

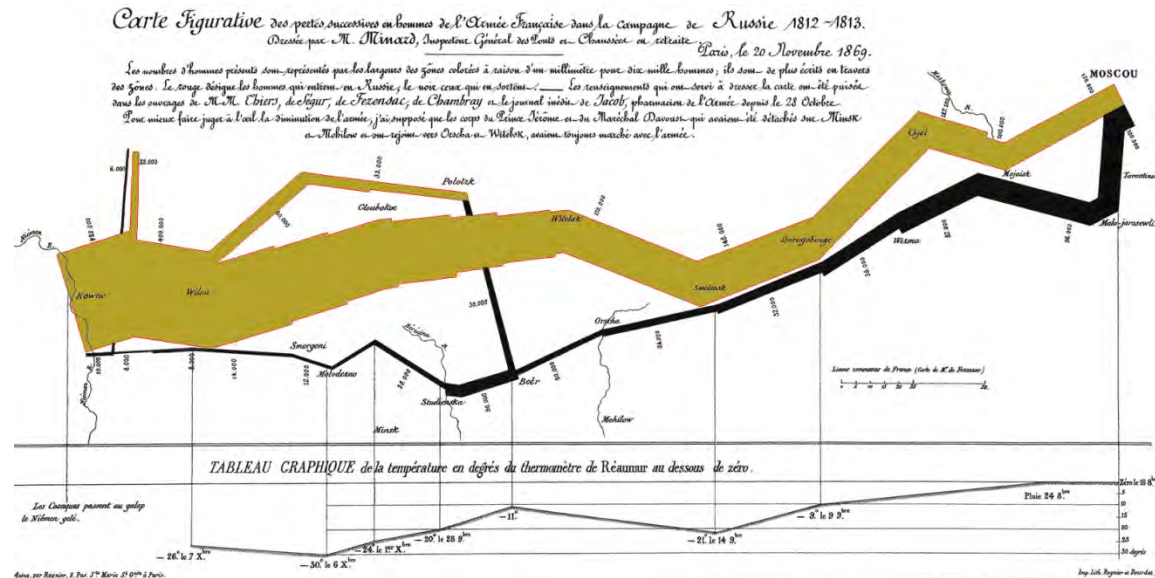


Workshop on How to Publish Papers in International Journals

Course coordinator and Lecturer: Dr. Raymond J. Ritchie



How to write the Results. Results (III) – The Graphs & Figures.



Tropical Plant Biology, Faculty of Technology and Environment, Prince of Songkla University Phuket Campus, Kathu, Phuket 83120 Thailand E-mail: raymond.r@phuket.psu.ac.th

Minard's graphic of Napoleon's march on Russia.

Results: Graphs and Figures

First points.

