

Fundamentals of Ecology

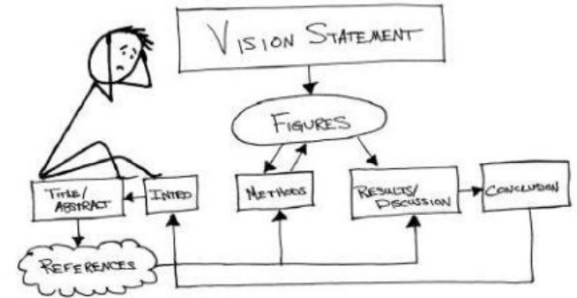
Scientific writing part I: Introduction and Methods

David Touchette

7 March 2024

Please try to sit with your group!

THURSDAY - PRACTICALS - ENV 220			Week	Teacher	Groups	Room	Important deadlines
22/02/24	11h15-13h	Introduction to practicals	1	J. Deluigi	Terrestrial	GRC001	
29/02/24	11h15-13h	Setting up experiments in the field	2	All TAs	Terrestrial	GRC001	Inform the experimental setup to TAs by email by 28/02/24
7/3/24	11h15-13h	Scientific writing part I	3	D. Touchette	All groups	GRC001	
14/03/24	11h15-13h	Introduction to R	4	All TAs	All groups	GRC001	Flip room lecture to watch before 14/03/24 (on moodle)
21/03/24	11h15-13h	How to do statistical analyses	5	C. Bachofen	All groups	GRC001	
28/03/24	11h15-13h	Field measurements 1	6	All TAs	Terrestrial	GRC001	
4/4/24 Easter Holiday							
11/4/24	11h15-13h	Field measurements 2	7	All TAs	Terrestrial	GRC001	Mid-term report provided to TAs by 12/04/24
18/04/24	11h15-13h	Data visualization in R	8	J. Deluigi & M. Bergström	All groups	GRC001	
25/04/24	11h15-13h	Field measurements 3	9	All TAs	Terrestrial	GRC001	
2/5/24 ENAC Week							
9/5/24 Ascension Day - Holiday							
16/05/24	11h15-13h	Field measurements 4	10	All TAs	Terrestrial	GRC001	
23/05/24	11h15-13h	Scientific writing part II	11	D. Touchette	All groups	GRC001	Weighting of plant material in GR B2 423 before 24/05/24
30/05/24	11h15-13h	Questions / Discussion	12	All TAs	All groups	GRC001	
FINAL REPORT SUBMITTED on MOODLE BY 7/06/24							



How to write the report

What is a lab report?

A document that outlines the results of a scientific experiment or investigation.

It typically includes:

- Description of the experiment or investigation
- Methodology used
- Data collected
- Analysis of the data
- Conclusions drawn from the analysis.



What is a lab report?

The purpose of a lab report is to communicate the results of the experiment or investigation to others in a clear and concise manner.

They should allow reproducibility of the experiments.

