Written communication- Project I

NGEA01-2018

Jeppe Å. Kristensen

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Written communication 2018 – overview

02/10	13.00 – 17.00	Lecture: Written communication, intro project 1- group division
05/10	09.00 – 17.00	Project 1 (individual studies) – brainstorm, find aim, narrow down to question(s)
05/10	17.00	Send problem/question + 5 key refs by email
08/10	13.00 – 16.00	Project 1 (with supervision)- discussion of problem/question w. supervisor
10/10	09.00 – 17.00	Project 1 (individual studies)
10/10	23.59	Send structure + 10-20 refs by email
12/10	09.00 – 12.00	Project 1 (with supervision) - Feedback on project plan and report structure
12/10	13.00 – 17.00	Project 1 (individual studies)
15/10	13.00 – 17.00	Project 1 (individual studies)
16/10	13.00 – 17.00	Project 1 (individual studies)
17/10	08.00 – 17.00	Project 1 (individual studies)
18/10	08.00 – 17.00	Project 1 (individual studies)
18/10	**17.00**	**Report deadline - submit by email to Jeppe**
22/10	09.00 – 17.00	Prepare oral presentations (individual studies)
23/10	09.00 – 17.00	Oral presentation, constructive feedback
24/10	09.00 – 17.00	Revise reports (individual studies)
25/10	12.00	Submit revised reports by email to Jeppe

Teachers: Jeppe Å. Kristensen, Britta Smångs, Lars-Johan Lyttkens Lindén
Submit by email to: **jeppe.a.kristensen@nateko.lu.se**

Grade pass/not pass. Comments should be revised in order to obtain a pass grade.

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Task:

What?

Write an academic report with the offset in an **Ecosystem**. The report must include:

- An **introduction** that starts with a general system description
- A specific **research question/aim**, which is analyzed and discussed in the report
- Correct **referencing**

How?

- **Group work** of about 3-4 people
- Each group will have an **opponent group**

Comment on all parts of classmates' report
- **Was the aim well formulated?**
- **Was the aim reached?**
- **Is the discussion well structured?**

Terrestrial Ecosystems
- **Tropical rainforest**
- **Tundra**
- **Desert**
- **Urban**
- **Agriculture**
- **Wetland**

Coastal Ecosystems
- **Estuaries**
- **Coasts**

Marine Ecosystems
- **Coral reef**
- **Continental shelf**
- **Hydrothermal vents**

Glacial Ecosystems
- **Glacier**
- **Sea-ice**

What is an ecosystem?

What does Wiki say?

An ecosystem is a community of **living organisms** in conjunction with the **nonliving components** of their environment (things like air, water and mineral soil), interacting as a system. These biotic and abiotic components are regarded as linked together through **nutrient cycles and energy flows**. As ecosystems are defined by the network of **interactions** among organisms, and between organisms and their environment, they can be of **any size** but usually encompass specific, limited spaces (although some scientists say that the entire planet is an ecosystem).

https://en.wikipedia.org/wiki/Ecosystem

Terrestrial Ecosystems

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- **Sea-ice**

What is an ecosystem?

Terrestrial Ecosystems

- **Tropical rainforest**

Ecology: Ecology […] is the **scientific analysis** and study of **interactions among organisms** and their **environment**. It is an **interdisciplinary** field that includes biology, **geography**, and Earth science.

https

My recommendation:

No matter whether you use modelling as a tool (although almost everyone does nowadays to some extend), it is useful to **think in conceptual models/systems**. The **processes/fluxes** influencing the aim, the **variables** needed for the investigation, and the **communication** of the results becomes clearer.