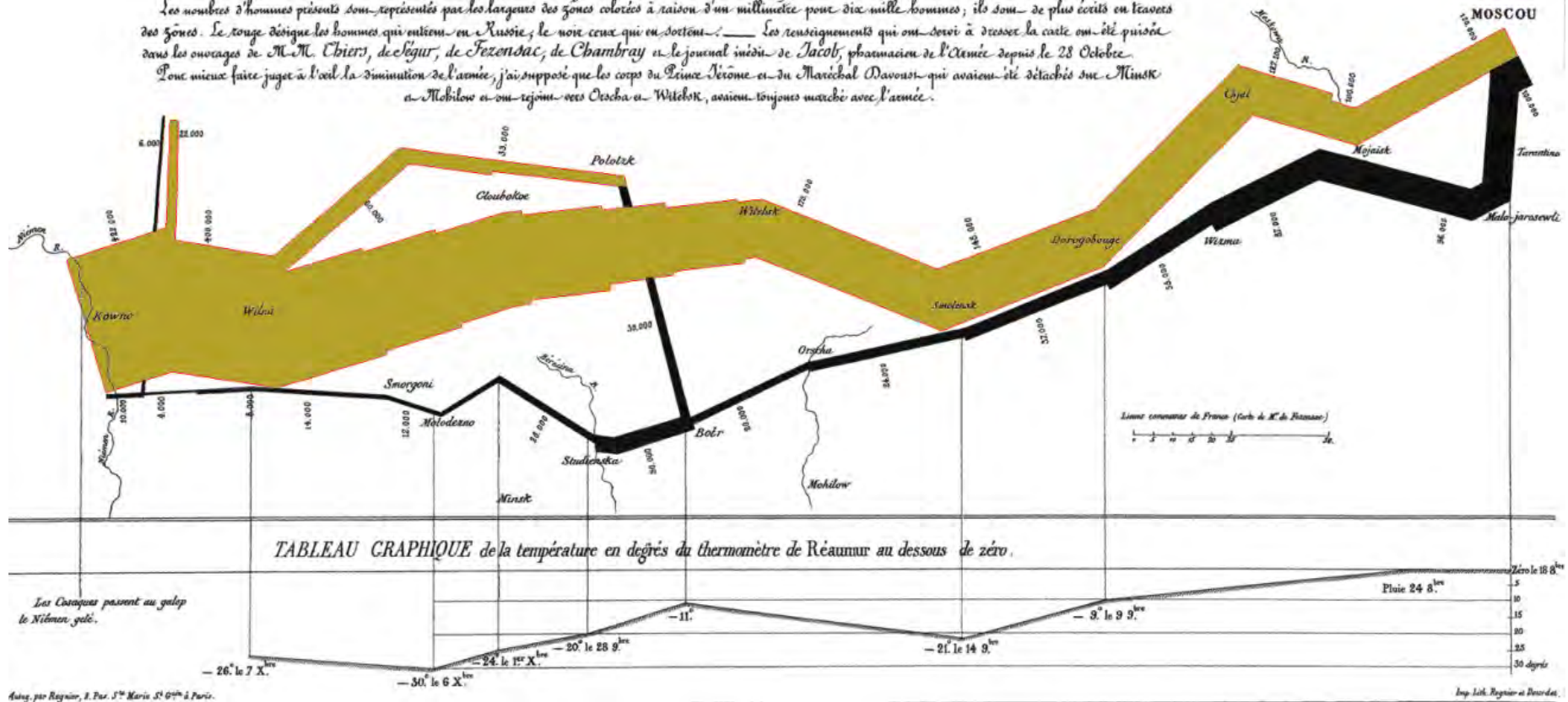
*** Problems with Graphs, Tables and Figures are usually the major reason why a paper is rejected.**

- Explicit verbal description of results is required. Graphs and Figures no more explain themselves than Tables do.
- Avoid information overload. Avoid complex figures and graphs.
- Conclusions based on statistics on data shown as graphs need to explicitly stated and it must be clear what data was used, the statistical tests that were used and the P values must be quoted.
- Graphs and Figures cost a lot of money in terms of technology and editorial and publishers time. Do not put in too many Figs².

Carte Figurative des pertes successives en hommes de l'Armée Française dans la campagne de Russie 1812-1813.

Dressée par M. Minard, Inspecteur Général des Ponts et Chaussées en retraite. Paris, le 20 Novembre 1869.

Les nombres d'hommes présents sont représentés par les largeurs des zones colorées à raison d'un millimètre pour dix mille hommes; ils sont de plus écrits en travers des zones. Le rouge désigne les hommes qui entrent en Russie; le noir ceux qui en sortent. Les renseignements qui ont servi à dresser la carte ont été puisés dans les ouvrages de M. M. Ebiers, de Féguir, de Fexendac, de Chambray et le journal inédit de Jacob, pharmacien de l'Armée depuis le 28 Octobre. Pour mieux faire juger à l'œil la diminution de l'armée, j'ai supposé que les corps du Prince Jérôme et du Maréchal Davoust qui avaient été détachés sur Minsk et Mohilew et qui rejoignent Orescha et Witebsk, avaient toujours marché avec l'armée.