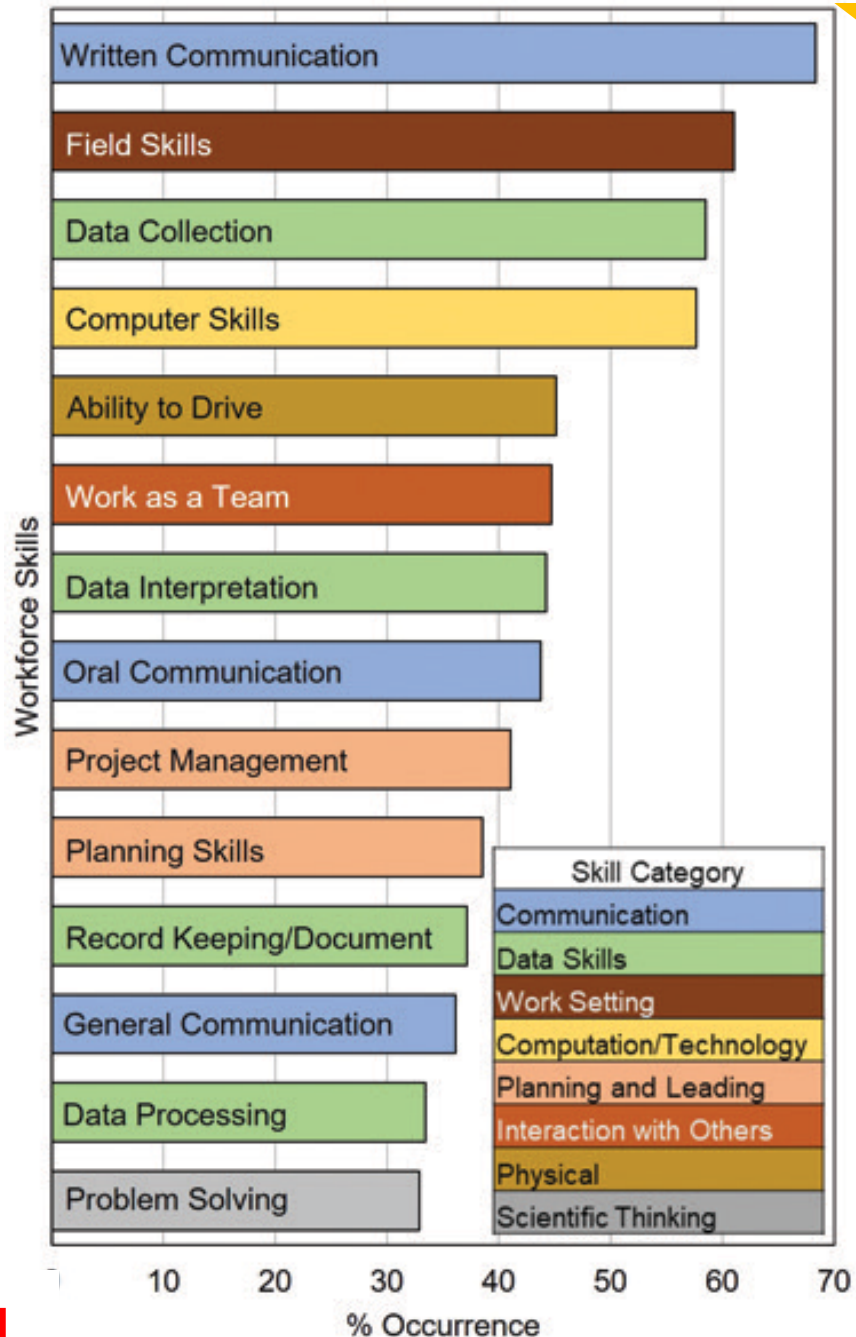
They may also include recommendations for further research or improvements to the experiment or investigation.



Why write a lab report?

- 1) Communication
- 2) Organization
- 3) Critical thinking
- 4) Attention to detail
- 5) Problem-solving
- 6) Research

Even if you do not plan to pursue a career in science, learning how to write a lab report can help you develop valuable skills that are useful in many areas of life.



Why write a lab report?

The most common skill desired in job advertisements (Shafer et al. 2022).

The assignment

Rough draft:

- Introduction and Methods
- Maximum 2 pages
- Intro includes ≥ 4 citations
- Due April 12th

Final report:

- Maximum 5 pages
- Includes Table(s) & Figure(s)
- Discussion includes ≥ 2 citations
- Due June 7th

Do NOT copy previous reports.

The use of IA...

1.How ChatGPT Can Help:

- ~~1. **Research Assistance:** ChatGPT could provide additional resources and insights on the experiment topic.~~
- 2. Structuring Support:** It could help organize the lab report into sections such as Introduction, Methods, Results, and Discussion.
- 3. Language Refinement:** ChatGPT could offer suggestions to improve clarity, coherence, and grammar in the report.

