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Presenting science

Biology Education Centre

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An investigation is not complete until the results are made public. This can be accomplished by scientific and popular articles, lectures and posters. Investigations within an area also need to be summarised and discussed in wider perspectives to further knowledge.

All presentations are made to convey a message. Therefore, all presentations are made from the point of view of the *recipient* of the message: How should the material be presented to awaken and maintain interest in the recipient, and how should the results be described so that the recipient understands? This means that the presentation will look different when aimed at different audiences; it is important to consider the intended audience when preparing a presentation.

Your presentation must be your own. You describe your results and discuss them in your own words. When you summarise what others have done, *e.g.* in your introduction and discussion, you have to use your own words and name the source of your information. Copying text without naming the source is considered plagiarism. Even if you name your source you are not allowed to copy more than single sentences (then within quotation marks); you should describe the information in your own words. A detailed description of how to use scientific sources and what is considered plagiarism and cheating can be found at the IBG web site under Student guide. Look for the document "How to avoid plagiarism".

Scientific reports

Reports, or "papers", are the most important tools for communicating scientific results. There are no principal differences between scientific articles and *e.g.* lab. reports or reports from field exercises – all aim to convey a message in an interesting way to their readers. Reports also demonstrate your abilities when you apply for a job or a research grant.

It is important that you express yourself clearly and in an interesting way. You must state the purpose of the investigation clearly and precisely, and organise your report in a logical, way permitting the reader to follow your work without leafing back and forth through the report. The amount of details should be sufficient so that the intended reader can read it from beginning to end, understanding what you did, how you did it, what the results were, and what they mean; it should be possible to repeat your work from your description.

There are general rules for how a report should be formatted to meet the demands for readability mentioned above. These are described in the following paragraphs. In addition, your supervisor will give you detailed instructions concerning what applies to the particular report you are writing.

Title

The title should be short, informative and arouse interest. If you include a vernacular species name in the title, you may add the scientific name in italics and within parenthesis. Alternatively, the scientific name can be introduced the first time the species is mentioned in the text. Abbreviations, apart from very common ones (*e.g.* DNA), are not allowed in the title.

Abstract

The abstract should be a summary of *your entire report*, that is, its introduction, materials and methods, results and discussion. The abstract should include why you chose the problem, what you did and how, what the results were, and what they mean. The abstract should *not* include any references. If you absolutely must quote a source for some statement, you must spell out author, journal, volume, pages and publication year within parenthesis. Abbreviations, except very common ones, should not be used.

Introduction ("why?")

In the Introduction, you introduce your problem area and describe briefly the *hypotheses* underlying the investigation and *what has been done previously* in this area, by yourself and others, citing sources of the information you describe. Divide the material into subsections with suitable subtitles. This is a good place to define terminology, and explain how complicated methods work. You should also describe *why* you consider it worthwhile to carry out this investigation. If your investigation deals with a particular organism a brief description of this organism may be called for, possibly including why it was chosen for this investigation. Longer description of investigated organisms are better off in Materials and methods under a heading like "The species studied".

The introduction is concluded by a description of your *aims*, under the subtitle "Aims". The aims should be described as clearly as possible, preferably as one or more hypotheses that can be tested. If there are several aims they should be stated in logical order – this simplifies your own writing as well as your readers' reading. However, the aims should be described in a few sentences only, and this section should not include a detailed description of your work or results.

Materials and methods ("how?")

Different branches of biology traditionally divide the contents of Materials and methods and Results differently. There are also different traditions with respect to where the Materials and methods section is placed - after the Introduction or after the Discussion. Ask your advisor what pertains to your report. For fieldwork and experimental work in *e.g.* toxicology and physiology, the experiments that were carried out are described in the Materials and methods section. For laboratory work, only the materials and the methods are described in the Materials and methods section, while the experiments you did are described in the Results section. You should describe how you have analysed your data and what statistical methods you have used. Methods described in common text books in statistics (such as the t-test) need no specific descriptions, but more uncommon methods do. Always name the computer programs or databases used. In all cases, the Materials and methods section must include sufficient detail so that another researcher may repeat the investigation. Also this section should be divided into subsections with subtitles.

Fieldwork

Describe *when* the investigation was carried out. Include date and time of day if this is of importance. Note that you cannot use the Swedish way of writing dates (980519 or 1998-05-19) if you write in English. Write 19 May 1998, or May 19th, 1998, instead.