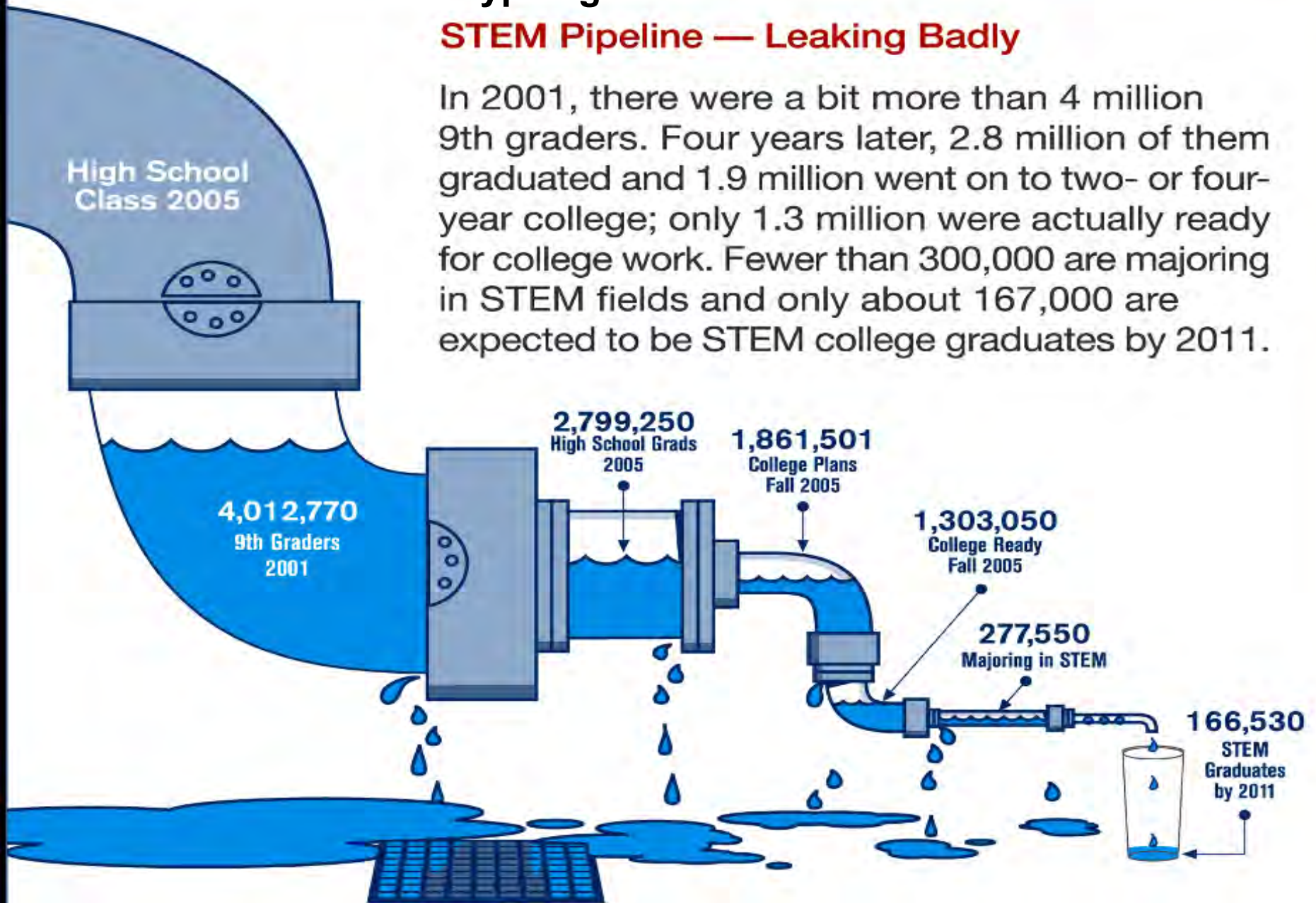


Minard's graphic of Napoleon's disastrous march on Russia conveys a great deal of information in a single figure. Napoleon lost nearly all his men, in particular those who had marched with him and had reached Moscow (only a few survived). Of 350,000 men only 10,000 got out of Russia but it is worse than that. Most of the survivors had been on garrison duty in Smolensk etc.

“A March on Russia” type figure on American Science Education

STEM Pipeline — Leaking Badly

In 2001, there were a bit more than 4 million 9th graders. Four years later, 2.8 million of them graduated and 1.9 million went on to two- or four-year college; only 1.3 million were actually ready for college work. Fewer than 300,000 are majoring in STEM fields and only about 167,000 are expected to be STEM college graduates by 2011.



Source: NCES Digest of Education Statistics; Science & Engineering Indicators 2008