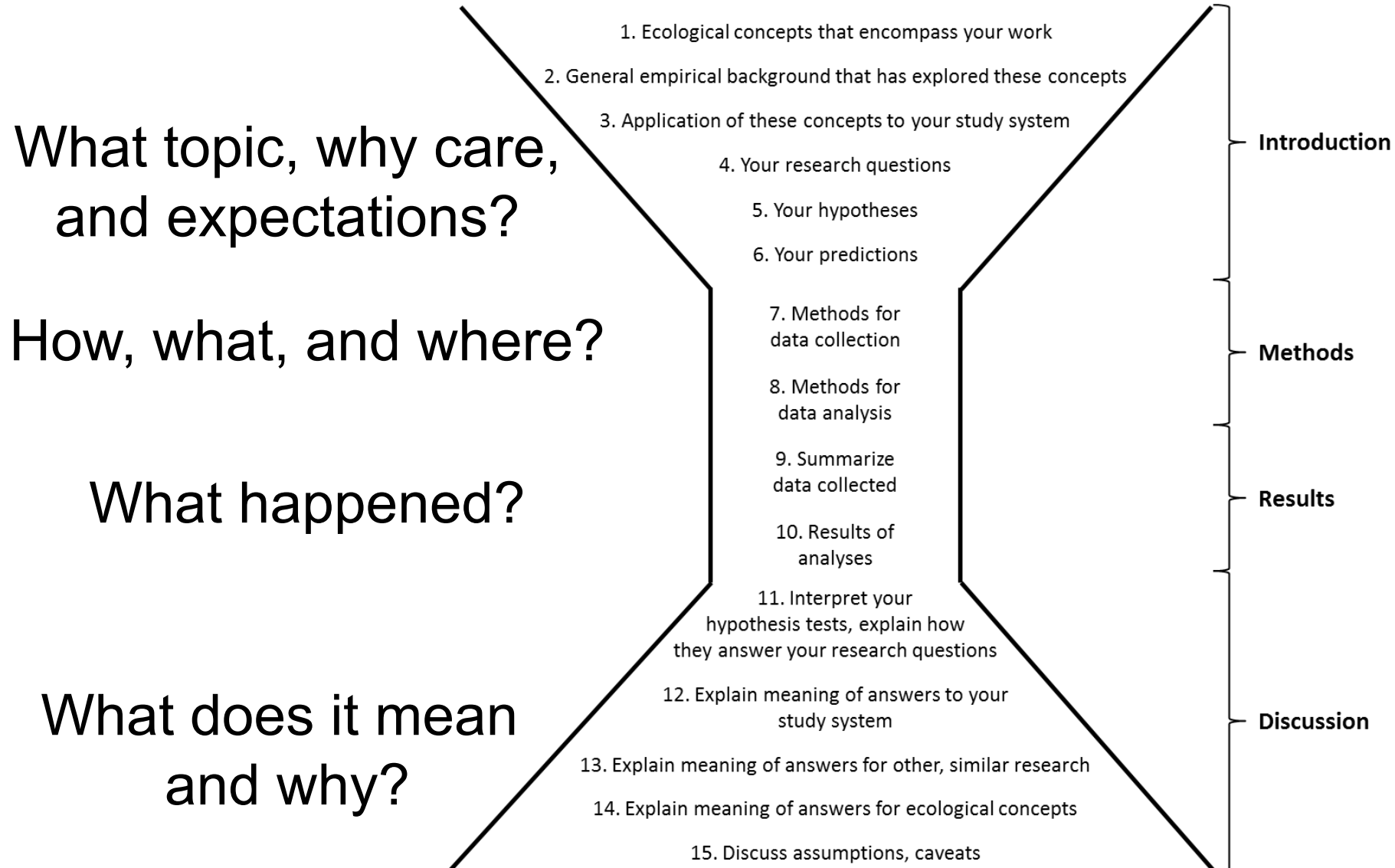
2.Generating Content:

