This resource was written 2009 by: Philip Mayer, Zurich-Basel Plant Science Center (http://www.plantscience.ethz.ch/education/Masters/courses/Scientific_Writing)

Guidelines for writing a Review Article

A) Good to know about review articles

What is a review article?
- A critical, constructive analysis of the literature in a specific field through summary, classification, analysis, comparison.
- A scientific text relying on previously published literature or data. New data from the author's experiments are not presented (with exceptions: some reviews contain new data).
- A stand-alone publication. Literature reviews as integral parts of master theses, doctoral theses or grant proposals will not be considered here. However, many tips in this guideline are transferable to these text types.

What is the function of a review article?
- to organize literature
- to evaluate literature
- to identify patterns and trends in the literature
- to synthesize literature
- to identify research gaps and recommend new research areas

Who is the audience of review articles?
- experts in specific research areas
- students or novice researchers
- decision-makers

Review articles targeted at the last two groups: Extended explanations of subjects or of subject-specific language are mandatory (e.g. through the uses of information boxes or glossaries).

Which types of review articles exist?
Types by methodological approach
- Narrative review
  Selected studies are compared and summarized on the basis of the author's experience, existing theories and models. Results are based on a qualitative rather than a quantitative level.
- Best evidence review
  A focus on selected studies is combined with systematic methods of study-selection and result exploration.
- Systematic review
  Findings from various individual studies are analyzed statistically by strict procedures. Meta-Analyses are used to pool the results of individual studies.

Types by objective (Noguchi 2006)

- Status quo review
  Presentation of the most current research for a given topic or field of research.
- History review
  Development of a field of research over time.
- Issue review
  Investigation of an issue (i.e. a point of disagreement or a question) in a specific field of research.
- Theory/model review
  Introduction of a new theory or model in a specific field of research.

Types by mandate

- Invited reviews: experienced researchers are invited
- Commissioned reviews: formal contracts of authors with clients
- Unsolicited submissions: researchers develop an idea for a review and submit it to journal editors

How long is a review article?
Review articles vary considerably in length. Narrative reviews may range between 8,000 and 40,000 words (references and everything else included). Systematic reviews are usually shorter with less than 10,000 words.

B) Elements of a review article

Title

Function	Helping readers to decide whether they should read the text or not. Includes terms for indexing (e.g. in data bases).
Elements	The title must be **informative:** • The title has to include important terms. • It has to indicate that the text is a review article. • It may include the message of the article, not just its coverage (Gustavii 2003). The title must be **short:** • Keep the title concise. • A longer subtitle may be an option in case a specification is necessary.
Tense	In a title with results indicated: the present tense stresses the general validity of the results and illustrates what the author is trying to achieve with the article; the past tense indicates that results are not established knowledge yet.
Citations	None
Length	between eight to 12 words (Davis 2005)
Question	The title should only be a question if this question remains unanswered at the time of writing.

List of authors

Function	Declare intellectual ownership of the work, provide contact information
Elements	**1)** Decision on authorship**:** • Every person that contributed significantly to the literature search, literature exploration and/or writing process. **2)** Order of authors**:** • The first author has done most of the research and written major parts of the article. • Authors between first and last author have contributed in one way or the other to the success of the project. They may be ordered alphabetically (indicating equality) or in a sequence of decreasing involvement. • The last author usually coordinated the project and had the original idea. **IMPORTANT: Discuss authorship as early as possible!**

Abstract

Function	Informs about the main objectives and result of the review article (**informative abstract**) or indicates the text structure (**descriptive abstract**).
Elements	***Descriptive abstract*** *- for narrative reviews* Description of subjects covered without specific details. A descriptive abstract is like a table of contents in paragraph form.
Tense	present
Elements	***Informative abstract*** *- for systematic and best evidence reviews* **1) Objectives:** One or two sentences describe the context and intention of the review. **2) Material and methods:** One or a few sentences provide a general picture of the methodological approach. **3) Results:** A few sentences describe main outcomes. **4) Conclusions:** One or two sentences present the conclusion (which is linked to the objectives).
Tense	objectives: present material and methods, results: past conclusions: present
Citations	usually none
Length	usually 200 to 250 words

Table of Contents

Function	Shows the readers the organisation of the text. Helps orientation among sections.
Note	Some review journals print an outline/table of contents at the beginning of the article, others do not. In general, these are recommended for extensive narrative reviews.

Introduction

Function	Provides information about the context, indicates the motivation for the review, defines the focus, the research question and explains the text structure.
Elements	Elements of a three paragraph introduction (after Anonymous 2003). **1) Subject background.** The general topic, issue, or area of concern is given to illustrate the context. **2) "Problem"**. Trends, new perspectives, gaps, conflicts, or a single problem is indicated. **3) Motivation/justification.** The author's reason for reviewing the literature, the approach and the organisation of the text are described.
Tense	present (use past tense for the description of your methods and your results)
Citations	many
Length	Between 10% and 20% of the core text (introduction, body, conclusions).
Note	Make sure to have a narrow focus and an explicit research question. Indicate these two points clearly in the introduction. Give theoretical or practical justifications for the need for a review.