Describe *where* the investigation was carried out, for instance by indicating direction and distance from the nearest municipality. You can also use coordinates; instructions for how to do this can be found on topographical maps. If you draw your own map, it must include *scale* and an arrow indicating *north*.

Include a brief *description of the area*. What kind of soil, water, or vegetation type was present? If your observations depend on weather conditions, you must describe the conditions prevailing during your work, as well as general climatic conditions at this location (*e.g.*, annual precipitation, mean temperatures). Describe how you carried out your investigations and experiments, and how the data were collected (instruments, methods). If different methods were used in different parts of the investigation, describe them in the same order they were presented in the Introduction.

Laboratory work

Start by describing all strains (bacteria, virus, animals, cell cultures, etc.) and plasmids used and after this how they were maintained and propagated. Tables are very useful here. If you have used genetically engineered strains, plasmids, etc. you often need to describe their construciton, preferably using simple maps.. Then describe how you did for example restriction cleavages, PCR, sequencing, measurements of enzyme activity, microscopy. Gather all like material together, in sections named *e.g.* "Oligonucleotides", "Immune histochemistry" etc., even if they have been used for very different things in your work. Your descriptions of methods should include *recipes for all solutions and media*, *volumes, times, temperatures,* etc. in an easily accessible form. For standard media and solutions, you may refer to standard laboratory manuals, *e.g.*, Sambrook's or Ausubel's manuals. For other media and solutions, recipes must be given, preferably within parenthesis, when they are first mentioned. Tables may be quite useful here as well. Centrifugations should be given in units of gravity, ("× *g*")[1]. If you have used kits, you

1) If m is the rotor radius in meters, and *rpm* the number of its revolutions per minute, the g-force (denoted × *g*) is $(\frac{rpm}{60} \times 2\,\pi)^2 \times m \times \frac{1}{9.82}$

must briefly explain what they contain and how they work. Sequences of oligonucleotides should be given, preferably in a table.

If you refer to other publications for detailed descriptions of methods, your text must include a short summary so that your reader can understand what you did and how you did it without a visit to the library. Thus, write "the concentration of exchangeable cations was determined after extraction with ammonium acetate as described by NN" rather than "the concentration of cations was determined according to NN".

Results ("what?")

In the Results section, you describe *what you did* (for experimental work) and *what the results were*. All results must be described in this section; you cannot include more results in the Discussion.

Fieldwork

The Results section of reports describing fieldwork usually contains only the data collected and analysed according to Materials and methods. The Results section therefore is relatively short.

Laboratory work

In reports of laboratory work the Results section includes descriptions of what you did. Organise this description so that you are telling a story, with a beginning and an end. This means that you need to explain what you did, usually also why, before you describe the results. Usually you need to include brief conclusions after each part explaining why you continued the way you did. This means you rarely report your work in the order you did the experiments. Often you realise halfway through that a control experiment is needed. Most logically, this is reported in the beginning or at the end of the Results section. Sometimes a flow chart describing the experimental procedures is required.

All work

Normally you have figures (diagrams) and tables illustrating your results (see below for how to construct these). All tables and figures describing your results must be included in the Results section, and you must refer to all of them in the running text. It is important to describe in the text *what* you see in these illustrations – do not just say "the results are shown in Table 1". No reader will find that very informative.

You must pick out the crucial observations, and describe them in words. Some examples of how you can refer to illustrations: "The Secchi depth was greatest in lake A, while the oxygen concentration was greatest in lake C (Table 1)." "We found a positive correlation between age and size of the perches (Fig. 1)." For statistical tests used you must include the name of the test, the number of observations or degrees of freedom, and the p value (see the example in Fig. 1).

Discussion ("what does it mean?")

In the Discussion, you comment upon your results, and make relevant comparisons to what others have shown earlier. It is important to support your statements by quoting the appropriate literature. You can also speculate in the significance of your results with respect to the organism or process you have studied. Here and there you need to summarise crucial results (so your reader is not forced to leaf back and forth through your report). However, such summaries should be brief indeed, the discussion is not a "glorified summary".

You should discuss whether your hypotheses have been falsified and therefore should be rejected, or if you can keep them for now. You should try to narrow down your hypotheses, or generate new hypotheses from your results.

If there were obvious sources of errors in your work preventing you from arriving at reliable results, you can name and discuss these briefly. However, you should not make the discussion into a long catalogue of everything that went wrong – everybody knows that with limited time available it is not always possible to go back and repeat the work. Instead, concentrate your discussion on the *positive* aspects of your investigation.