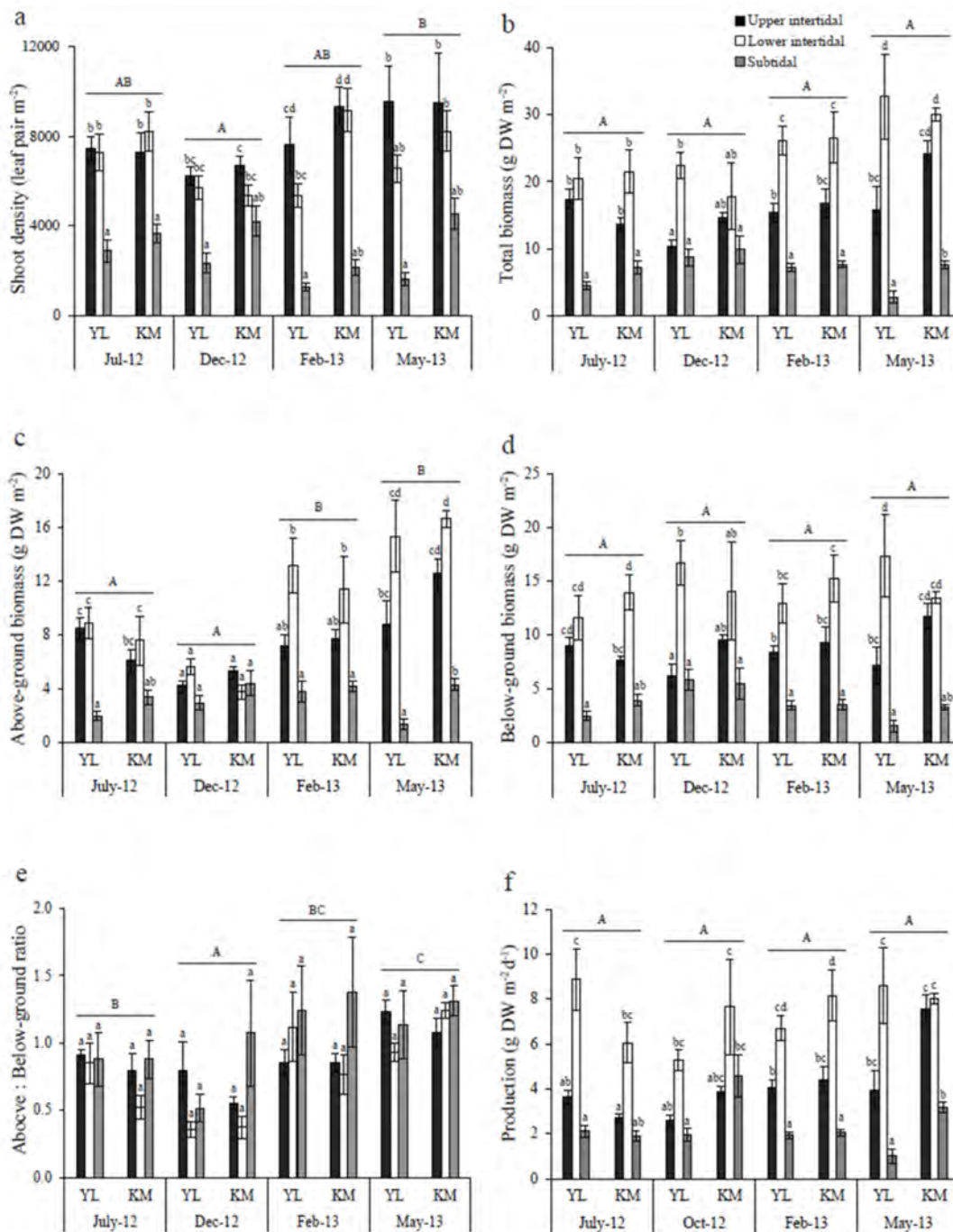


Fig. 4 a,b,c,d,e,f

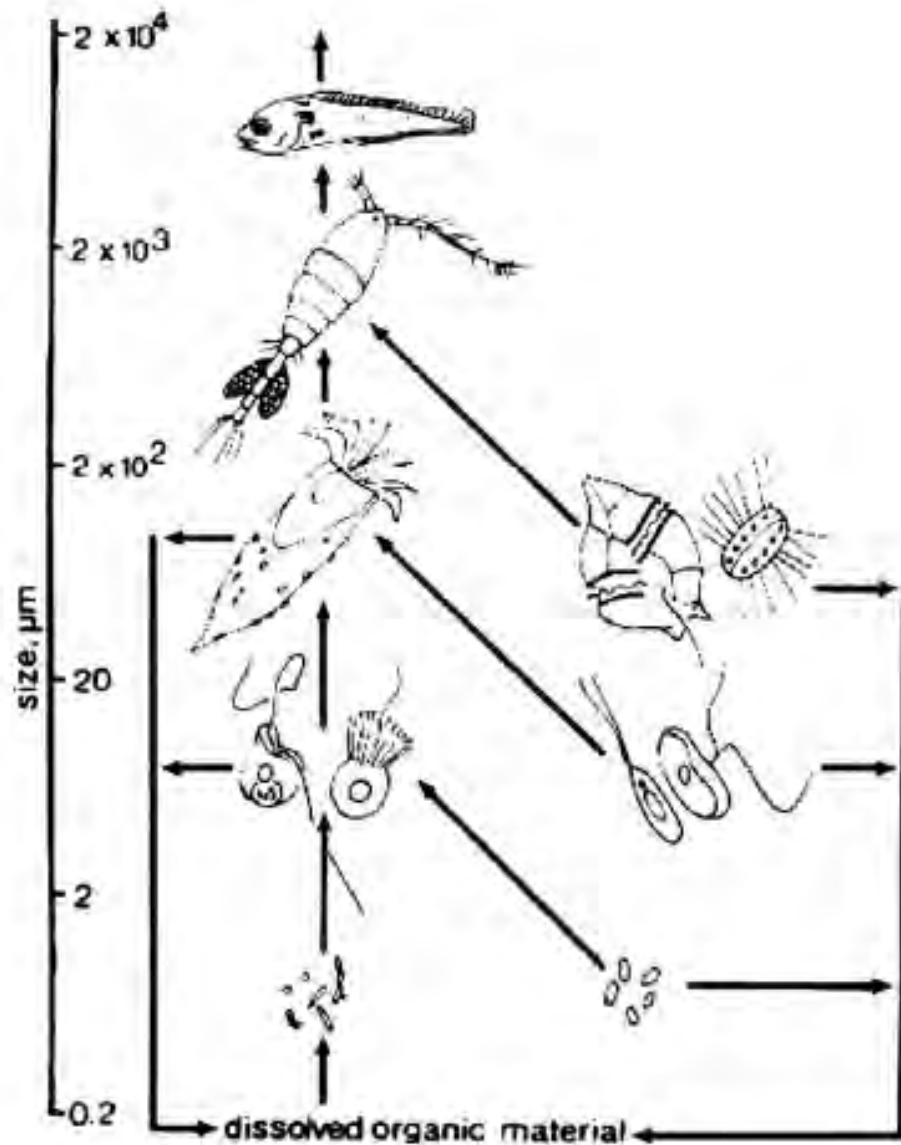
Here is an example of a bad figure, again from one of my own papers (Kaewsrikhaw et al., 2015). The problems are information overload and the text is so small you cannot read it .

In Graphs you are expected to:

- **Accurately** present the results, do not leave out data points you do not like.
- Graphs and Figures no more explain themselves any more than Tables do. **Just because you have a photo of something that does not mean you do not have to say what it shows.**
- The more complex the Figure the more likely you will make mistakes in them. The chances of you finding a mistake in the previous figure is very small.
- **Instructions to Authors** are often very detailed about information for Figures. They can be absurdly detailed. Patiently do what the journal wants.
- Most journal publish Figures in colour for free, others do not. Be careful that you do not find yourself up for a massive bill. Journals often have two choices. Figure over one column or over two. A figure squeezed into a single column might be unreadable. If in doubt specify how you want it presented.
- Despite its obvious limitations use Microsoft EXCEL to draw graphs.

Some things you should not do with Graphs and Figures

- **Avoid information overload in Graphs – too many lines.**
- Conference proceedings often have very strict space limits. This encourages squeezing all your data into one or two big Tables. When you rewrite a conference paper into a journal paper it is a good idea to convert them to graphs. **Figures are better than tables.**
- Remember that **Graphics** do not explain themselves. You must state explicitly what they show. “Figure 1 shows the Electron Micrograph of the fish eggs” – **that is no good**. What does the EM show about the fish eggs?
- Have a good reason for putting in every **Graph** and **Figure**. If there is nothing much to say about them leave out or put in the Supplementary Material.
- Put esoteric information into the **Supplementary Material**.
- Read the **Instructions to Authors** very carefully about **format**.

