

Scientific Writing:
Journal articles & research papers

What do you want from your published scientific paper?

- You want:
 - To report scientific findings
 - Paper must be published!
 - Paper should reach a wide audience
 - Choose publication carefully
 - Highest impact
 - Widest reach
 - Recognition at work
 - Enhance reputation.
 - Help promotion/job prospects
 - Help career prospects
 -
 - Peer recognition
 - High quality paper leads to enhanced reputation and external esteem.
 - Research calibre assessed by publications of your work – international level playing field
 - Reputation helps succeed in funding applications?
 - High quality comes from well written paper, high quality data & good science
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 - Recognition by a wider (global) audience
 - Paper must be of high quality
 - Paper must be readily found using an electronic search engine.
 - Could lead to future collaborations
 - Fund raising opportunities
 - Winning competitive bids
 - Demonstration of ability to deliver.

Where do I start? A research idea.

Is it novel? Is it original in a big a small way?
Need to check literature and discuss with peers. Collaborate.

**READ THE LITERATURE to check for novelty BEFORE YOU START
EXPERIMENTAL WORK**

Examples of Reference data bases
(Web of Science/Science Direct/PubMed/Google Scholar/Infoseek/Journals/etc)
Request PDF articles from corresponding authors. Easy to find people using google

What is novel? Example of published work

- Stevenson et al., 2007 evaluated effects of *Cassia sophera* leaves on *Sitophilus zeamais* in Maize in controlled field trials.

Which of these is sufficiently novel

1. Effects of *Cassia sophera* on *Sitophilus oryzae*?
2. Identification of compounds responsible for activity of *Cassia sophera* against *S. zeamais*?
3. Farmer participatory storage trials of *C. sophera* for controlling *Sitophilus* infestation.

Can the “research” be carried out by you?

What is the kind of work – laboratory based? Literature based? Do you have a sufficiently effective lab or library to the job properly. If its worth doing – its worth doing properly.

Can the “research” be carried out by you at your institute?

What are the requirements:

- i) Scientific expertise
- ii) Available facilities /resources (equipped laboratory + computing)
- iii) Time frame (make a GANNT chart)
- iv) Group project/collaborations through networks
- v) Multi-disciplinary teams
- vi) Collaborative approach
- vii) Management/end goals
- viii) Financing – increasingly the driving force.

The steps of the Scientific Method

Observation of phenomenon

Research Hypothesis

Prediction

Experimentation

Conclusion (s)

Then comes

PAPER WRITING!!!!

- Materials, samples, chemicals
- Equipment & instrumentation
- Experimental protocols (complexity/diversity)
- Methods of data analysis (e.g. statistics)

- Seek advice – cooperate and collaborate
- The enemy is ignorance not your colleagues

Remember:

- 1) Health and Safety rules and regulations forms e.g. In UK *Control of substances hazardous to health* (COSHH) – Health and Safety Executive
- 2) Ethics
- 3) Consent forms
- 4) Are “licences” required? (e.g. Insects? GM materials? Material Transfer Agreements? Contract agreements?)
- 5) Safety issues
- 6) Requirements of regulatory bodies (Institutional, National, International)

Keep Voucher specimens!!!!

Consider where your work will be published

Where is the research to be “published” (?):

- i) “in-house news letter”
- ii) internal report
- iii) professional journal/publication
- iv) scientific journal - consider
 - impact factor
 - refereed
 - printed/electronic
 - pure electronic “journals” (payment?)
- v) book chapter
- vi) conference proceedings
- vii) poster at national/international conference

Major considerations before embarking on report of Research findings

- Research, content and conclusions of manuscript must be evidence based
 - Avoid excessive conjecture
 - Avoid assumptions
 - But see the broader picture
- Use peer reviewed research methodologies
- Ensure all legal/institutional/ethical issues are covered

Authorship

- Establish co-authors & who will write what
- Don’t have more authors than facts! E.g.
- Order of authorship
 - 1st place usually to the principal writer and investigator

- last place traditionally second most significant spot – e.g. overall project PI
- Corresponding authorship often used to indicate overall project or research team authority.
- Ethical guidelines on authorship
 - All authors should be able to say what they contributed constructively to the paper
 - This is a requirement for many journals now
 - Running the department doesn't count!
 - Being someone's boss doesn't either!
 - Designing experiments & developing concept might

Key approaches to writing: being read successfully

- Clear & Concise with Coherent and Critical thinking (of your own research and other cited work).
- Put yourself in the readers (referees) position
 - Don't make assumptions about readers knowledge
 - Establish in-house editorial groups
 - Get colleagues to read your work - feedback
 - Read colleagues work in return.
- Put manuscript in drawer for 2 weeks and then re-read it – helps to give new perspective

Who are you writing for?

