Report writing and presentation skills

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551-1119-00L Microbial community genomics

How to write a report? - Some guidelines

Structure of a scientific manuscript

1. Title
2. Abstract
3. Introduction
4. Materials and Methods
5. Results
6. Discussion
7. References

- Figures
- Tables
- Acknowledgements
- Supplementary Materials

Instructions to authors

- Scientific journals provide instructions (rules) to authors
  → **carefully read and exactly follow them**

- Different manuscript formats have different rules
  - Article
  - Short article (letter, brief communication)
  - Review

- Limitations: length of text, number of figures/tables, number of citations, etc.
  → boils down to number of printed pages

General considerations

- Learning scientific writing is similar to learning a language
- Concise, accurate, structured, non-redundant
- Avoid:
  - non-quantitative adjectives (many/lots, some, little, very)
  - ambiguous wording, grammar

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Good: *“Increased run-offs caused higher levels of bacteria.”*

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Example 2:

Bad: “*The experiment showed that the treatment was very effective at reducing symptoms.*”

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Bad: “*The experiment showed that the treatment was very effective at reducing symptoms.*”

Good: “*The experiment showed that the antibiotic-treatment reduced symptoms by 40% compared to the baseline, as measured by symptom severity scores*.”

Abstract

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 summarizing 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. (This 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.

https://www.nature.com/documents/nature-summary-paragraph.pdf

Introduction

- Guide the reader from a general/theoretical description of the topic to the very specific question or hypothesis you are aiming to investigate

  - *Background:* indicate why the general research area is of importance
  - *Knowledge gap:* indicate the need to extend previous work
  - *What was done:* announce the experimental procedure and general findings

Materials and Methods

- Accurate description of materials and methods
- Necessary and sufficient information for reproducing all results
- Pay attention to use of units, vendor details, software version used, etc.

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  - Tables/figures and individual sub-parts of figures, as well as supplementary figures, must appear in the order in which they are mentioned in the text.
  - Simple explanation/conclusion can be mentioned
    - *“Our finding points towards a link between bacterial mating success and motility”*

Discussion

- Reference to the main **purpose or hypothesis** of the study
- Brief summary of the **most important findings**
- Discuss **possible explanations** for the findings and **compare** them **to other investigations/publications**
- State some **limitations** of the study
- Explain potential **wider implications** of the study
- End your report with an **open question** or a small statement what needs be addressed in the **future**

References

- Follow the journal format for references and citations in the text
- Tip: Try a reference manager, such as Zotero, which can work with Google docs and Microsoft word

Figures and tables

- Figure captions should be self-contained, clear and understandable without having to read the whole manuscript
- Use clear and informative titles (take home message).
  - *“Bacterial motility genes are enriched at higher temperatures”*

Figures and tables

- Use clear and informative figure headers

Table 1. Height after treatment

Group	light	5 days	10 days
control	12	70.3±2	90±10.5
test	12	60.4±1.5*	78±7.9*
control	16	75.7±8.	100±3
test	16	52.2±2	81±6.7

*P<0.05.

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Figures and tables

- Use informative row and column titles, units, error values and sample sizes

Table 1. Exposure to salinity reduces the growth of wheat plants

		Height, cm (mean ± S.E.M)	
Group (n = 5 each)	Light/day (h)	5 days exposure	10 days exposure
Control group (0 mM NaCl)	12	70.3±2	90±10.5
50 mM NaCl	12	60.4±1.5*	78±7.9*
Control group (0 mM NaCl)	16	75.7±8.	100±3
50 mM NaCl	16	52.2±2	81±6.7

*$P<0.05$.

Final remark

- Try to read your report/manuscript as if you were an uninformed first-time reader
- Have your manuscript read by an colleague / someone unfamiliar with the details of the work

Presentation skills - Some guidelines

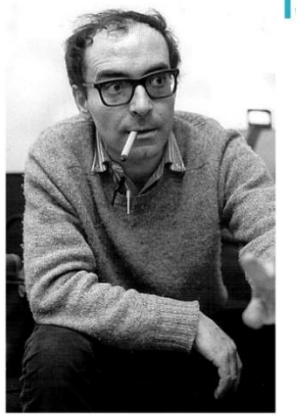
Structure of a scientific presentation

1. Title
2. Introduction
3. Materials and Methods
4. Results
5. Discussion
6. Summary / Conclusions

Might be combined

General considerations

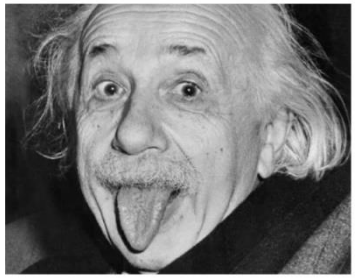
- Scientific presentation is storytelling
  - Plan what points to make and how to get there
  - Tell a coherent story with a central theme
  - Make it exciting, show importance
  - Don’t be complete, be selective