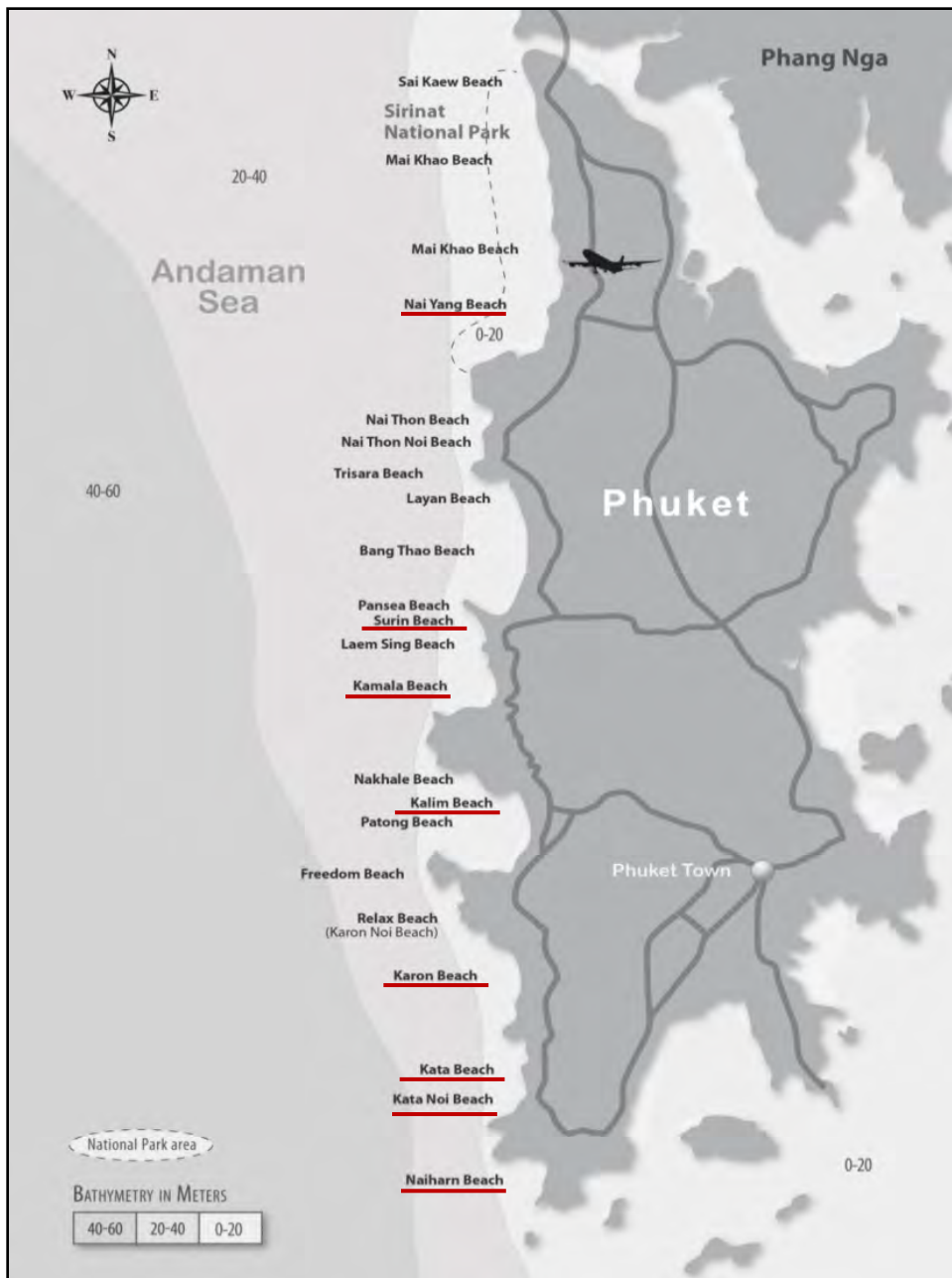


A simple drawing like this is worth 2-3 pages of text. However, you still need to explicitly state what it shows.

All Figures and Graphs must have a legend clearly stating what data is being presented. A minimal description is required.

*** Note that this Figure came from another publication. This must be acknowledged otherwise you are in trouble for breach of copyright.**

Fig. 2. *A drawing can say more than a thousand words; the marine plankton food web – including the microbial loop. After Fenchel (1998).*