- Research papers
 - refereed journals
 - conference papers
- Research/technical reports
 - Press, Policy papers, technical reports for funding agency.
- MSc /PhD Theses
- Read successful examples – *critically*.
- Don't publish same work twice.

What to include in your article? (This will depend on journal).

- Title
- Abstract
- Introduction
- Materials and Methods
- Results (with Tables and Figures)
- Discussion
- Acknowledgments
- References or Literature Cited

Choosing a Journal

- Read journal aims and scope to determine if your work fits with the journal and readership.
- Can reject papers outright if outside scope.
 - Don't waste your time
 - rejection is deflating and resubmission requires a lot of work – re working style, references etc.
- Read recent papers from the chosen journal to check content, style and length.

Crop Protection – Aims and Scope

The Editors of *Crop Protection* especially welcome papers describing an interdisciplinary approach showing how different control strategies can be integrated into practical pest management programmes, covering high and low input agricultural systems worldwide. *Crop Protection* particularly emphasizes the practical aspects of control in the field and for protected crops, and includes work which may lead in the near future to more effective control. The journal does not duplicate the many existing excellent biological science journals, which deal mainly with the more fundamental aspects of plant pathology, applied zoology and weed science. *Crop Protection* covers all practical aspects of pest, disease and weed control, including the following topics:

Impact and readership.

- Impact factor (ISI-Thomson Reuters)
 - mean annual citations per article in most recent two years following publication. i.e., in 2010 and 2009 for 2008 papers.
- *Nature* IF = 34
- *Current Biology* IF = 10
- *Pest Management Science* = 2.2
- *Crop Protection* IF = 1.3
- *African Journal of Biotechnology* IF = 0.6
- *African Journal of Agricultural Research* IF = 0.08 (<10%)
 - Can look these up on web for individual journals
 - Many new journals (especially on line) don't yet have them.

Instructions for authors

- Read them thoroughly
- They are provided for a reason.
 - Uniformity
 - Economy of space.
 - suggested length of sections, things to include, options for supplementary information, style – particularly references etc

Plagiarism in publishing

- *Plagiarism is a very serious academic and publishing offence.*

- *In UK – students get temporary suspension from the University and a mark of zero. This could lead to course failure*
- *Submitted manuscripts rejected (authors names noted).*
- *Loss of academic integrity.*

Plagiarism - What is it?

- Copying others work (even if you cite)
 - Entirely copied work
 - Word for word sections of others work
 - Concepts and ideas process (intellectual property)
 - Crude paraphrasing
 -

Plagiarism – avoiding it.

- Distinguish between your ideas and others.
 - intellectual honesty
 - if you use other’s conclusions, acknowledge them even if you came to same conclusions yourself.
- Distinguish carefully your own words and experimental work and words of others.
- Organize your writing in an original manner.
 - Avoid mimicking pattern or order of argument used by others.
 - Remember: this is YOUR contribution
- As you weave others ideas into your work, *make clear choices about the use of quoted material.*
- Avoid close paraphrasing or purely cosmetic changes.
- Write an initial draft without actually looking at your source material.
- add specific facts later

- effective paraphrasing is not the same as *substituting synonyms and rearranging words – this is plagiarism even where the source is cited!*

Original:

If the existence of a signing ape was unsettling for linguists, it was also startling news for animal behaviorists. ---Flora Davis (1978), *Eloquent Animals*, p. 26

Version 1:

According to Flora Davis (1978), linguists and animal behaviorists were unprepared for the news that a chimp could communicate with its trainers through sign language (26).

Version 2:

The existence of a signing ape unsettled linguists and startled animal behaviorists (Davis, 1978).

Version 3:

If the presence of a sign-language-using chimp was disturbing for scientists studying language, it was also surprising to scientists studying animal behavior (Davis 1978).

So what do you include and what do you write first?