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https://e

are […] **simplified reflections of reality** that, despite being **approximations**, can be extremely useful. Building and disputing models is fundamental to the scientific enterprise

https://en.wikipedia.org/wiki/Scientific_modelling

ydrothermal vents

Ecosystems

acier

ea-ice

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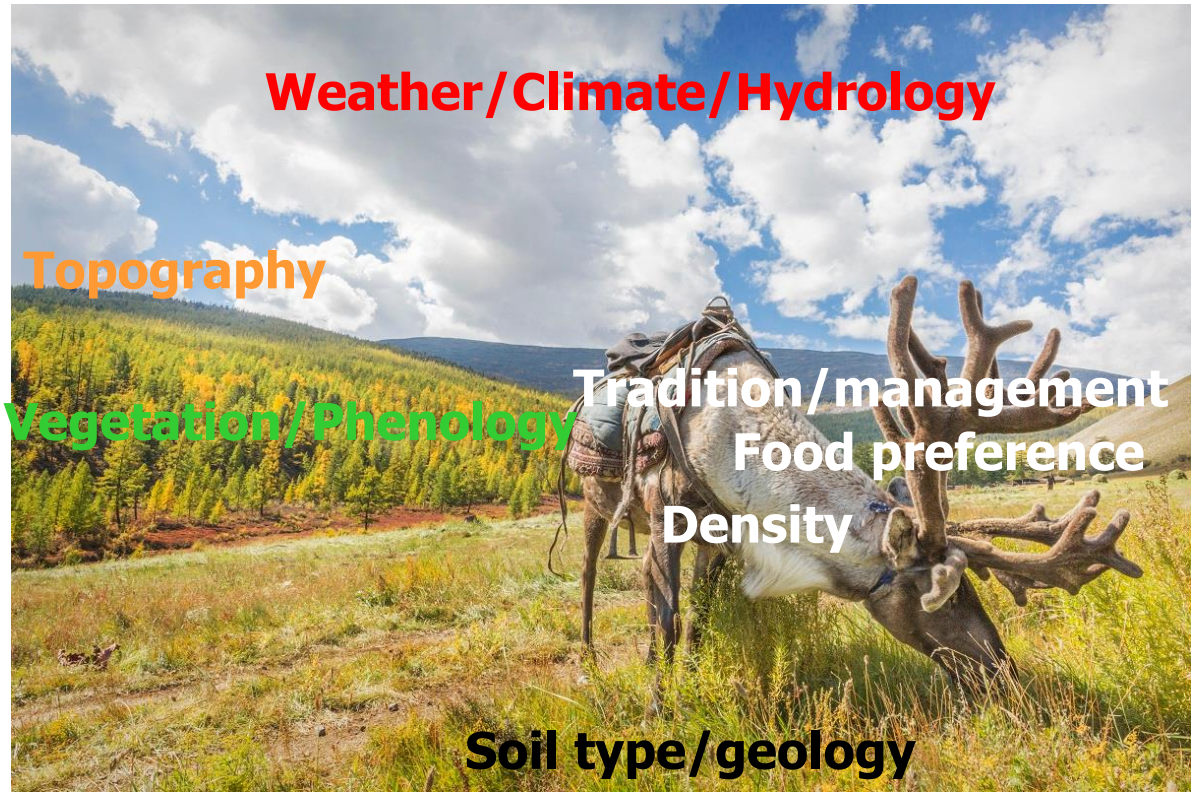
Example: What are the ecosystem consequences of reindeer herding in Mongolia?



http://thediplomat.com/2016/09/tsaatan-mongolias-reindeer-herders/

Terrestrial Ecosystems

- Tropical rainforest
- Tundra
- Desert
- Urban
- Agriculture
- Wetland

Coastal Ecosystems

- Estuaries
- Coasts

Marine Ecosystems

- Coral reef
- Continental shelf
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Glacial Ecosystems

- Glacier
- Sea-ice

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inter


1.80LT


WE TRIED
SUSHI
BURGERS
TO SEE IF THEY'RE ACTUALLY
WORTH THE HYPE

What characterizes a scientific report?

- Logical and standardized structure
- It is examined by colleagues / teachers (peers) and revised one or several times before being published
- Clarity, simplicity, impartiality
- The reader is given the possibility of doing his/her own evaluation of the study and its results
- New knowledge
- Should be reproducible

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What characterizes a scientific study?

new knowledge being produced

It investigates something, what?
→ The aim

A problem or open question: clear, specific, of limited scope

The aim must be achievable!