At the end of the discussion you can write a few sentences describing how this research can be continued.

Acknowledgements

If someone or some people have provided constructive criticism or support helping your writing, this is the place to thank them.

Citing your sources in the text

In your report, especially in the Introduction and Discussion, you need to describe what others have written about the topic you address, or nearby subjects. In addition you must in the Materials and methods section describe sources for all methods, experimental organisms, material etc. used. References for all this information must be cited in the text. Different journals use different standards for how to write citations. The ways references should be cited in your work are summarised below:

- The name of an author can be mentioned directly in the text, followed by the publication year in parenthesis. "The breeding success of the magpie has been studied earlier by Hansson (1967)."
- If the author is not mentioned directly you put both the name of the author and the publication year in parenthesis: "These cysteine residues are crucial for chelating the Zn cofactor (Öst 1987)"
- If you cite several references in the same place in your text, and/or cite more than one publication from the same author, you write them in chronological order, separated by commas (Johansson 1947, Johansson 1948, Ivanjak 1953, Öst 1953)
- If you cite two papers by the same author published the same year, provide them with a letter index (Svensson 1977a, 1977b,). These letter indices must appear also in the same place (after the publication year) in the reference list .
- If there are two authors to a report, you write the names of both (Ivanjak and Kärcher 1953).
- If there are more than two authors to a report you write the name of the first author followed by et al. (in italics; this means "and others"). NOTE that all authors must be named in the reference list.
- If your supevisor wants you to use numbered references, you number them in the order of first appearance in the text either within parentheses or as upper indices: "The magpie often uses old nests (9)" or "The magpie often used old nests[9]".
- Sometimes you only have an oral reference (somebody told you something). Cite an oral reference as (Göran Sahlén, personal communication [this is the only case where you give full names in a

citation]). Unpublished data, your own or those of others, can also be cited as (K. Johansson, unpublished observations). Before citing an oral communication, make sure you have understood the information correctly and obtain permission form the person you wish to quote. Personal communications and unpublished observations must not be used when there are published references saying the same thing, and they should not be listed in the reference list.

- Only reliable Internet sources may be cited (universities, authorities etc.). Cite them the same way (name of person or institution responsible for the page, year) as other sources.
- Web addresses to data banks and programs are given directly in the text.
- Software you have used (common in i.e. bioinformatics), are cited just as if it was a book. There is a person/company/organisation that owns the copyright (= author), and you should cite the organisation behind the computer programme (if any), year of the edition you have used and the URL where you have downloaded it. Often the citation information is available on the software web site.

Reference management software

To make it easier to manage references, you can use a free reference managing software called Zotero. IBG's reference style is available for Zotero. Please go to www.ibg.uu.se and search for Zotero to learn more and to download the programme and the IBG style.

Compiling the reference list

The Reference list includes *all publicly available work that you have cited*, no more, no less. Personal communications and unpublished work should not be included. Organise the list alphabetically by the first author. Reports by the same author are organised chronologically. Also here there are many different systems available. If you want to quote your sources by number rather than by name + year, number them in the order they appear and organise the reference list according to number (an alternative not available in Zotero). You may use a different format for individual references than the one shown here if that is more common in journals in your area, *as long as all information shown below is included for all references*. For papers you include *all author(s)*, *year of publication*, *title of paper, journal*, *volume and pages*. For books you include *all author(s)*, *year of publication*, *title, possibly edition*, *publisher*

and place of printing. For anthologies (collections of papers) you include also *editor(s)* and *title of the collection* as well as the *pages* occupied by the cited chapter.

For journals without a paper edition you should cite the volume and e-page number or the doi number (digital object identifier number), but the journal name must still be included. In the next section you find more details on how to cite a paper that you read on the web.

For web sources other than journals you should include the *name* or organisation behind the site, the *title* of the work, the *date* of publication or last update, and the *date* you visited the site.

Article in a journal:
Stenøien HK, Såstad M. 1999. Genetic structure in three haploid peat mosses (Sphagnum). Heredity 82: 391–400.

Journal *Volume* *Pages*

Journal without volume and page numbers:
Wilmers CC, Getz WM. 2005. Gray wolves as climate change buffers in Yellowstone. PLOS Biology, doi 10.1371/journal.pbio.0030092.

Book:
Begon M, Harper JL, Townsend CR. 1996. Ecology. Individuals, populations and communities. 3rd ed. Blackwell Science, Oxford.