- ~~1. ChatGPT can assist in generating content for various sections of the lab report based on input prompts.~~

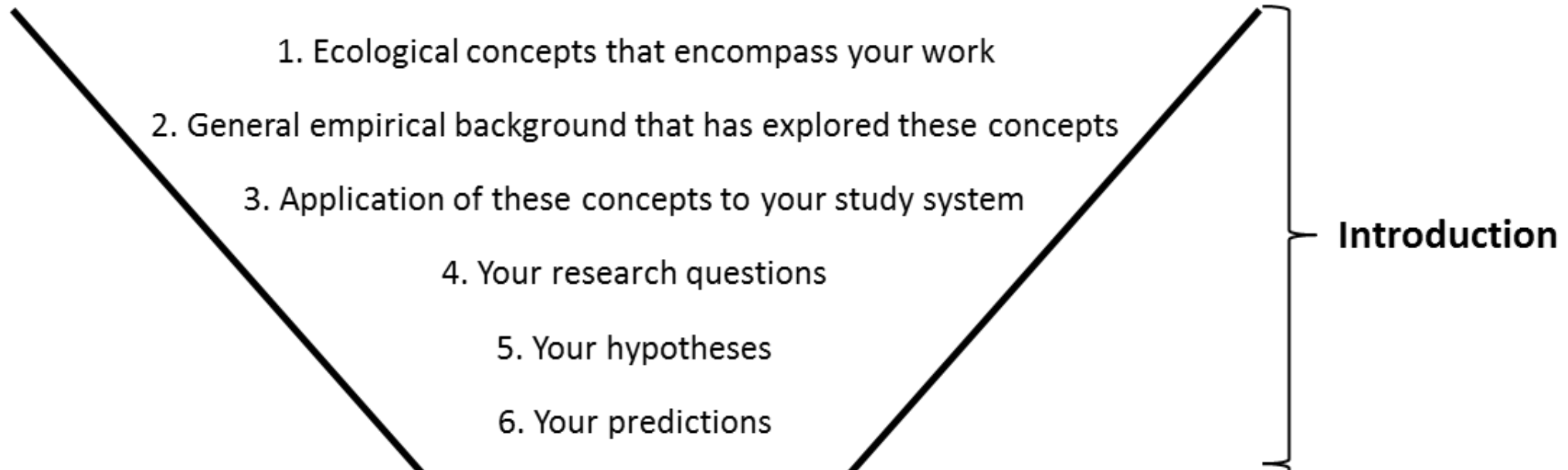
3.Revision and Feedback:

1. Students could use ChatGPT to receive feedback on their draft reports, helping them refine and improve their writing.

Lab report format

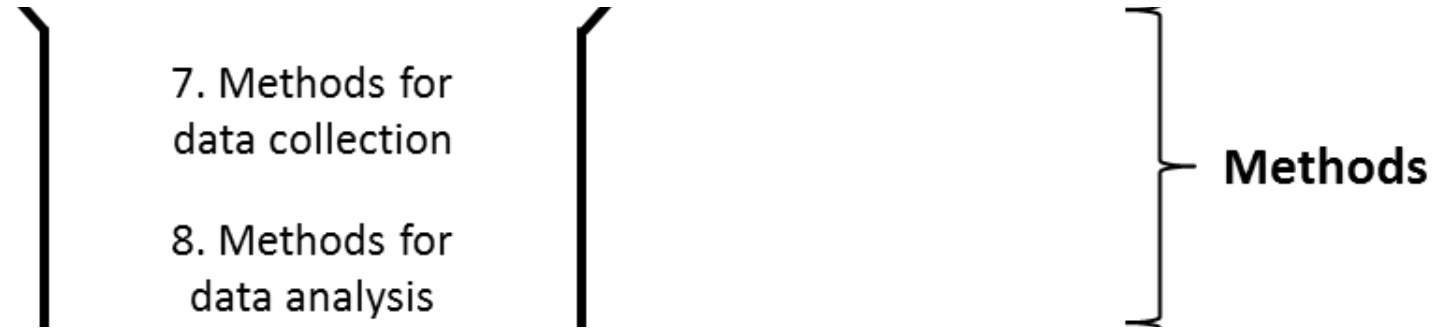


Introduction



Provide the necessary context to explain why your experiment is relevant both in the general context of ecology AND in the specific question.