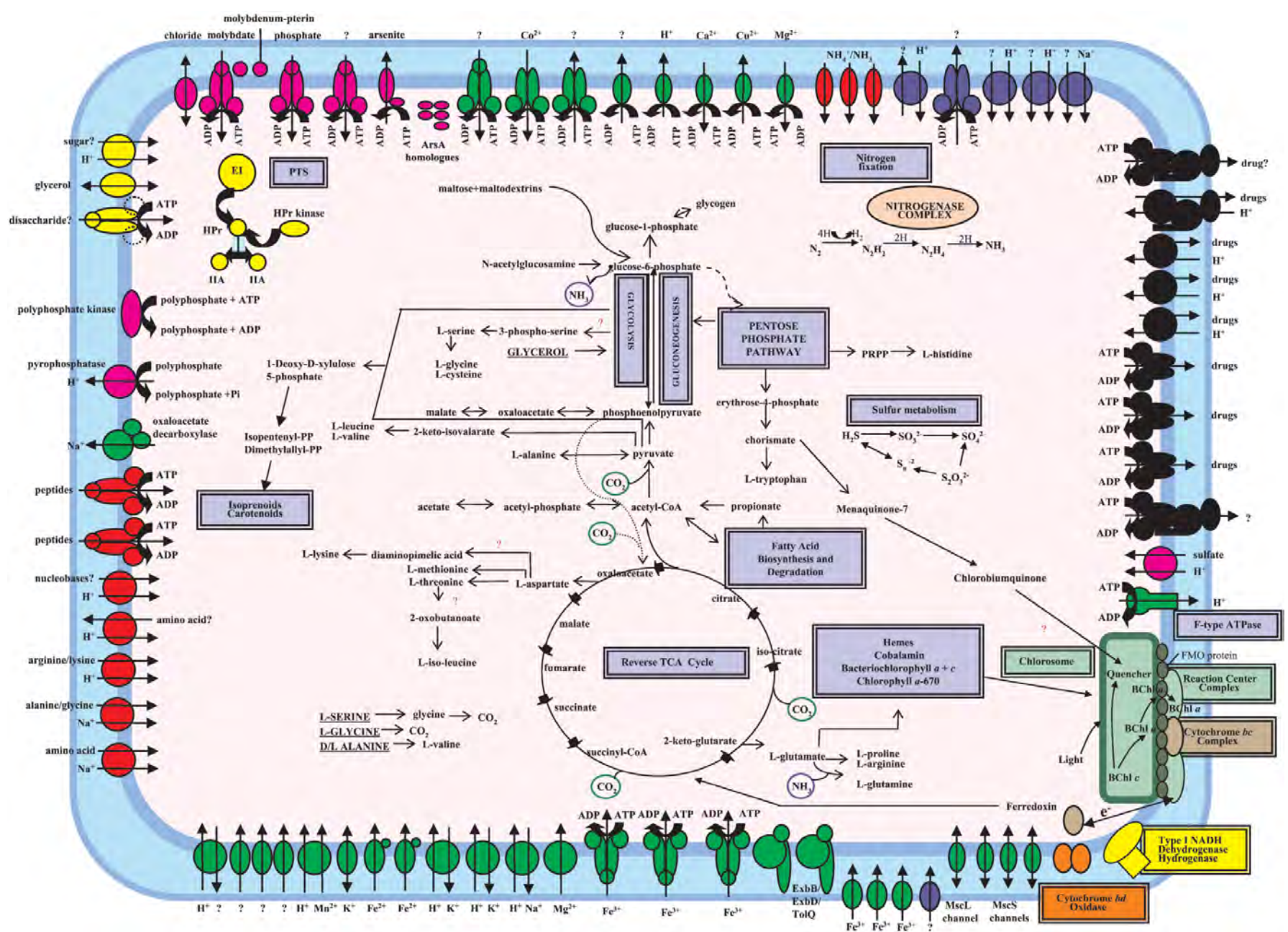
Anything wrong?

No distance scale!