Body: Material and Methods

Function	Systematic and best evidence reviews have a methods section. This section enables motivated researches to repeat the review. Narrative reviews do not have a methods section but should include some information about applied methods at the end of the introduction.
Elements	The material and methods section contains for example information about: data sources (e.g. bibliographic databases), search terms and search strategies, selection criteria (inclusion/exclusion of studies), the number of studies screened and the number of studies included, statistical methods of meta-analysis.

Tense	past
Citations	few (e.g. to statistical analyses or software used)
Length	Approx. 5% of the core text (introduction, body, conclusions).
Note	Make sure that data sources are clearly identified. Precision has first priority in the material and methods section.

Body: Main Part of the Review Article

Section structure

A coherent structuring of the topic is necessary to develop the section structure (Bem 1995). Subheadings reflect the organisation of the topic and indicate the content of the various sections. Possible criteria for structuring the topic are:

- methodological approaches
- models or theories
- extent of support for a given thesis
- studies that agree with another versus studies that disagree
- chronological order
- geographical location

Paragraph structure

- Cover one idea, aspect or topic per paragraph.
- Avoid referring to only one study per paragraph; consider several studies per paragraph instead.

Links

- Frequently link the discussed research findings to the research question stated in the introduction. These links create the a thread of coherence in your review article.
- Link the studies to one another. Compare and discuss these relationships.

Tense

According to Ridley (2008) three tenses are frequently used:

- Present: reporting what another author thinks, believes, writes, reporting current knowledge or information of general validity, e.g. *It **is** believed…*
- Simple past: referring to what a specific researcher did or found, referring to a single study, e.g. *They found…*
- Present perfect: referring to an area of research with a number of independent researchers involved, e.g. *They have found…*

Citations	Citations are usually **indirect** but in some cases pointed and relevant remarks might be cited **directly**. • Non-integral references (**indirect**): The author's name, or a number referring to the reference list, appears in brackets. Non-integral references emphasize the idea, result, theory etc. rather than the person behind it *(Ridley 2008)*. Most references in biology are non-integral. • Integral references (**direct**): The author's name has a grammatical function in the text. *As Ridley (2008) points out* this type is appropriate to emphasize the contribution of a specific author.
Length	70 to 90% of the core text (introduction, body, conclusions).
Note	Make sure to organise the different pieces of information into a line of argument. An appropriate organisation of information is all-important for the quality of a review (Day & Gastel 2006). Throughout it is important that the idea/topic (paragraph 3 of the Introduction) drives the article and not the literature used; write an idea-driven, rather than literature-driven article!

Conclusions

Function	Answer the research question set in the introduction.
Elements	• implications of the findings • interpretations by the authors (kept separate from factual information) • identification of unresolved questions
Tense	present: summarising and drawing conclusions present perfect: referring to an area of research or a body of literature
Citations	few or none
Length	5 to 10% of the core text (introduction, body, conclusions).
Note	Make sure to have a clear take home message that integrates the points discussed in the review. Make sure your conclusions are not simply a repeat of the abstract!

Acknowledgements

Function	• Expresses gratitude to people who helped with the literature search, the structuring of the material or in the writing process (but whose contribution is too small to justify co-authorship). • Expresses gratitude to funding organisation and specifies the funding program (often required by funding agencies).

Elements	• Full names of people and their specific contributions to the project are given. • The name of the funding agency and program as well as the grant number and the person to whom it was awarded are mentioned.
Tense	present (past tense when referring to funding agencies in terminated projects)
Citations	none

References

Function	• Shows interested readers how to find the literature mentioned in the text. • Acknowledges the work of other scientists. • Compulsory to avoid charges of plagiarism
Elements	Include every reference cited in the text. Do not include additional references. Avoid internet sources. If internet sources must be used, find the original source for the internet reference, check it has been correctly cited and cite it directly.
Length	A range between 50-100 references is in most cases appropriate.
Note	• For narrative reviews the inclusion of all relevant, high-quality studies is the target. • Systematic and best evidence reviews need explicit criteria for the inclusion/exclusion of studies from which they got the data.

Illustrations: Concept Maps

Function	Concept maps are used in review articles to visualize the structuring of the topic, to show the relationships between studies, concepts, models or theories.
Organisation of data	Boxes with terms or names are arranged in a two-dimensional space. Arrows are used to link boxes. Specifications of the relationship are written on the arrows.
Legend	The legend describes the concept map's content. It is specific and informative (it should be possible to understand the map without reading the full text).
Note	Concept maps are very useful to display complex relationships.
Boxes	Often provided to explain terms/concepts for those who are interested in certain issues more in depth.
Glossary	Often provided to explain terms particular to a subject area so that as broad an audience as possible may be reached.