Chapter from book:
Chapter title
Keddy PA. 1990. Competitive hierarchies and centrifugal organisation in plant communities. In: Grace JB, Tilman D (eds). Perspectives on plant competition, pp. 265–290. Academic Press, San Diego.

Chapter title *Pages* *Publisher* *Editors* *Printing place*

Reports and theses:
Berggren Å, Söderberg M. 1992. Diversity of soil animal in different habitats. Project work, Ecology MN1, Uppsala University. *Note that you can quote a thesis only for the actual results described, not for background information.*

Year of the edition, sometimes you should also give the version number
Copyright owner
Software:
R Core Team. 2013. R: A Language and Environment for Statistical Computing. R Foundation for Statistical Computing, Vienna, Austria. URL: http://www.R-project.org.

Title *Organisation* *Organisation place*

Articles from the Internet:
Beckleheimer J. 1994. How do you cite URLs in a bibliography? WWW document 15 March 1994: http://www.nrlssc.navy.mil/meta/bibliography.html. Accessed 23 June 2003.

You must be consistent and use exactly the same format for all references. Here are some details to consider:

- Check *carefully* where to use period, comma and colon.
- Use abbreviated *or* full names of journals, not a mix. There are standard abbreviations for the journals, but if you do not know the abbreviation you should write out the full name.
- For journals you should not include the word "volume", and you should not include the number of the issue within the volume. Write "11: 115–121" (*not* "volume 11(2): 115–121").
- In some reference list formats journal names and book titles are in italics, and the volume number is in boldface. If you use such a format you should use it for *all* references.
- The reference list should have the same language as the rest of the paper, but always give the title of the work in the original language. In a report in Swedish you would write "opublicerad rapport från Uppsala universitet" but in English "unpublished report from Uppsala University". See also these examples: Swedish: I: Grace JB, Tilman D (red.). Perspectives on plant competition. English: In: Grace JB, Tilman D (eds). Perspectives on plant competition.

How to cite an article from the Internet?

This is how a paper might look like on the web:

In the running text you cite it as (Gilbert *et al.*, 2005). In the reference list you cite it as:

> Gilbert RA, Tomkins N, Padmanabha J, Gough JM, Krause DO, McSweeney CS. 2005. Effect of finishing diets on *Escherichia coli* populations and prevalence of enterohaemorrhagic *E. coli* virulence genes in cattle faeces. Journal of Applied Microbiology 99: 885–894

Note that authors are listed with their family name *last* in the paper, but they should be listed with their family name *first* in your reference

list. Thus, if you take the information from the paper itself, you need to rearrange the names. If you take the information from *e.g.* PubMed (http://www.ncbi.nlm.nih.gov/sites/entrez) instead, you get it correct from the beginning, but you have to remove the date, issue number and e-publication date (shown with arrows below) before including it in your reference list.

PubMed citation:
Two closely related RecQ helicases have antagonistic roles in homologous recombination and DNA repair in Arabidopsis thaliana.
Hartung F, Suer S, Puchta H.
Proc Natl Acad Sci U S A. 2007 Nov 20;104(47):18836-41.Epub 2007 Nov 13.

Your reference list:

Hartung F, Suer S, Puchta H. 2007. Two closely related RecQ helicases have antagonistic roles in homologous recombination and DNA repair in *Arabidopsis thaliana*. Proceedings of the National Academy of Sciences of the USA 104:18836–41

You should not give the doi designation when you have volume and page numbers. If neither volume nor pages are shown but just a doi designation, you give this. If a volume number is given but no regular pages, only "e pages", you quote this (*e.g.* e237). The web address is never cited in the reference list.

Tables and figures

How much data should be reported? You need to report your work so that your reader can see that your claims are justified. You must present *representative data* in the form of diagrams, tables, gel pictures, elution profiles etc. You do not need to search for "the perfect gel" showing analysis of all your samples – a representative gel with a few of them is satisfactory. Avoid lengthy tables with raw data. Lists of species etc., that are helpful but not essential, can be placed in an Appendix. The same data are reported *either* in a table *or* in a figure, never both. Tables are used for numerical data or data that can be described with a few words; everything else is presented as figures. Tables are also very useful in Materials and Methods to describe organisms, strains, plasmids, cell cultures, oligonucleotides etc. that you have used. When you have reported data in a figure or a table, you do not repeat the data in the running text. Instead, you present your important results in words in the running text, as described above. The title of a table or figure together with the explanatory text should be sufficient to enable the reader to understand what the table or figure shows without referring to the running text. This means it must be indicated clearly what you analysed, and what analysis was done.