<i>Component</i>	<i>Order of writing</i>
• Title	6
• Abstract	5
• Introduction	4
• Materials and Methods	3
• Results (with Tables and Figures)	1
• Discussion	2b
• Acknowledgments	7
• Literature Cited	1-7

Title

- Make the title specific:
 - A good title should describe the contents of the paper in the fewest possible words.
 - Keep to 12 words or less.
- The title should be appropriate for the intended audience (particularly the referee).
- It should make people want to read the paper.

e.g., compare

- *A study of the effects of chaos as a source of complexity and diversity in evolutionary processes.*
- *Chaos as a source of complexity and diversity in evolution*
- Titles contain key words.
- Some are more important than others.
- Place key words near the start of the title
 - makes it easier for reader to determine what paper is about.
- Insert searchable keywords in your title.
- This makes it easier for your work to be found using web-based engine.

Compare word search

- Interim Technical Report on progress from the ADAPPT project.
- Optimising Efficacy of Pesticidal Plants against cattle ticks and maize pests in Africa: ADAPPT Project interim report.

Suit title to your audience

- Fat Rats: What Makes Them Eat? *New Scientist*.
- The role of Luteinising Hormone to Obesity in the Zucker Rat *Journal of Neuroendocrinology*
- Rats hold the key to a gorgeous body. *The Daily Mail*.

Scientific names in title help clarity about content and with citations.
But avoid overdoing it! – e.g. Family names, species authority etc

Abstract

- The abstract should provide a very short summary of your work.
- It should stand on its own and it should not be too technical or bulging with data
- It should state your main findings and conclusions.

- ITS OFTEN THE ONLY PART OF YOUR PAPER THAT WILL EVER BE READ.
- Publications databases provide abstracts only
- Shouldn't be unintelligible
 - Even if nice to look at

What to include in the abstract

- Very briefly (check word count with journal and guidelines) write:
 - What you did,
 - Why you did it
 - What are the results implications

The Keyword List

- opportunity to add words used by indexing and abstracting services
- They are often but not exclusively additional to those in the title.
- Helps others find your work and cite it.
- All research quality now determined by citation indices.

The Introduction

- The purpose of the introduction is to:
 - Establish the context of the work being reported.
 - This is accomplished by discussing (as briefly as possible) the relevant primary research literature (with citations) and
 - Summarizing current understanding of the problem you are investigating.
- State the purpose of the work in the form of the hypothesis, question, or problem you investigated.
- Briefly explain your rationale and approach and, whenever possible, the possible outcomes your study can reveal.

Experimental Details (Materials and Methods)

- This section of the paper ought to contain the following details where appropriate:
 - Materials used;
 - Organisms used
 - Instruments used

- Experimental protocols
- The experimental section should contain enough details that a competent researcher could repeat your experiment.
- The cornerstone of good science is reproducibility and repeatability.

Precision

- When giving details of measurements such as the temperature of the oven be precise.
- Accurate methods allow your work to be repeated and verified by others.
- Which is better?
 - The experiment was carried out at room temperature!
 - The experiment was carried out at $23 \pm 1^\circ\text{C}$

Grammar : Use the third person past passive voice.

Results

- Present your results clearly and HONESTLY
- When possible use tables and figures effectively
- Do not repeat all of the information that appears in a table or figure in the text; but do summarize it.
- Draw out key points

Using tables and figures

- For example, if you present a table of temperature measurements taken at various times, describe the general pattern of temperature change and refer to the table.
- *"The temperature of the solution increased rapidly at first, going from 50° to 80° in the first three minutes (Table 1)."*
- Make graphs clear and provide them with a suitable caption.
- They need to be able to stand alone
- Make sure you keep the results section just for results
- Some journals combine Results and Discussion

Discussion

- It is not enough to simply present your data again in a slightly different way
- Discuss their significance and implications.
- Discuss the meaning of individual results in this section; but wait until the conclusions section to tie everything together
- Conclusions are sometimes a separate section.
- Were the results consistent with your expectations?
- Does experimental error account for any deviations between the results and your expectations?
- What underlying patterns or relationships exist in your results?
- Do these results support the hypothesis that you were testing?
- Do these results support the predictions/expectations in the literature?

Don't; gloss over problems

- If your results show a smooth curve with an unexpected dip in the middle, avoid the temptation to gloss over the unexpected deviation – it may turn out to be the most important part of your data.
- There are times when you have may developed a novel way of treating your data. This can go in the discussion section. Though sometimes it may go into a separate section.

Acknowledgements

- If you received any significant help in thinking up, designing, or carrying out the work; or received free materials from someone you must acknowledge their assistance and the service or material provided.
- Although usual style requirements (e.g., 1st person, objectivity) are relaxed somewhat here – “Acknowledgments” are always brief and never flowery.

