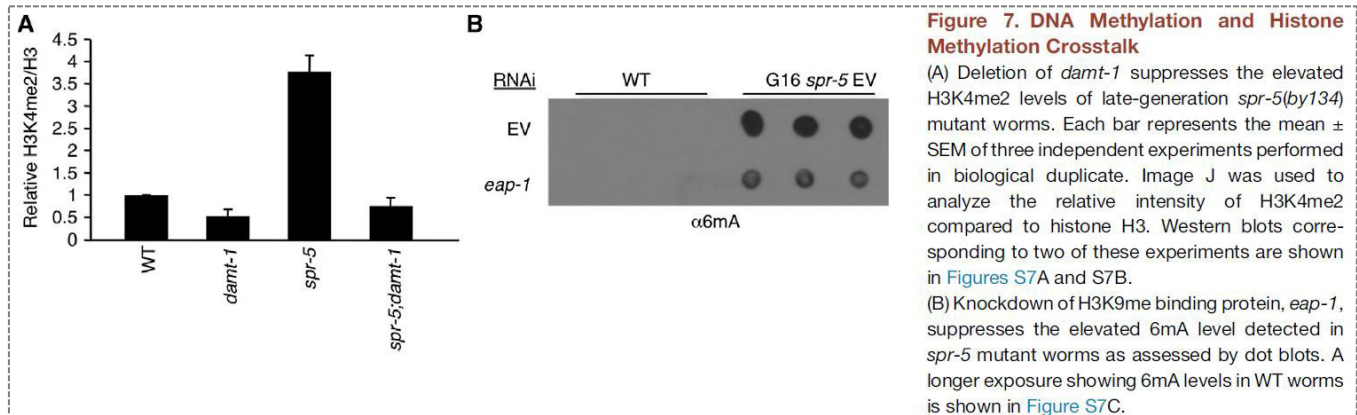
**Format for in-text citations**

- One author: (Rodriguez, 2011).
- Two authors: (Liao and Smith, 2012).
- Three or more authors: (McCauley et al., 1999).

## Style Guide for Figures and Tables (from the journal Cell)

### Figures

- Below or next to the figure put a legend with the figure title; begin with the word “Figure” followed by the number of the figure, then a period, a space, and the title with all significant words capitalized. A new paragraph describes the figure.



- Refer to the figure in the text of your thesis as Figure and the number as shown in the box below.

(Greer et al., 2014); also decreases 6mA levels in *spr-5* mutant worms (Figure 7B). Conversely, deletion of the potential 6mA methyltransferase, *damt-1*, decreases H3K4me2 levels in *spr-5* mutant worms (Figure 7A). Consistent with the possibility of crosstalk between H3K4 and adenine N<sup>6</sup> methylation regula-

- These examples are taken from page 876 (image) and page 875 (text) of this article: Greer, Eric L., Blanco, Mario A., Gu, L., Sendinc, E., Liu, J., Aristizábal-Corrales, D., Hsu, C.-H., Aravind, L., He, C., and Shi, Y. (2015). DNA methylation on N6- adenine in *C. elegans*. *Cell* 161, 868-878.

### Tables

- See specifications at <https://www.cell.com/cell/authors> (scroll down to Tables).
- Tables should be created from data gathered by the thesis author rather than copied from published works.
- Tables should be formatted using the Word table insert feature.
- Above the table, in bold, type Table followed by a space and the table number, then add a period, a space, and the title.
- Define symbols, terms, and abbreviations in a legend below the table using superscript lowercase letters, ending the explanatory note with a period.
- Refer to the Table in the text of your thesis as Table and the number as shown.
- These examples of a table, legend and in-text citation can be found at the top of page 781 and page 782 of this article: Garcia, L.R., Mehta, P., and Sternberg, P.W. (2001). Regulation of distinct muscle behaviors controls the *C. elegans* male's copulatory spicules during mating. *Cell* 107, 777-788.

Table 2. Drug Concentrations that Cause Spicule Protraction in 90% of Males

Genotype	EC <sub>90</sub>		
	Levamisole <sup>a</sup>	Arecoline <sup>b</sup>	Nicotine <sup>c</sup>
Wild-type	2 $\mu$ M	1 mM	258 $\mu$ M
<i>unc-38</i>	>1 mM	n.d.	n.d.
<i>unc-29</i>	>1 mM	n.d.	n.d.
<i>unc-38; unc-29</i>	>1 mM	500 $\mu$ M	338 $\mu$ M
<i>unc-38; egl-30</i>	n.d.	>10 mM	>6 mM
<i>egl-30</i>	35 $\mu$ M	1 mM	489 $\mu$ M
<i>egl-19(n582)</i>	3.7 $\mu$ M	>10 mM	1.4 mM
<i>unc-68</i>	>1 mM	2 mM	>6 mM
<i>unc-38; syEx469[pmyo-3::unc-38]</i>	20 $\mu$ M	n.d.	n.d.
<i>unc-68; syEx475[pmyo-3::unc-68]</i>	15 $\mu$ M	n.d.	101 $\mu$ M
<i>egl-19(n582); syEx465[pmyo-3::egl-19]</i>	n.d.	1 mM	567 $\mu$ M

For each concentration, 20–100 males were tested.

<sup>a</sup> Seven concentrations between 100 nM and 1 mM were tested.

<sup>b</sup> Five concentrations between 10  $\mu$ M and 10 mM were tested.

<sup>c</sup> Five concentrations between 1  $\mu$ M and 6 mM were tested.

the only type of AChR functioning in protraction behavior. The double-mutant males behaved in NIC and ARE similarly to wild-type males (Table 2), demonstrating that these drugs act on other receptors.

ARE is implicated in activating muscarinic ACh receptors.

### Guide for thesis defense

The preferred format for BMB students working with faculty members in the BMB department is as follows: A 25 minute “public” oral presentation with a minimum of 5 minutes for questions, attended by your faculty sponsor and committee member. Other members of the sponsoring lab are also invited, along with any others interested in hearing about the work. Following this presentation the student should also expect to have time with just the faculty sponsor and committee member to address further questions and discuss the research significance for another 30 minutes.

The BMB Department recognizes that student sponsors outside the Department may have in place other procedures for defense of an Honors thesis. Students may propose the above format to their sponsor. If the sponsor wishes the student to participate in another forum as the defense, such as a poster session or short talk, the student should schedule an appointment of a minimum of 30 minutes to meet with their BMB Committee member to discuss in more detail the content and significance of their thesis.