All figures and tables should be numbered consecutively (Arabic numerals), in separate series for the figures and the tables, in the order in which they are referred to in the text. You must refer to all figures and tables from the running text.

Tables

A table should have a *heading* explaining its content. There are different traditions for how explanatory texts are handled: footnotes, a short legend placed *beneath* the table, or explanatory text *above* the table (between the title and the table itself. Ask your advisor what applies in your case.

table title *label* *unit*

Table 1. Oxygen concentration and Secchi depth in three lakes.

	Oxygen concentration (mg l^{-1})		Secchi depth (m)
Lake	day	night	
A	5	5	10.0[a]
B	8	ND	5.0b
C	10	8	1.5[b]

table head

[a] one determination

[b] average of three determinations

footnotes

The table head contains titles for all columns, naming categories and units. You may have two or more rows of headlines (see example above). The leftmost column ("Lake" in the example above) names the category whose properties are described in the same row in the following columns (oxygen concentration and Secchi depth). All entries in one row in a table must describe properties of the category named in the leftmost column. Data should be organised so that the table is read across (that is, the lakes should be in the leftmost column so that their properties are read across). Horizontal lines separate the table head (containing headlines for the different columns) from the data, and delineate the table at the top and bottom (see Table 1). Vertical lines are not used in scientific tables, nor are there horizontal lines in the table itself. If you lack data at one point, write "ND", which means not determined, to distinguish lack of data from data that are zero. Be sure to use decimal points rather than decimal commas (which are used in many Swedish-language computer programs). Footnotes may be used for explanations referring to single rows or columns in the table, for instance, explaining abbreviations.

Figures

Figures can be diagrams, maps, drawings of the organisms studied, gel images, plasmid maps, and bar graphs or curves showing numerical results (see Figures 1–4 below). For graphs, both axes must be labelled with what is measured, and in what units. All figures should have legends that make them understandable without reading the report itself. The first sentence after the figure number is the figure title, which should explain the content of the figure. The remaining text should be written in complete sentences. The experimental material must be described, and also what is analysed in each well on the gel, each bar in the diagram etc. However, the text should only explain what is analysed, not what the results mean. There are different traditions in different areas of biology concerning the level of details in figure legends; consult your supervisor for information on what applies to your work. The equation of the regression line is included only if it is used in your work.

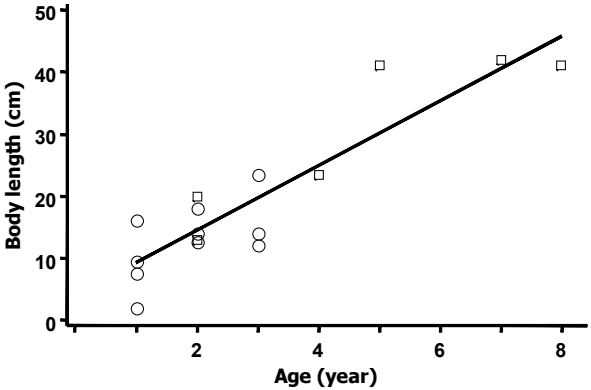


Figure 1. Relationship between perch body size and age in lake Erken. R^2 = 0.86; n = 16; p < 0.01. Circles = males, squares = females

Use sufficiently large letters and symbols in the figure so they can be read after printing the text in A4.

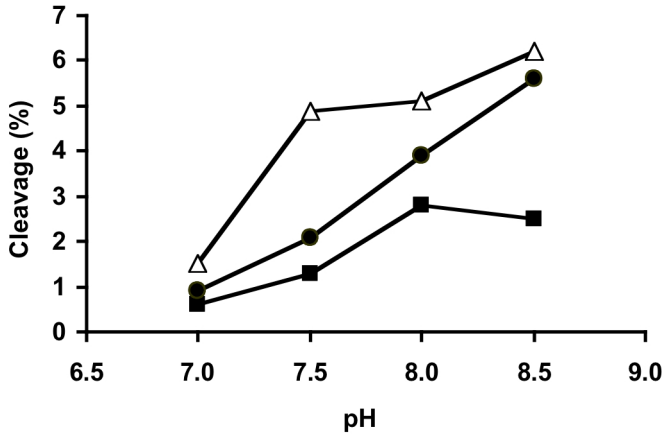


Figure 2. Cleavage of the three plasmids at different pH. Covalently closed circular DNA from pUH71 (triangles), pUH72 (filled circles) and pUH73 (filled squares) were treated with I-PpoI in vitro for 30 min in buffers with different pH.The reaction products were separated in agarose gels, and the cleavage frequency at the I-PpoI- site calculated as fraction linearised DNA.

