How to write a report? - Some guidelines

Shinichi Sunagawa, Oct 1st 2020

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

  Example: *"Due to the fact of more run-off into the water, the end result is more bacteria in the water."*

  Revision: *"Higher levels of bacteria are caused by increased run-off."*

- Avoid:
  - non-quantitative adjectives (many/lots, some, little, very)
  - ambiguous wording, grammar

  "Using multiple-regression techniques, the animals in Experiment I were found to be significantly …"

http://people.vetmed.wsu.edu/jmgay/courses/documents/ScientificWritingWordUsage.pdf

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 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.

https://cbs.umn.edu/sites/cbs.umn.edu/files/public/downloads/Annotated_Nature_abstract.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

  - indicate why the general research area is of importance
  - indicate the need to extend previous work
  - 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.

Results

- Section are organized as the following:

- Section title that explains the purpose or the main question
- Methods are briefly mentioned
- Results are presented (figures, tables)
- Simple explanation/conclusion can be mentioned
- 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.

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

Figures and tables

- Figure captions (below figure) should be self-contained, clear and understandable without having to read the whole manuscript
- Use clear and informative titles.

Figures and tables

- Use clear and informative titles

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

*$P<0.05$.

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

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

*$P<0.05$.

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 as hard as possible 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