It tries to get somewhere, to what?
→ The conclusion

A solution to the problem/answer to the question

http://epublishunum.com/2012/06/writing-publishing-science-based-books/

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Elements of a scientific academic report

The IMRAD structure

What question was studied?	**I**ntroduction
How was the problem studied?	**M**ethods
What where the results?	**R**esults
	And
What do the findings mean?	**D**iscussion

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Aim

- A scientific problem to be resolved
- The aim must be reached within the report
- Limitations to scope clearly defined

Not suitable

- Learn more about...
- Explore…
- To study...

Good

- Is there a negative relationship between x and y?
- Does X show a decreasing trend over time?
- Does X vary between two geographical regions/environments?

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Aim- examples of poorly formulated aims

The purpose of this paper is to examine the melting of the Arctic ice sheet and to learn more about the mechanisms underlying the increased melting.

We hypothesized that the main driver of the melting of the Arctic sea ice is increasing sea surface water temperatures

The purpose of the report is to present the tropical rainforest ecosystem in terms of geographic distribution, climatic conditions, soil types, vegetation and fauna.

Here, we investigate the ability of abiotic factors (climate and soil characteristics) to predict variation in the biodiversity of tropical rainforests

The aim is to highlight the importance of climate change on the Great Barrier Reef. How will the unique wildlife of GBR be affected by climate change?

How will predicted increase in storm intensity influence the trophic cascades and nutrient cycling of the GBR?

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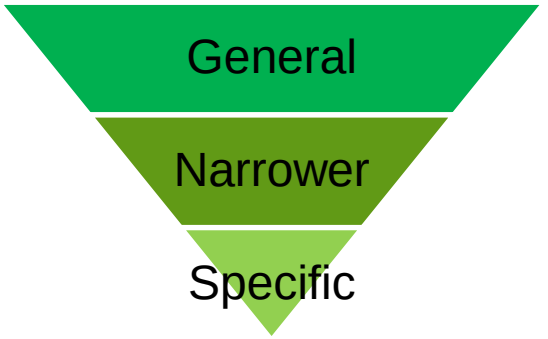
Introduction

- Background; catch the interest of the reader

- Context and justification
  - Make the aim understandable
  - Why are you doing this? Why is there a problem/knowledge gap?
  - Why should we spend money on this?
- Introduce the **aim/study question**



Should not contain

- Interminable definitions of indefinable terms
- More abbreviations than strictly necessary
- Background texts without clear relevance to the aim

Should

- Raise the interest of the readers
- highlight the importance of the topic and identify a scientific problem through referencing relevant literature
- Justify the hypotheses

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Introduction

E.g.:

Nutrient regulation of freshwater plankton productivity is crucial for the future development of lake ecosystems in face of land use and climate change. By controlling phytoplankton primary… ➡ **Context/ Justification**

For example, studies on bioavailability from different aquatic systems showed that a highly variable fraction of DOC can be readily used by bacteria.. ➡ **Previous Works**

Most studies on energy and nutrient availability conducted in humic-rich waters have neglected the variation with climate, focusing either on total inputs or… ➡ **Problem**

Based on the synthesis of C and N bioavailability estimates obtained… ➡ **Basis for the aim**

We hypothesized that bioavailability of C and N would increase as a response to increasing temperatures in boreal forests. ➡ **Aim**

Methods

- Description of methods and analyses (own measurements)
- Analysis of quantitative data from other studies ('meta-analysis')
- Qualitative analyses
  - **Previous conclusions (classic literature review)**
  - Interviews
- Omit unnecessary detail
- **Ensure the study/experiment is reproducible!!**

Less good

- We used "Shed" in ArcGIS to calculate the slope index...
- K was calculated as...
- A literature review was performed...

Unnecessary detail

Too little detail

Excellent

- Herbivory rates were estimated according to (ref). Briefly, 3 plots…
- Deposition rates were estimated based on multigrain OSL dating (ref). Standard chemical laboratory preparation (ref)…
- Oneway ANOVA were applied to compare treatments...

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Methods - review example

- We used combinations of the words “herbivor*”, “nutrient*”, “carbon”, “nitrogen” in ISI Web of Science to obtain 78 studies on the 22/7/2017. After an initial screening of abstracts they were narrowed down to 43 relevant peer reviewed and published articles (see Supplementary A for full list of papers). Based on the initial screening, we created a review table with relevant variables before the full-text review was conducted…

Reproducible?

