



# Workshop on How to Publish Papers in International Journals February 2018

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## How to write the Materials and Methods.

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# Materials and Methods (M & M)

## First points.

- M&M sections of papers **are often badly written and provide inadequate information**. Do not contribute to this unfortunate modern habit. **Remember** your results need to be **reproducible**.
- Never write **M & M** like a cake recipe in present tense. Always past tense, preferably 3<sup>rd</sup> person. The cake recipe format makes you look amateurish and editors will reject your paper.
- Non-English speakers often work very hard on improving the English of the Abstract, Introduction and Discussion and neglect the English in the Materials and Methods and the Results. They foolishly think that the Materials and Methods are “technical” and do not worry about the English. If people cannot understand what you did and how you did it your paper is unlikely to be accepted.

**Materials and Methods are often inadequate in both old and modern papers but seem to be getting worse.** This is not just a problem in the hard sciences. Social science papers often have very poor descriptions of what methods they used as well.

- If you use a reference to cover a method that you used you must actually look at that paper to see if it really does actually give a useable description. Some references are used out of habit because everybody uses them. That is very bad science. You might get a rude shock if you actually look at the actual original paper.

- If you used microbes, plants or animals for your study you must give an adequate taxonomic description at least when you first mention it. You can get away with cat, dog, rabbit, rat or mouse without the Latin names but you have to specify the strain used. For peas, beans, wheat, rice etc you need to use the Latin names when first mentioning them and the cultivar you used and then you can use the common name in the rest of the text. If you are doing a study on a bacterium called *Rhodopseudomonas palustris* (names in italics) you give the full name, strain name, and description first and then later you can call it *R. palustris* or *Rhodopseudomonas* if there is no confusion about the organism you are talking about.

- Caution is needed with common names of plants. Some crop plants have different common names in American and English English. Look up what “corn” means in American vs. English.
- Culture media and how things were grown. Make sure you give an adequate description of both. Culture media recipes have to be carefully checked against the original descriptions. The biological literature is littered with inadequate descriptions of culture media. Sometimes the original description of the medium is unobtainable, in which cases you try and find the oldest complete description that is in the open literature.
- Do not use a thesis or a conference proceedings as sources for such information. Reason? **Poor accessibility.**

- You need to mention the key scientific instruments you used for the study. You need the Model, Manufacturer, City and Country where it was made.
- This is easy to forget. I submitted a paper on 26 February 2016 where I forgot to mention the type of light meter I used.
- Software. You need Version, Manufacturer, City and Country.
- Generally using INTERNET references are frowned upon because they are **ephemeral** however you can use them as sources of database information. For example, DNA sequences, spectra of stars etc. The proper format for referring to Internet Information has to be used and that includes the **DATE OF ACCESS** and **WEB ADDRESS**. No **WIKIPEDIA!**

## **What you are trying to do in the M&Ms?**

- Remember in the M & M you are trying to establish that you knew what you were doing. Standard analysis texts can be very useful but references to Big reference books need page numbers eg (APHA-Standard Methods, 1998, p 1234).**
- Describe the basic statistics you used and the statistics software you used. It is a good idea to mention a statistics book that you used as the basic statistical authority.**
- If you do anything involving human subjects or animals make sure you obey bioethics procedures and say so in your M & M. A journal will not accept your paper if there is any hint of bioethics problems.**

## **More Things You are expected to do in M&Ms:**

- Accurately describe the materials you used,**
- Essential materials such as culture media should be either presented in detail or referred to an easily available source.**
- Must include details about the key equipment.**
- Give details of software used with details of manufacturer and version number. This detail is also easily forgotten.**
- Deposit new plants, animals or microbes with a herbarium, museum or a culture collection.**
- The M&Ms should provide enough information for it to be feasible to repeat the experiments and M&M description is properly referenced. That is what M&Ms is actually for!**

## Some things you should not do in the M&Ms

- References used in M&M must be readily accessible, this is just as important in the M&Ms as in the Introduction or Discussion. Avoid “grey” literature as much as possible. If you have to use grey literature simply write it out in full and state clearly where you got it. For example, give full details of the culture medium recipe, the experimental protocol or the statistical procedure you used from the grey literature rather than simply cite it.
- Do not refer to Theses as sources of M&M information including your own thesis. Reason? Theses of many universities are not readily available.
- Do not use Conference Proceedings as sources of M&M. If you must use the information write it out again in full and state its source. The reason is again **accessibility**.
- Government reports should also be avoided because of the issue of **accessibility** of grey literature. If necessary quote in full.



# References

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