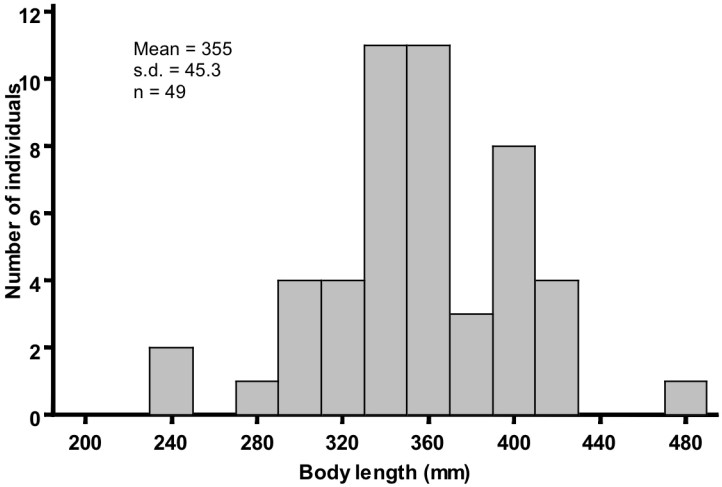
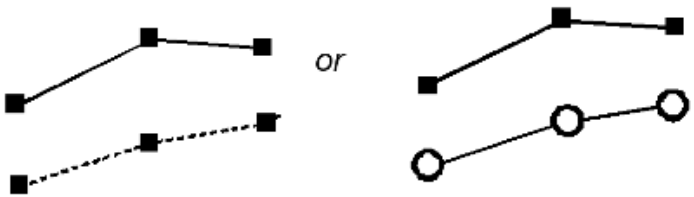


Figure 3. Size distribution in female Syngnathus acus.

Line graphs should be used only when the variable varies continuously; otherwise use *e.g.* bar graphs. You may need to distinguish curves using different colour or line style, or by using different symbols for different data sets. However, more than one distinguishing feature often gives a confused impression.



A flow chart may also be helpful:

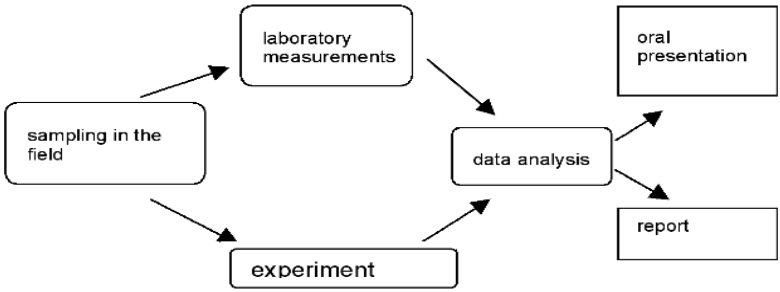


Figure 4. Scheme of the different steps in a scientific investigation.

Use colour with caution, and make sure your graph can be understood also if printed in grey-scale.

Format, grammar and spelling

Format your report approximately like a scientific report in your area of work, but remember that your target group is fellow students, that is, students having the same basic education that you have but lacking the specialist knowledge you have gained through your work on this project. You must write so they understand, and *include more background than is common in the scientific literature*. Explain *all* special terms and abbreviations that are not known from your common basic education. Use as few abbreviations as possible! If you need many abbreviations you should make a list; place such a list after the summary. Numbers lower than 12 are written with letters in running text (*e.g.* "three birch species"). Note the space between a number and its unit (45 mM).

Use polished language and avoid jargon. Write complete sentences and make sure all allusions are correct. Write short sentences; long sentences often lead to misunderstandings because of unclear allusions. Be consistent in your use of **present and past tense**, and *always describe your own results in the past tense*, when describing your aims, in the Materials and methods section and in Results. Also in the Discussion you use the past tense when you summarise your results. You use present tense here only when you draw general conclusions from your work. Use the past tense also when you describe results obtained by others and use present tense describing the conclusions from that work.