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Results

www.eremedia.com

- **Results should speak for themselves, i.e. no interpretation**
  - Visualize if possible
- **Readers should be able to interpret the results individually**

- **Do not show figures and tables you do not use/present**
  - Painful to omit results you worked hard to obtain, but don't – they only blur the message
- **Keep the results short**

- **"Table 2 shows that A is ~85% higher than B…"**
- **"A is ~85% higher than B (Table 2)…"**

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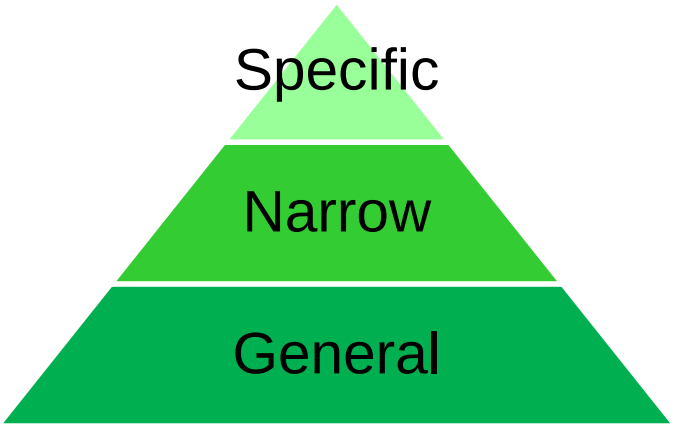
Discussion

- **Interpretations of the results – answer hypotheses**
- **Comparison with existing literature**
- **Conflicting/surprising results should be highlighted and discussed**
- **Discussion should be transparent about limitations/uncertainties of the study**
- **Draw conclusions**
- **Speculate (explicitly)**
- **Further studies**



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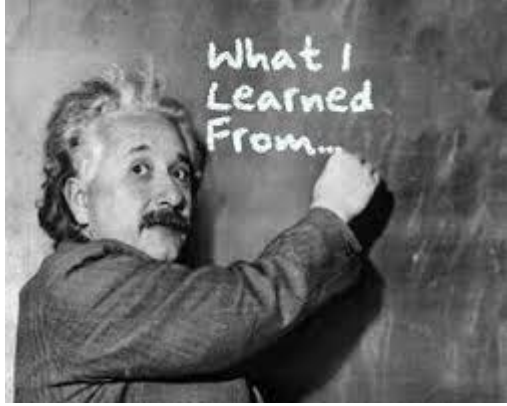

Conclusion (optional, but recommended)

- **Briefly mention main findings**
  - **E.g. 3 bullet points: ”In this study we found, i)..., ii)..., iii)...”**
- **Keep it short (not more than half a page)**
- **No methodology, detailed results etc...**
- **Opportunity to leave the most important findings in the mind of the reader in the end**
- **One last sentence highlighting the significance and how to proceed**