Methods



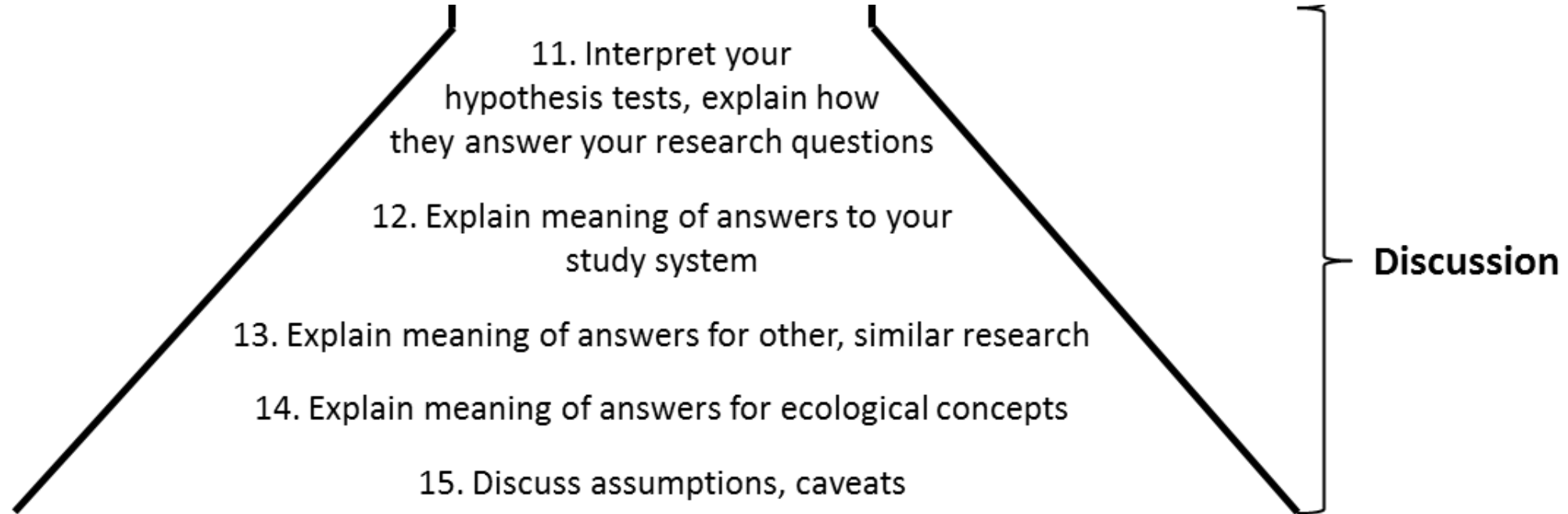
Describe where and how the experiment was performed, including how the data was collected and analyzed.

Results



Describe the outcome of the experiment **without** interpretation.
Describe data and the output of statistical analyses.

Discussion



Explain and interpret the results. Describe what it all means and link back to the bigger topic.

Where to put these things?

