Comparative Genomics

Lecture 10:
Scientific Writing

Scientific Writing

- Research Papers
  - Most important way for a scientist to document her qualities
  - Publication quantity: number of publications/pages published per year
  - Publication quality: impact (citation frequency), prestige of the journal the work is published in, peer review
- Proposals
  - Principal source of research funding is external grants not universities
  - Grants are usually awarded based on research proposals

Scientific Writing

- Research Papers (McMillan Chapter 4, pp. 51-87)
- Proposals (McMillan pp. 175-183)

A Research Paper

- Title
- Author(s)
- Address(es)
- Abstract
- Introduction (Background)
- Materials and Methods
- Results and Discussion
- Acknowledgments
- References (Literature Cited)
- Tables
- Figures and Figure Captions

Abstract

- Usually a word limit
- Present:
  - short background
  - central results
  - important implications

Introduction

- Around three to four paragraphs
- Background to the studied problem
- Question(s) being asked / hypothesis(-es) being tested
- Approach taken to address the question(s) / test the hypothesis(-es)

Data and Methods

- Describe the data being used
  - How was it collected?
  - What sequences are included (accession numbers)?
- Describe how the data was analyzed
  - Software packages and versions
  - Algorithms and options / settings

Results and Discussion

- Describe the results of the analyses
  - Be short and concise
  - Use tables and diagrams if possible
- Discuss the results
  - Write a short discussion after each result or a longer discussion after all results have been presented
  - End the discussion with broader implications and future research directions

Acknowledgments

- Be brief
- List people who have helped in the writing of the paper in some significant way
- Acknowledge grant support

References

- Follow a consistent style
- All items in alphabetical order
- Book
  - Cite in text as (Alpha, Bethe & Gamov, 1958)
  - Cite in reference list as:
    Alpha, H. L., Bethe, H. K., & Gamov, G. 1958. *DNA and RNA structure*. Harvard University Press, Harvard.
- Paper
  - Cite in text as (Watson & Crick, 1954)
  - Cite in reference list as:
    Watson, J. D. & Crick, F. C. 1954. The structure of DNA. *Nature* 143: 230-241.
- Book chapter
  - Cite in text as (Thompson, 2003)
  - Cite in reference list as:
    Thompson, S. M. 2003. Similarity searches using GCG. Pp. 231-245 in Krawetz, S. & Womble, H. (eds), *Bioinformatics*. Humana Press, Urbana.

Tables

- Number in consecutive order
- Place after main text
- Cite in main text as (Table 1)
- Use a short table heading
- Use only horizontal lines in the table (typically three lines)
- Explain symbols in footnotes if necessary

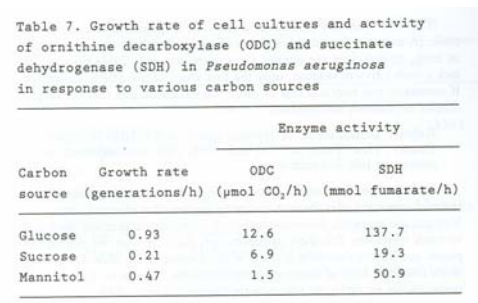

Table 7. Growth rate of cell cultures and activity of ornithine decarboxylase (ODC) and succinate dehydrogenase (SDH) in *Pseudomonas aeruginosa* in response to various carbon sources

Carbon source	Growth rate (generations/h)	Enzyme activity: ODC (μmol CO_2/h)	Enzyme activity: SDH (mmol fumarate/h)
Glucose	0.93	12.6	137.7
Sucrose	0.21	6.9	19.3
Mannitol	0.47	1.5	50.9

Figures

- Number in consecutive order
- Place after Tables
- Cite in main text as (Fig. 1)
- In the caption, use a short heading
- The caption should be sufficiently complete to explain the figure without reference to the text
- Make sure all the information in the figure is legible but not excessively large compared to the main text
- Make figures simple to understand; they are often the most important part of the paper after the abstract

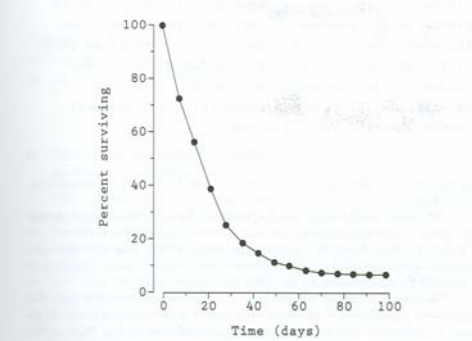

Figure 1. Survivorship of *Chaenorrhinum minus* from seedling emergence to production of mature seeds on railroad cinder ballast in Roslyn, New York, 1980

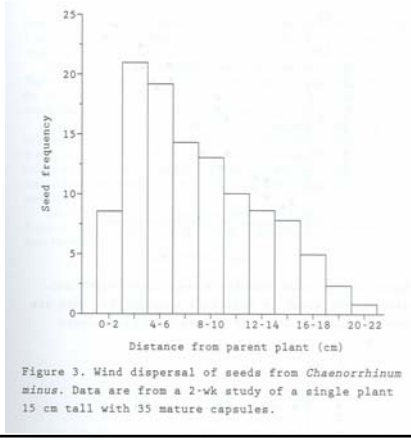

Figure 3. Wind dispersal of seeds from *Chaenorrhinum minus*. Data are from a 2-wk study of a single plant 15 cm tall with 35 mature capsules.

Your Report

- The report should be handed in on time (5 points deduction if late).
- The report should be machine printed
- The manuscript should be between 10 and 20 pages long (double line spacing, 12 pt font unless stated otherwise) (excluding figure legends, tables, and figures). The length should be appropriate considering the scope of the content.
- The language should be such that a fellow student would be able to read the report and understand its content.
- The report should formatted as a manuscript for Molecular Biology and Evolution.

Scientific Writing

- Research Papers (McMillan Chapter 4, pp. 51-87)
- Proposals (McMillan pp. 175-183)

A Research Proposal

- Title
- Author(s)
- Address(es)
- Background
- Aim
- Data and Methods
- [Preliminary Results]
- [Budget and Timeline]
- References (Literature Cited)

Background

- Introduce the problem you want to study
- Explain why it is important
- Explain your general approach and why it is going to be successful

Aim

- Specific aims of the proposed research
- Often in a bulleted or numbered list
- Brief (one paragraph)
- Ideally should include hypothesis(-es) and predictions to be tested and the general approach used to test them

Data and Methods

- Describe the data being used
  - How will it be collected?
  - What sequences are included (accession numbers)?
- Describe how the data is going to be analyzed
  - Software packages and versions
  - Algorithms and options / settings

References

- Cited and listed as in a scientific paper

Your Proposal

- The proposal should be handed in on time (3 points deduction if late).
- The proposal should be machine printed (not hand-written), legible and well organized (all margins should be 1 inch; pages should be paginated). It should be stapled together.
- The proposal should not be more than two pages long (excluding References) and it should be printed using 12 pt serif font and single line spacing.
- The language should be such that a fellow student would be able to read the proposal and understand its content.
- Table(s) and figure(s) should be included in the two pages of text