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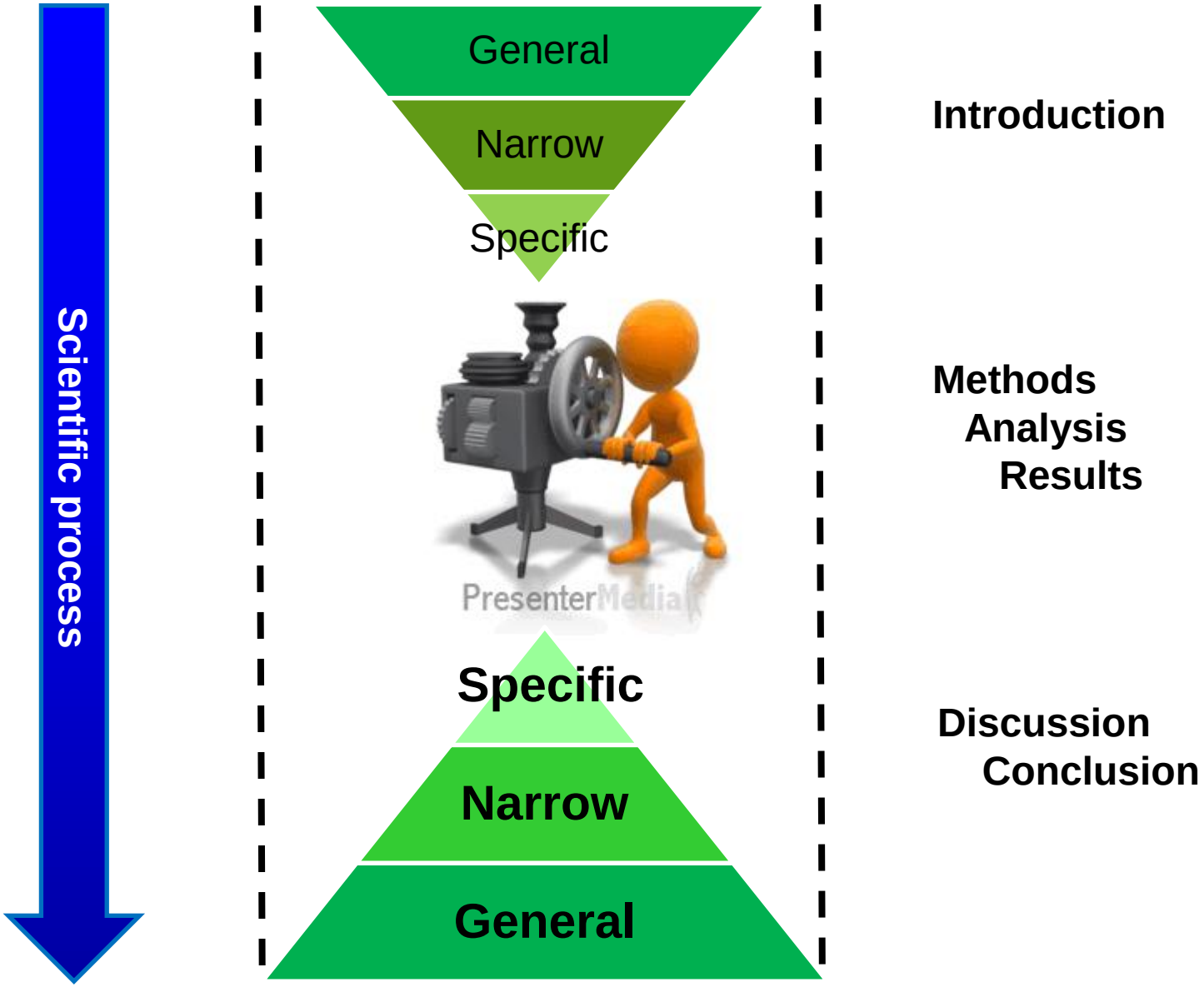
Scientific process
General
Narrow
Specific
PresenterMedia
Specific
Narrow
General
Introduction
Methods
Analysis
Results
Discussion
Conclusion

Title

- **The most read part of the work – make it interesting**
- **Should have the fewest number of words possible but still comprehensible**
- **Shall not be too short either- e.g.- "Landscape dynamics".**
- **Should not contain abbreviations, chemical formulas, jargon**
- **Hanging titles commonly used in ecology/ecosystem science:**

  e.g.: " Cryptic wetlands: integrating wetlands in regression models of the export of dissolved organic carbon from forested landscapes"

"First impressions are strong impressions; a title ought therefore to be well studied, and to give, so far as its permit, a definite and concise indication of what is to come."

- T. Clifford Allbutt

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Abstract

- **Miniature of the work**
  - **Background information (justification)**
  - **Problem identification**
  - **Attempt to solve the problem- "In this study", "Here we show"**
  - **Method (optional; if included should be a very short description)**
  - **Results and conclusions**
  - **Zoom out, speculation, implications**
  - **2-3 lines introduction, 2-3 lines methods, 5-6 lines results, 4-5 discussion, 2-3 lines conclusion and implications**

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nature

How to construct a *Nature* summary paragraph

Annotated example taken from *Nature* **435**, 114-118 (5 May 2005).

*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[1,2]. 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[3]. Hypotheses for bipolar spindle formation include the 'push–pull mitotic muscle' model, in which kinesin-5 and opposing motor proteins act between overlapping microtubules[2,4,5]. 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*[6]. 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 interpolar 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.