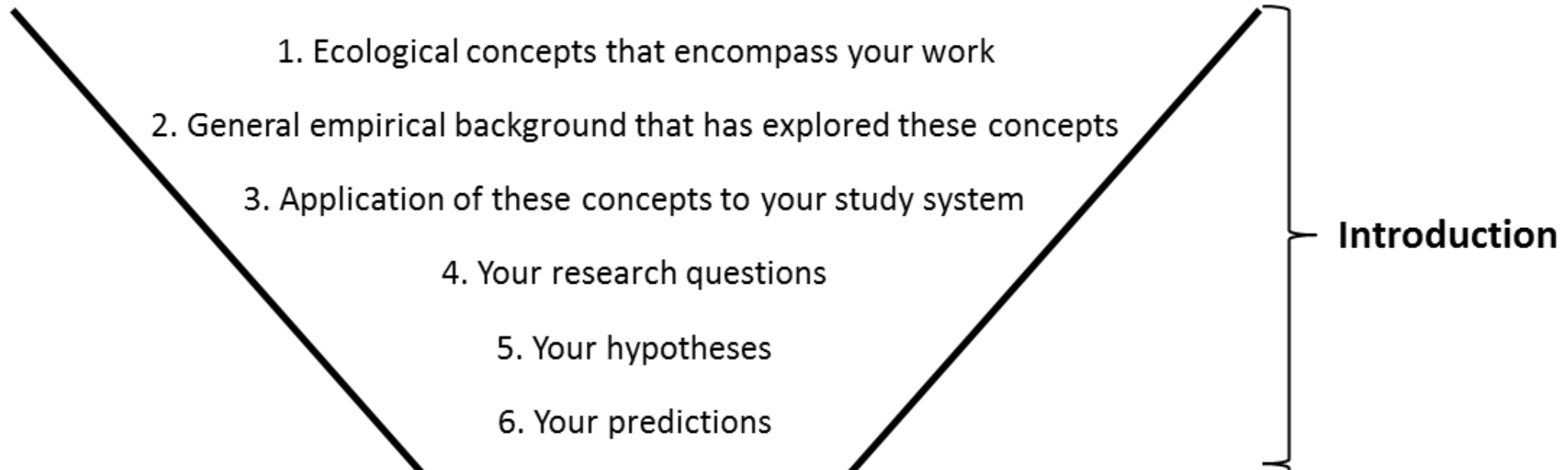
- 1) Data collected during experiment
- 2) Your hypothesis
- 3) How the experiment was prepared
- 4) Where the experiment was performed
- 5) Information on the topic of your study
- 6) Interpretation of results
- 7) A graph of data with results
- 8) Explanation if your hypothesis was correct
- 9) Statistical analyses performed on the data

Where to put these things?

- 1) How many and what type of leaves were placed in the bags
- 2) How quickly leaf matter was lost
- 3) How treatments (e.g., pool vs. riffle) were different
- 4) Why leaf matter is important to stream ecosystems
- 5) The mean number of new leaves per treatment
- 6) How water availability is expected to affect plant growth
- 7) How plant growth was measured
- 8) What we learned from the experiment

Introduction

Introduction



Provide the necessary context to explain why your experiment is relevant both in the general context of ecology AND in the specific question.

Introduction

A good introduction should:

- Provide a brief background of the study topic
- Provide any necessary definitions, along with common and scientific species names
- Explain how your study fits into existing research
- Provide rationale for your hypotheses and predictions

A good introduction should NOT:

- Be an exhaustive literature review – include only enough information to inform the reader on your study topic and logically present your hypothesis
- Provide extraneous information that does not specifically relate to your project
- Include detailed information on what you did
- Include results or discussion

Introduction

Citations are used to give credit to the sources of information that were used to inform the study.

Citations are typically used to:

- Provide background information
- Support the hypothesis or research question
- Highlight gaps in knowledge

“Typically, dissolved organic matter decomposition increases with increasing water temperature (Creed et al., 2015; Gannon et al., 2015).”

Use GoogleScholar to search for citations relevant to your study.

Summarizing literature

USE YOUR OWN WORDS

The goal is for you to understand the science and important themes, thus putting the ideas into your own words will demonstrate this.

Copy-pasting is not useful (and not allowed).



Which one is better?