If you want to include **tables** or **figures** in your review article… …see **Guidelines for writing a Research Article**

C) Preparing a review article in 18 steps

stage		step	
prepare	**1.**	narrow the topic, define a few research questions or hypotheses	☐
	2.	search for literature sources, refine topic and research questions during the search*	☐
	3.	read, evaluate, classify and make notes	☐
	4.	redefine the focus and the research questions, define the take-home message	☐
	5.	compose a preliminary title	☐
develop structure	**6.**	find a structuring principle for the article (e.g. chronological, subject matter, experimental procedure)	☐
	7.	prepare an outline, find headings for the sections in the text body	☐
	8.	plan the content of each paragraph in the different sections	☐
	9.	prepare tables, concept maps, figures	☐
write draft	**10.**	draft the methods section (if needed)	☐
	11.	draft the body sections	☐
	12.	draft the conclusions	☐
	13.	draft the introduction	☐
	14.	draft the abstract	☐
revise	**15.**	revise drafts of different sections, abstract & title, tables, figures & legends	☐
	16.	revise citations and references	☐
	17.	correct grammar, spelling, punctuation	☐
	18.	adjust the layout	☐

*In systematic and best evidence reviews additional points have to be defined and considered in the preparation stage:

- selection of databases, published data and other resources, search strategy
- criteria for inclusion and exclusion of studies (comparability of methods is an important point here)
- statistical procedures for the analysis of studies (meta-analysis)
- treatment of qualitative research presented in the review

All these points have to be described in the material and methods section. In addition, a detailed review protocol is required by some contracting bodies.

IMPORTANT: For all types of review articles: **Make sure to ask competent persons for feedback** in the stages “prepare”, “develop structure”, and “revise”.

D) Examples of high-quality review articles in the plant sciences

High impact review journals in the plant sciences

Annual Review of Plant Biology
Current Opinion in Plant Biology
New Phytologist: "Tansley review" series (commissioned, paid)
Trends in Ecology and Evolution
Trends in Plant Science
Nature Reviews Genetics*
Nature Reviews Microbiology*
Nature Reviews Molecular Cell Biology*

Sample review articles

Narrative review: Kessler A. & I. T. Baldwin (2002). Plant responses to insect herbivory: The emerging molecular analysis. Annual Review of Plant Biology 53: 299 – 328.

The structure includes:

- Title – in this case does not indicate that it is a review article.
- Abstract – includes a description of subjects covered.
- Table of Contents – shows the reader the organization of the text (overview)
- Introduction includes a description of context (paragraph 1 – 3), motivation for review (paragraph 4, sentence 1) and defines the focus (paragraph 4, sentences 2 – 3)
- Body – structured by headings and subheadings
- Conclusion – states the implications of the findings and an identifies possible new research fields
- References ("Literature Review") – organised by number in the order they were cited in the text.

Systematic review: Ashmann T-L. & C. J. Majetic (2006). Genetic constraints on floral evolution: a review and evaluation of patterns. Heredity 96: 343 – 352.

The structure includes:

- Title – informs us it is a review
- Informative Abstract – informs us this is a meta-analysis (novel analysis in a novel context of previously published data)
- Introduction
- Body – Material & Methods, Results (including the use of tables and figures to display novel findings), Discussion
- Conclusion – a listing of novel findings of the meta-analysis
- References – organised alphabetically

This is structured like a research article (see **Guidelines for writing a Research Article**)

*Not specific to plant sciences but none the less important media in this field.

E) References

Anonymous (2003): Tips for conducting a literature review. Centre AlphaPlus. Available on http://alphaplus.ca/pdfs/litrev.pdf; accessed 12 November 2008.
Bem, D.J. (1995): Writing a review article for Psychological Bulletin. Psychological Bulletin 118 (2): 172-177.
Day, R.A., Gastel, B. (2006): How to write and publish a scientific paper. Sixth edition. Greenwood Press, Westport.

Noguchi, J. (2006): The science review article – An opportune genre in the construction of science. Linguistic Insights Volume 17. Peter Lang, Bern.

Ridley, D. (2008): The literature review – a step-by-step guide for students. Sage Publications, London.

Other references

https://www.scribbr.com/dissertation/literature-review

https://www.nature.com/articles/s44222-024-00256-4

https://scientific-publishing.webshop.elsevier.com/research-process/writing-a-good-review-article

https://authorservices.wiley.com/Reviewers/journal-reviewers/how-to-perform-a-peer-review/step-by-step-guide-to-reviewing-a-manuscript.html

https://www.youtube.com/watch?v=3EXpRQihNtU