More on Project I

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General ecosystem introduction

Start the introduction with a brief general description of the ecosystem:

- geographic distribution
- climatic conditions
- soil type
- vegetation types
- fauna and flora

Focus on what is relevant for your aim!

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Specific question/aim:

End the introduction by **introducing a specific study aim.**

This could for instance be a comparison of two ecosystems or geographically separated similar ecosystems with respect to a specific property, e.g. landscape development, hydrology, soil types, nutrient cycling, environmental threats, climate change, human impacts etc.

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Possible aims:

Ecosystem: Savannas
Aim: How does the African savanna differ from savannas in South America with respect to the abundance of C3 and C4 plants? What are the causes?

Ecosystem: Tropical forests
Aim: How have humans affected the hydrological cycle of tropical forests in South and Central America during the past 100 years? What similarities and differences exist between the two regions? Possible causes?

Ecosystem: Coral reef
Aim: How have the increased storm frequency influenced the ability of reefs to protect coastal communities against flooding on the Maldives?

The more specific the better – and easier!

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Start by:

1. Select ecosystem
2. Search literature about the ecosystem
   - For background knowledge
   - For possible specific (and interesting) questions to address
3. Formulate aim

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Project plan

1. Definition and short description of Ecosystem.
2. Formulate aim using 1-2 sentences. As concise and limited in scope as possible.
3. Select 5 key references (e.g., book chapters) that will form the basis of the report

Send word-version by **e-mail** to jeppe.a.kristensen@nateko.lu.se

…no later than **5th of Oct 17:00**

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Disposition/structure

1. (preliminary) Title
2. More thorough **introduction**
3. More **specific aim**
4. Section headers
5. 5-10 bullet points for each section/subsection
6. 10-20 scientific references – rather 10 good ones than 20 sloppy ones!

Send word-version by **e-mail** to jeppe.a.kristensen@nateko.lu.se

...no later than **10th of Oct 23:59**

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Structure of the final report

- Title
- Abstract
- Key words
- Contents
- **I**ntroduction
- **M**aterials and methods
- **R**esults
- (**A**nd)
- **D**iscussion
- Conclusion
- References

Send word-version by e-mail to

jeppe.a.kristensen@nateko.lu.se

...no later than 18th of Oct 17:00

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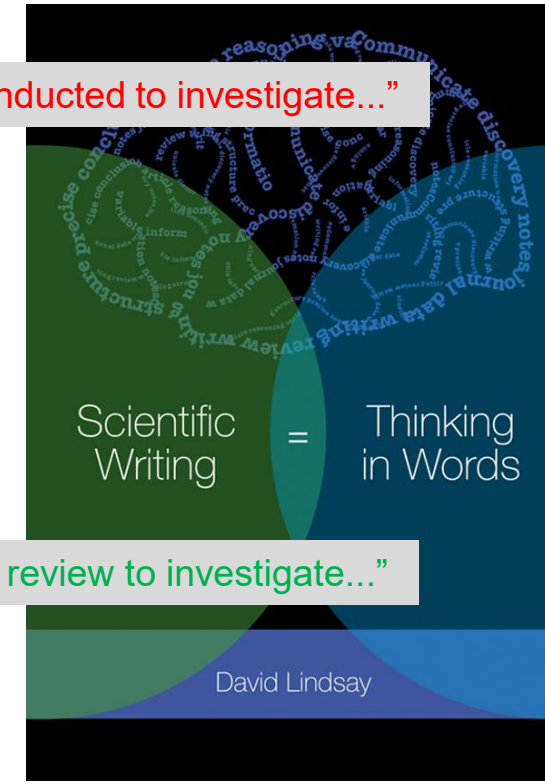
Writing tips:

Day, *Robert A.*, and *Barbara Gastel*. 2006**. How to Write and Publish a Scientific Paper.** 6th ed. Greenwood Press, Westport, Conn., US. 320 pages

Lindsay, David. 2011. **Scientific Writing = Thinking in Words.** CSIRO Publishing, Collingwood, Victoria, Australia. 122 pages

Passive voice: ”A literature review was initially conducted to investigate...”