Aquatic ecosystems rely on organic matter as a major energy and carbon source.

An ecosystem is a biological community of interacting organisms and their physical environment.

Which one is better?

Many environmental parameters, such as temperature, sunlight, microbial activity, oxygen concentration, water velocity, and pH, influence organic matter decomposition rates in streams.

Many environmental parameters, such as temperature or sunlight, influence organic matter decomposition rates in streams.

Which one is better?

Plants are important for the environment.

The growth of plants is influenced by a variety of factors, including soil nutrients, water availability, and light intensity.

Which one is better?

Increasing the amount of fertilizer given to plants will result in faster growth rates.

Plants will grow better if they are in better conditions.

Which one is better?

The rate of decomposition of organic matter will increase with increasing stream velocity.

Decomposition will be different.

Which one is better?

The role of leaves decomposition is crucial in providing a source of carbon and energy in streams and more generally in aquatic ecosystems. Leaves falling in streams undergo diverse physical (leaching, fragmentation or abrasion), chemical and biological transformations that drive the cycle of matter.

Overall, six different stages can be highlighted, bacterial, fungal and shredder biomass, dissolved organic matter, fine-particulate organic matter and inorganic mineralization products (such as CO_2 or NH_4^+).

Many environmental parameters such as temperature or sunlight have been shown to influence decomposition rates in streams. First, temperature is related to breakdown rates as detritivore communities and litter quality will vary. 1-4°C rise will lead to an average increase of 10% of breakdown rates as activation energy of involved chemical processes will be reached more rapidly. In addition, sunlight availability such as organic matter decomposition.

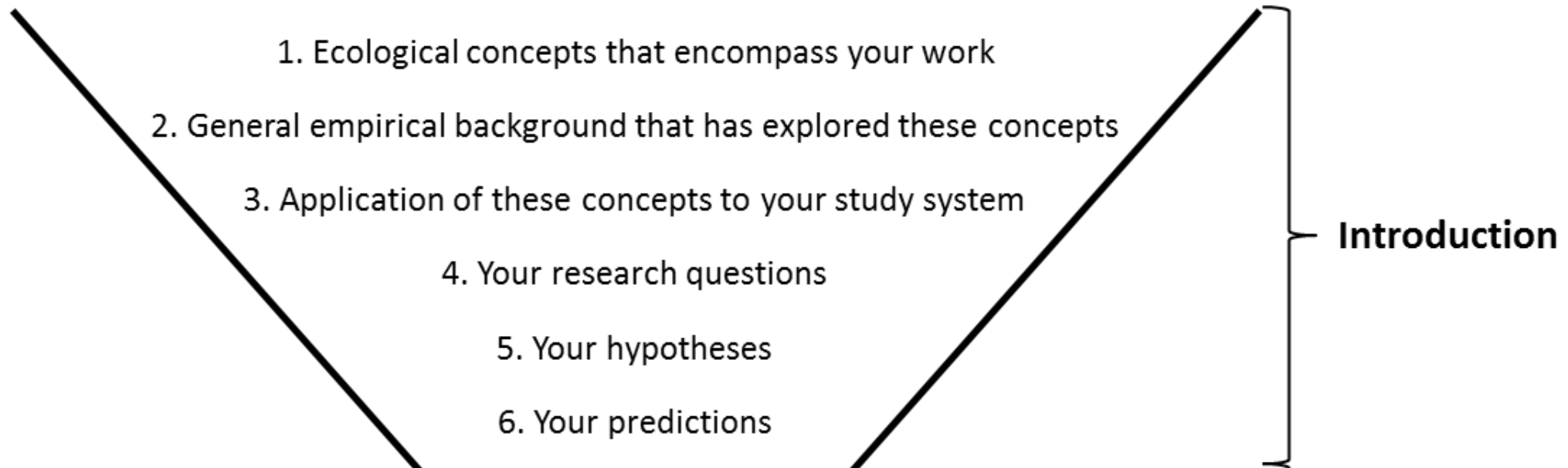
To begin with, it was shown that light availability is strongly related to heterotroph processes. In experiments involving omnivorous macro-invertebrates, it was observed that fungal growth rate and bacterial biomass (two major components to organic degradation) are influenced by light.