A common misunderstanding states that scientific reports must be written in the **passive voice**. Your report will be more easily read, and you avoid some linguistic traps, if you *alternate between active and passive voice* and *avoid using nouns where a verb would simplify the narrative*. Write "we (I) measured..." instead of "measurements were performed...". (However, do not write "we" in a report where you are the sole author). An occasional "I" is quite OK. This is your work, and you have all reasons to be proud of it! You can use the search function of your word processor to find all "made, done, carried out, performed". After reading a sentence where such a word was found, rewrite it without this word. The text will become shorter, more succinct, and easier to understand. Use the spelling and grammar checker of your word processor with care – it is written for general texts, not scientific texts. It might be a good idea to ask somebody to check your report with respect to language before you hand it in.

Scientific names of organisms are italicised:

- *Quercus robur* (pedunculate oak), *Betula pubescens* (birch).
- When you mention the same species again you can abbreviate the genus name:
- *Q. robur, B. pubescens* (note space after the abbreviation point and small initial letter for the species epithet). However, you can use the same genus abbreviation only for one particular genus in a report; if you talk about several genera starting with the same letter you must include more letters in the abbreviation to avoid confusion.
- Names of higher taxa (*e.g.* families) are not italicised: Betulaceae (the birch family)
- One or several unspecified species in a genus: *Betula* sp., *Betula* spp.
- Subspecies: *Betula pubescens* ssp. *czerepanovii* (mountain birch).
- Note that sp., spp. and ssp. (subspecies) are not italicised.
- Names of types (groups without taxonomic significance) are not italicised: *Salmonella enterica* serovar Typhimurium.

Also **gene names** are italicised: *lacZ*, *Sox3*. The names of the corresponding RNA or protein products are not italicised: lacZ, Sox3.

Use of upper-case and lower-case letters varies in different areas of biology; ask your supervisor what pertains to your area. If your report discusses both RNA and protein products you need to include the words "RNA" and "protein" as needed to avoid misunderstandings.

Be **consistent** in the layout of your report. Use the same style and size for all subheadings, and use *either* an empty line feed above new paragraphs *or* indentation of the first line of a paragraph. The following standard is useful:

- Font Times New Roman, 12 points.
- Title written in bold, 14 points.
- Subheadings bold.
- Explanatory figure and table texts, 10 points. However, the table text itself should be in 12 points
- Pagination centred in the bottom margin.
- All text adjusted left, 2.5 cm margins all around.

Versions to be read and commented by others must be doubly spaced.

Reviews

A review is not based on your own data but on published literature, and is organised somewhat differently. The parts *Summary*, *Introduction*, *Discussion*, *Acknowledgments* and *References* are included also here, but as a rule there are no Materials and methods, and instead of a section named "Results" you use headlines and subheadings suitable for the content you summarise. The introduction is very short, as a rule at most 1/3 page, and provides only a brief introduction to the problem discussed and why this is interesting. In the discussion you discuss the results you have summarised and place them into a larger context; personal reflections are not wrong here. References are cited as you write in the same way as described above, and tables, figures and the reference list are prepared as described above.

Popular scientific reports

The disposition and style of a popular scientific report is quite different from that of a scientific report. Write it like a newspaper article: a striking title conveying an interesting message, and an introductory paragraph that expands this message and explains what is so interesting about it. Always start with the most interesting and the most concrete. Your text competes for the attention of the readers with many other texts, and if you do not arouse their interest in the first couple of lines your case is lost. Thus, it pays to devote some effort to the title and first paragraph.

Avoid technical language, writing instead simple, everyday language with short sentences. Metaphors, simple figures and illustrations are helpful. Write personally, preferably in first person. Aim for holding on to the interest of the reader. Details, methods and complicated arguments are placed towards the end of the report. Save a little goodie to finish your report, maybe a sentence about future research in the area, to make the reader feel satisfied and eager to learn more after finished redaing.

Posters

A poster is more an advertisement for your investigation than a report. Reading *and understanding* a poster must not take more than 10 minutes, preferably less. This means that you need to simplify, and emphasise the most important material. It is easiest to prepare your poster using a suitable PowerPoint template. The title is your main message. Short subtitles divide the text into smaller parts and make the overview simpler. Start with what is most important, use figures rather than text. Attach cards with your contact information, and sheets with additional information. Landscape format is preferable; you must avoid text at knee level. Large text (like on a poster) should be written in a font without serifs, like this (Arial, Helvetica or similar) while small text (like in a printed report) should have serifs (*e.g.*. Times New Roman) to give the eye "a line to follow". If the title occupies only one line you can use UPPER CASE LETTERS, otherwise (and for all other text) use lower-case letters. An example of a poster is shown in the middle of this booklet.