Active voice: ”We initially conducted a literature review to investigate...”



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Writing advice and tips

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Well written text

- Correct **format** and **structure**
- The purpose / aim is the focus of the title, abstract and all the report parts
  - Redundant passages deleted
- It is concise- brief without being unclear
- It is interesting without being improper
  - Sensationalism may lead to loss of academic credibility (e.g. “huge difference”)

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Headings

Contents

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Headings

- **Main headings** (Introduction, Materials and methods, Results, Discussion, Conclusion, References)
- **Avoid too many levels of heading**: 2 is sufficient in most cases
- Headings increase the readability and improve the text structure, but they can also have a negative effect by chopping the text into isolated sections (sometimes breaking to a new line is enough)
- Tip: Try deleting all headings. If the text still has a nice flow and the different sections are well linked to each other, then the text is well structured. Re-insert the headings.

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Figures and tables

Every figure, table, equation, appendix, etc. must be cited in the text paragraphs and must have captions

- Normally done by using brackets (Fig. 1)
- Try to avoid ’Figure 1 shows…’ – it breaks the flow

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Figures and legends

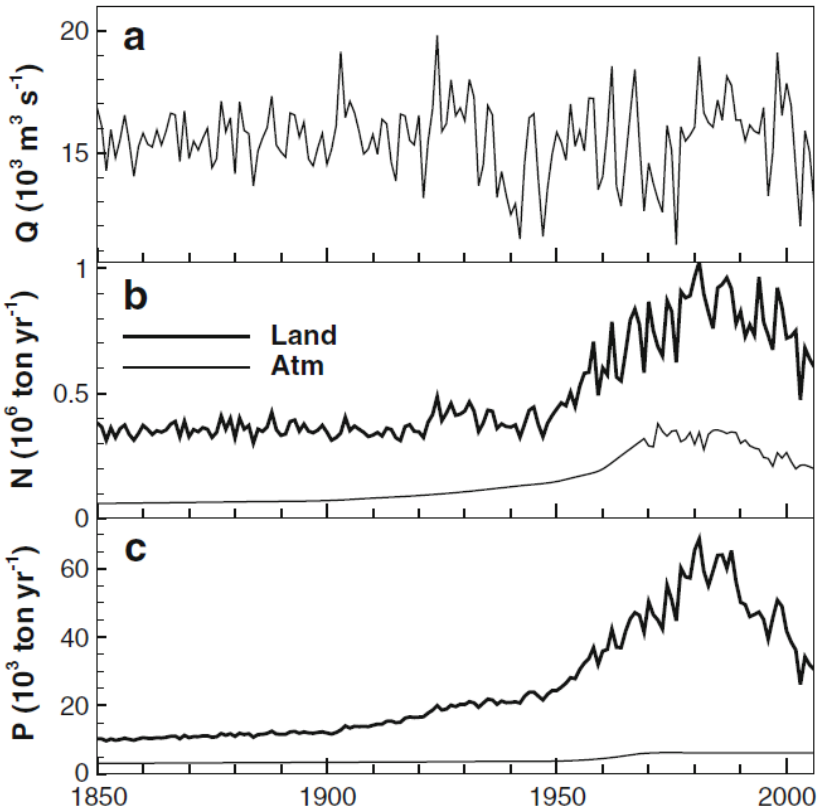

Fig. 2 Time series of annual average total river runoff (Q), nitrogen (N), and phosphorus (P) loads from land and atmosphere to the whole Baltic Sea

Reference from text

The annual mean river runoff to the Baltic Sea (Fig. 2a) shows only little variability before 1900. This is probably due to the reconstruction, which is not based on observed runoff in 1850–1900. The beginning and end of the twentieth century were relatively wet periods while particularly dry periods occurred around 1930–1940, 1960–1980, and from 2003 and onwards.

Nutrient loads to the Baltic Sea (Fig. 2b, c) reached a peak level at about 1980, and since then decreased again.