”Sometimes **reality** is too complex. **Stories** give it a form.“

Jean-Luc Godard

- Science needs to be understood
  - Adjust complexity to audience
  - Be precise and clear
  - Introduce terms



”Everything should be as **simple** as possible, but **not simpler**. “

Recommendations (common mistakes)

- Don’t assume the audience knows the topic in detail
  - Invest time in the introduction: *Results are meaningless without a proper motivation*
  - Go from broad interest to the specific problem addressed
  - Clearly state hypotheses

- M&M should be short but sufficient to understand what you did
  - Cartoons and flowcharts usually help

- Invest time in describing the results
  - All figure items should be readable
  - Describe both the figures (axes, legends, etc.) and the meaning of the figures
  - The title of each slide contains the take-home message

Recommendations (common mistakes)

- The discussion may include
  - Limitations of the data, analyses and results
  - Alternative explanations for the results
  - Comparisons to other studies / previous knowledge
  - Alignment of the results to the initial hypothesis
  - Broder implications of the results
  - Future directions / open questions

- A conclusions / summary section is always needed

Block Course report & presentation details

- **Written report (1/2): one report by each student**
  - **December 11th 2024**
  - In the format of a short scientific paper: *Title, Abstract, Introduction, Methods, Results, Discussion (+Figure/Table)*
  - Each report should contain at least one figure/table with legends/headers.
  - Font size 12, 1.5 line spacing. Maximum 10 pages in total including figures, legends and references.
  - An additional 2 pages of supplementary material is allowed

- **Oral presentation (1/2): one presentation by each student**
  - **November 27th 2024**
  - 20 minutes (15 presentation + 5 questions)

- **Written report (1/2): one report by each student**
  - **December 11th 2024**

  Upload the report to the gdrive:
  https://drive.google.com/drive/folders/1Fmhswcmf9OVkAJHcQ7fzhFF6VKHhSHvO?usp=drive_link

  AND

  Send a copy of the report via mail to:
  - Prof. Shinichi Sunagawa (ssunagawa@ethz.ch)
  - Sam (smiravet@ethz.ch)
  - Martin (msperfeld@ethz.ch)

Evaluation of Reports and Presentations

Reports Evaluation

	Item	Max score	Description (requirements)
Structure	Sections	5	All present (Title, Abstract, Intro, Methods, Results, Discussion, Figs/Tables)
	Length	5	Font size 12, 1.5 line spacing. Maximum 10 pages in total including figures, legends and references(0: > 12; 2: 10-12; 5: <= 10)
Sections	Abstract	5	Overall quality
	Intro	5	Introduction to the topic
		5	Present a problem / gap of knowledge and state a hypothesis
		5	Briefly describe approach used to tackle problem
	Methods	4	Explanation of study design
		4	Explanation of bioinformatic pipeline
		4	Explanation of statistical analysis / software used
	Results	5	Results correctly described
		5	Results backed-up with statistical test(s)
		5	Figures / tables are correctly referenced in text
	Discussion	8	Results are correctly interpreted and integrated (i.e. Is not a summary)
		5	Results are discussed with current knowledge
		5	Results are assessed critically (i.e. Limitations and improvements are mentioned)
	Figs/Tables	5	Figure /Table (Correct type for the data, axis, units, etc.)
		5	Overall clarity and qualtiy (readibility)
		5	Clarity of captions
	Total (Tmax)	90	**Raw total (T)**

Presentations Evaluation

	Item	Max score	Description (requirements)
Structure	Sections	3	All present (Title, Intro, Methods, Results, Discussion)
	Time keeping	3	Student not exceeding 15min allocated presentation time
	Flow	3	Clear structure to the presentation, logical order of presented items
Sections	Intro	3	Introduction to the topic
		3	Present a problem / gap of knowledge and state a hypothesis
	Methods	3	Explanation of study design
		3	Explanation of data available/data generation
	Results	3	Results correctly described
		3	Results backed-up with statistical test(s)
		3	Figures / tables are readable and all elements explained (axes, etc.)
	Discussion	3	Results are discussed with current knowledge
		3	Results are assessed critically (i.e. Limitations and improvements are
Additional	Notes		
	TOTAL	36	