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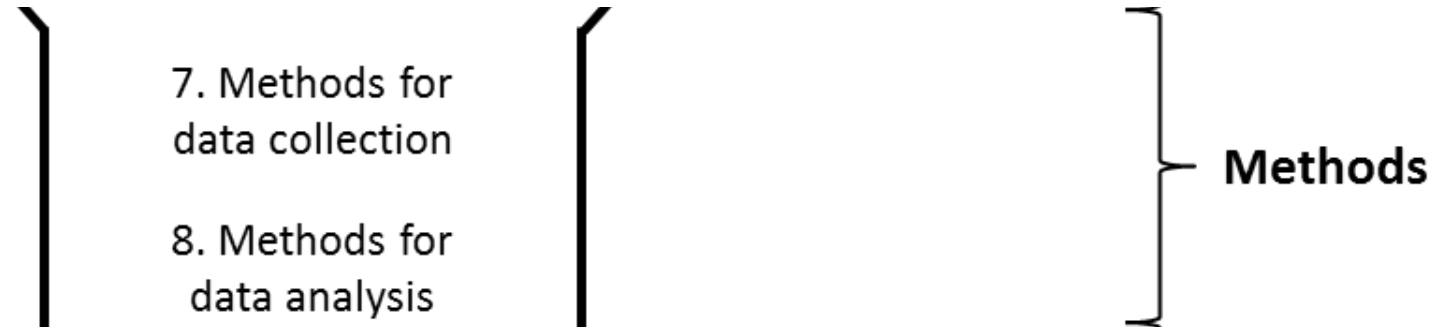
In your groups...

Create 4-6 points which outline the introduction to your lab report. Start broadly with the large topic your project focuses on, and narrow down to a specific hypothesis and/or prediction.



Methods

Methods



Describe where and how the experiment was performed, including how the data was collected and analyzed.

Methods

Study area: Describe your study area. Geographic location, size, boundaries, topography, and habitat type may be relevant.\

Procedure: What you did – write in paragraph format (no point form or numbered steps). Include an explanation of your experimental design, sample size, replicates, measurement techniques, etc.

Methods

Materials: Within the prose of your procedure text, integrate materials that you used. Include model numbers of specialized lab equipment, concentrations of chemical solutions, and other such details.

Data Analysis: What statistical tests you used (including tests of normality), significance level set ($\alpha=?$), and any data manipulation required. Include specific calculations, if appropriate.

Methods

A good methods section should...

- Provide enough detail to allow an accurate reproduction of the study
- Be written in a logically flowing paragraph format
- Provide details on the study site, materials, procedure, and statistical analyses

A good methods section should NOT...

- Be a recipe-book-style instruction guide
- Provide a list of materials
- Use bullet points
- Cite other studies for comparison

Which one is better?

Leaves were put in 18 bags and then put in the stream in a pool and a riffle.

Approximately 2g of dried pine needles were sealed in mesh bags. The bags were then placed in the stream, with 9 bags placed in a pool section and 9 bags in a riffle section.

Which one is better?

Soil temperature was measured.

Soil temperature was measured at 10-15 cm depth at the center of each pot.

Which one is better?

After two weeks, the dried leaves were weighed.

The process took a few days so we had to come back two weeks later in order to weigh the dry semi-decomposed leaves.

Which one is better?

Statistical analyses and visualizations were done in R.

The data collected had to be analyzed with a statistical program, R coding was used to create appropriate graphs and visualize the results accurately.

In your groups...

Write 1-2 paragraphs about the preparation of the experiment we did last week. Include where the experiment is taking place.