Pieces of advice on oral presentations

All oral presentation require preparations. Listeners gratefully listen to a well prepared presentation. If you are well prepared you can catch their interest within a few minutes, and you can show your knowledge in the area. A few pieces of advice to catch the attention of your audience:

- Find out who are listening. Your talk must be at an appropriate level. Start where their knowledge ends. What is obvious to you now is new to others.
- Make sure your audience can hear you. Use a microphone if there is one available in the hall.
- Introduce yourself and possible collaborators.
- Hand out a summary of your talk, especially if you are showing complex figures.
- Maintain visual contact with your listeners. You can activate them by posing a question.
- Start with what is most interesting, and repeat your main message at the end.
- Introduce essential background and methodology together with the results they gave, and discuss the significance of those results directly. Listeners easily get lost if you organise your presentation as you would have organised a written report.
- Simplify. A short talk can never give the whole story – but the best part of it.
- Use illustrations (animals, plants, instruments etc.) if appropriate. Just beware that all time is not spent viewing your material.
- Use written key words. It is *extremely* difficult to read from a written manuscript in a natural way. Watch out for fillers (uh, eh, like), and use ordinary language without slang. Don't avoid personal touches and flavour your talk with an occasional joke, opinion or thought. This can lift a talk immensely.

- End in time to give room for questions.
- Practise beforehand, preferably with a friendly listener.

PowerPoint presentations

- Use text without serifs, at least 22–24 points, at most 5–6 lines of text per slide.
- Prepare several slides rather than cramming lots of information into a single slide. One message per slide works best.
- Make sure, *ahead of your presentation*, that your equipment works!
- Guide the listeners through the figures: name the axes and explain all symbols.
- Stand next to the screen facing the audience.
- Use a simple, bright background.
- Avoid using to many colours to highlight text or symbols; it will look messy. Certain colour combinations can be difficult to interpret for the colour-blind.
- Beware of ready-made formats and flashy effects in computer presentation programs. To many animations will distract your audience.
- Remove fine print and other details from a published figure you wish to use, and use larger fonts than in the original for axes labels. Cite the source below the figure.

Supplemental reading

Björk LA, Räisänen C., Björk M. 2003. Academic Writing: A University Writing Course. Studentlitteratur.

Day RA, Gastel B. 2012. How to write and publish a scientific paper. 7:th ed. Cambridge University Press.

Hoffman A. 2011. Thinking and Writing in Academic Contexts: A University Companion. Studentlitteratur.

Knisely K. 2013. A student handbook for writing in biology. W. H. Freeman, Sinauer Associates, Inc. (Co-publisher).

Malmfors B, Garnsworthy P, Grossman M. 2004. Writing and Presenting Scientific Papers. 2nd ed. Nottingham University Press.

Swales J, Feak, CB. 2012. Academic Writing for Graduate Students. University of Michigan Press.

UPPSALA UNIVERSITET

Do not tamper with the logotype! It has to be in Swedish, no matter what language the poster is in. And it has to have the square zone around it as above. This text is placed as close to the logo as allowed.

Here you can add some information. For instance:

Name
Tutor
Department

But no images! They are forbidden in the grey are according to the graphical profile.

An short engaging title, 120 pt

– It may be followed by a subtitle (80 points).

Name Surname

<- An image of yourself if you like

Conclusions first

Think of your poster as an ad for your work. Lift the most important results and ideas. Your header should communicate your main message.

A short introduction

Of some kind may be good to include.

Templates: The poster is most easily made in a PowerPoint template. You can find the templates in your course folder in the student portal or at https://mp.uu.se/c/perm/link?p=868875

Figure legend 24 points

Figure legend 24 points

The text

It is good to use subtitles. They will help the reader navigate and quickly understand what is communicated.

Use short paragraphs, ca. 4–5 sentences (4–7 rows).

About 35-40 letters per row (never more than 60). Left hand adjustment is preferable.

Leave some air between each paragraph.

Font for UU posters: Arial or Times New Roman, ca. 36 points.

References

If you want to include references, you can write then in a really small font, e.g. 12 points, and place them at the bottom of the poster.

Layout

The layout of the poster depends on the material presented. It is usually better to separate it in columns than in rows.

Remember to leave some space around the paragraphs and images to give an impression that the posters is easy to read.

Decorative images can be placed low on the poster.

Images

Use relevant images/figures/tables of high quality. They should be at least 200–300 dpi in 100% size.
Use **figure legends** (ca. 24 points) explaining what is shown. Do not double the information in your text.

Figure legend 24 points

Example of a poster