References

- All the citations in the corpus of the text need to be identified in the reference list placed at the end of the paper.
- Ensure that the formatting of the citations in the text and reference list conform with the style of the journal your article will be sent to.
- This really bugs editors – get it right!
- Laziness here could tempt a referee to assume laziness elsewhere in carrying out the work or even collating results.
- Every part of your written work gives an impression of your overall scientific calibre.

Reviewers guidelines - *Phytochemistry*

Please examine the paper with reference to the questions on this form

- (1) Does the paper fall within the scope of the journal?
- (2) Is it a new and original contribution?
- (3) Are there any assumptions made which you consider unjustifiable?
- (4) Are there any apparent errors of fact or logic?
- (5) Is the length of the paper in keeping with its importance?
- (6) Are the Titles and Abstract informative?
- (7) Is the English satisfactory?

Examples of rejection

Paper No 1.

- REJECT
- This paper describes three new compounds from *Anotherus plantus*. The structures are secure but represent trivial variants of known compounds. Since the authors have already published two papers in this series and announce their

intention of looking at other parts of this plant I suggest that they include these compounds in a subsequent publication of more substance.

Paper No 2

- REJECT
- Larvicidal effects of essential oil and methanolic extract of *A plant*.....
- Bloggs et al.
- This manuscript describes a single bioassay of essential oil and methanolic extract against *Echinococcus granulosus*. Despite being a new biological activity the manuscript is too insubstantial for BSE and lies outside the scope of the journal.
- The abstract gives the impression that the authors have actually analysed the essential oil but in fact authors simply include write data published elsewhere (Ahmadi 2010). (Plagiarism). (Hood winking editors)
- The bioassays are presented with no statistical analysis to demonstrate variation in the data and no scientific evidence is provided to substantiate claims about the compounds purported to be responsible for the biological activity.
- Hydroxywithanolide as a chemical resistance of Cape Gooseberry against herbivory.
- Bloggs et al.
- This manuscript describes a comprehensive analysis of cape gooseberry for 4-beta hydroxywithanolide.
- The paper has demonstrated this compound occurs in the plant at higher concentrations in roots than in leaves in mature plants but at lower concentrations in roots than in leaves in seedlings and asserts this is to do with their role in resistance
- The paper is far too long and makes what is a fairly simple outcome is made too complicated.
-

Majpr Revision (probably should have been reject...)

- *The introduction.*
- The introduction needs to be shortened by at least half and the text needs to be relevant to the research activities that will be covered in the text. Presently it is more like a review of strategies to reduce resistance costs.
-
- *The methods*
- Similarly, the methods are far too long. Attempt to reduce by at least half. The introduction spills over in to methods. The authors need to shorten this to the

- absolute minimum. E.g. cite previous uses or combine repeated uses of same method
- - The methods contain results and introduction.
 -
 - NMR data for 4beta hydroxywithanolide and physapruin has been already published elsewhere so not required here. It is welcome as supplementary information but not for publication.
 - *Results:*
 - Results should be much more concise. Combine sections.
 - Logic fails with insects pests chosen to test *Physalis* resistance compounds because they are not pests of *Physalis*. *Epilachna* is a specialist bean beetle, *Tribolium castaneum* feeds on flour and grain (not *Physalis*) no record of *Spodoptera littoralis* being a pest of *Physalis*.
 -
 - *Discussion*
 - Again too long by at least half. A simple result is over-complicated. The extrapolation of the results to highly significant implications is largely unconvincing and may be made more so by a considerable reduction in the text to the salient points.
 - Figures are excessive and most can be described in the results without the need for a table. E.g. Table 1 to 5 could be omitted and simply described in a few words in the text as could Figure 5. Figures need indication of statistics used including error bars.

What to do when your paper is accepted with revision

- Address the comments of the referee specifically
- Be conciliatory
- Be assertive
- Do what you've been asked if it means the difference between publishing and not.
- Provide the editor a clear inventory of changes to original manuscript.
 - Thoroughness here is a helpful for the editor

Proof reading

- And just when you thought you couldn't read a page of the work one more time..... the galley proofs arrive with 24 hours to return them
- If you miss a typo now it will be ever thus!
- Proof read your manuscript at least twice

Key approaches to writing: being read successfully

- Clear & Concise with Critical thinking (of your own and cited work).
- Put yourself in the readers (referees) position
 - Don't make assumptions about knowledge
 - Establish in-house editorial groups
 - Get colleagues to read your work – get feedback
 - Read colleagues work in return.