Legend always below figure

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Tables and table texts

Reference from text

A common theoretical way to assess RQ is to analyze the stoichiometry of complete oxidation of different substrates (Table 1). In glucose respiration, $6O_2$ is required for transformation of $C_6H_{12}O_6$ into

Table text always above table

Table 1 Stoichiometry of aerobic complete oxidation of selected compounds

Compound	*Chemical equation*	*CO_2 produced*	*O_2 consumed*	*RQ*
Methane	$CH_4+2\ O_2 \rightarrow CO_2+2\ H_2O$	1	2	0.50
Palmitic acid	$C_{16}H_{32}O_2+23\ O_2 \rightarrow 16\ CO_2+16\ H_2O$	16	24	0.70
Glucose	$C_6H_{12}O_6+6\ O_2 \rightarrow 6\ H_2O+6\ CO_2$	6	6	1.00
Pyruvic acid	$C_3H_4O_3+2.5\ O_2 \rightarrow 2\ H_2O+3\ CO_2$	3	2.5	1.20
Citric acid	$C_6H_8O_7+4.5\ O_2 \rightarrow 4\ H_2O+6\ CO_2$	6	4.5	1.33
Tartaric acid	$C_4H_6O_6+2.5\ O_2 \rightarrow 3\ H_2O+4\ CO_2$	4	2.5	1.60
Oxalic acid	$C_2H_2O_4+0.5\ O_2 \rightarrow 1\ H_2O+2\ CO_2$	2	0.5	4.00

Abbreviation: RQ, respiratory quotient.

Clarifications can be put below, e.g., explanation of abbreviations

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Common referencing mistakes

- **Do not use URL in the text**

  Nutrient regulation of freshwater plankton productivity is crucial for the future development of lake ecosystems in face of land use and climate change (www.naturewebsite.com).

- **Do not reference wikipedia**

  Wikipedia is not a scientific reliable source

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Results

Neutral reporting of what the literature showed. Focus on what is relevant to the aim / study question, but draw no conclusions or add own values.

- Present information that is relevant to the study question, but make no explicit attempt to answering the question, or interpreting the reported texts
- Strong results should come first
- Smallest number of figures possible

Grammatical tense: Past

Example: Nitrogen mineralisation in tilled soils was higher than in soils under conservation tillage (Brady and Weil 2007a; Michelsen et al. 2011…

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Abstract

= a short summary of the study.

Is written as one paragraph, consisting of about 200-250 words. Should contain:

- Indication of **aim** and **scope** (not misleading)
- Short information about the **method** that has been used (e.g., qualitative literature analysis)
- The most important **conclusion(s)**
- **Significance** and **further studies** **(present/future)**

Grammatical tense: Past

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Introduction

- Start with a broad general description of the ecosystem (geographic span, climatic conditions etc.)
- Narrow down and approach the aim
- Formulate the aim

Grammatical tense = Present (not aim 'was', aim 'is'!!)

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Materials and methods

1. Explain **how the aim was reached** (through literature study). If necessary, develop and clarify aim / study question

2. Describe the **scope of the study**, i.e., what geographical areas (study area) were targeted, what specific aspects that were covered by the study question etc.

3. Describe **how data / information was acquired**, e.g. through literature search in a library catalogue using certain keywords. Describe and justify the selection of books and other possible source materials.

4. Describe **data processing**, e.g. filtering, statistics.

5. Something else of importance for reaching the aim?

Grammatical tense = Past. One has performed the search for literature, the data has been collected etc.

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Discussion

The results are used to answer the study question (aim)

- Discuss, how can the results be interpreted to answer the study question?
- Is there ambiguous information, e.g., sources that are in conflict?
- Error? Can the sources be trusted? What are the weaknesses?
- Present your own interpretations, but make sure that they are well justified (refs) or explicitly state they are speculation.
- Finally, what could be done to improve the study, e.g. other analytical methods? Can new research questions for future studies be identified?
- **Most important comes first**

Past and present tense interchangeable. Past when the discussion looks back at the results, but present when an interpretation is made.

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Conclusion

- Present the **main findings**, i.e. summarize the most important take-homes from the discussion. Brief and clear.

→ Clear (simplistic?) answer to research question

Try putting the aim and the discussion in a bigger perspective

NOTE: This is a short chapter. Most often only one paragraph. Avoid repeating the aim or other parts of the introduction!

Grammatical tense = Past and present

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