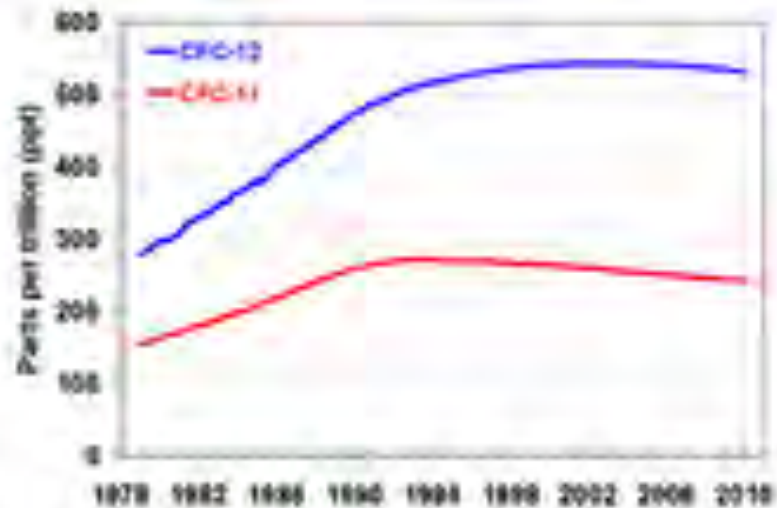
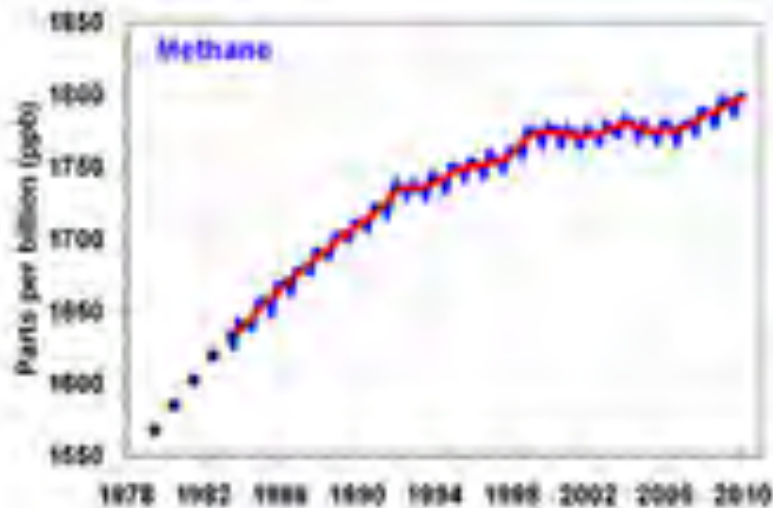
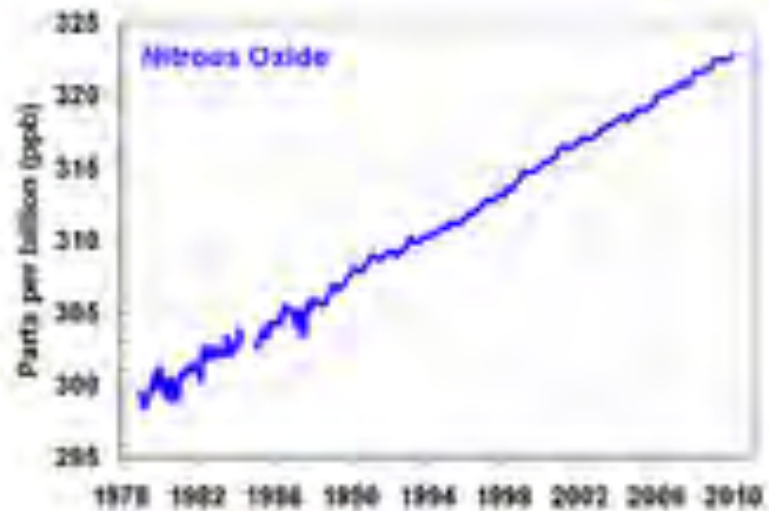
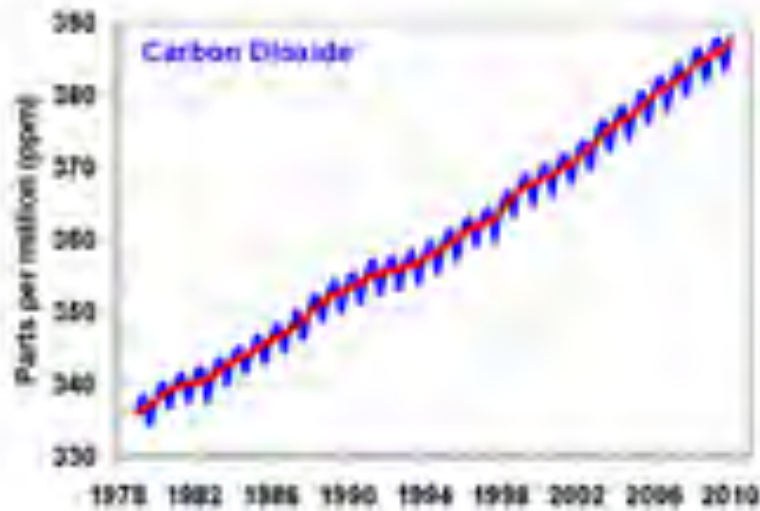
The author has previously published this figure but that original paper (Martin & Assenov, 2013b) does not actually say where he got it.

Steve Martin has told me he had it drawn for him so it is original but that is not stated.

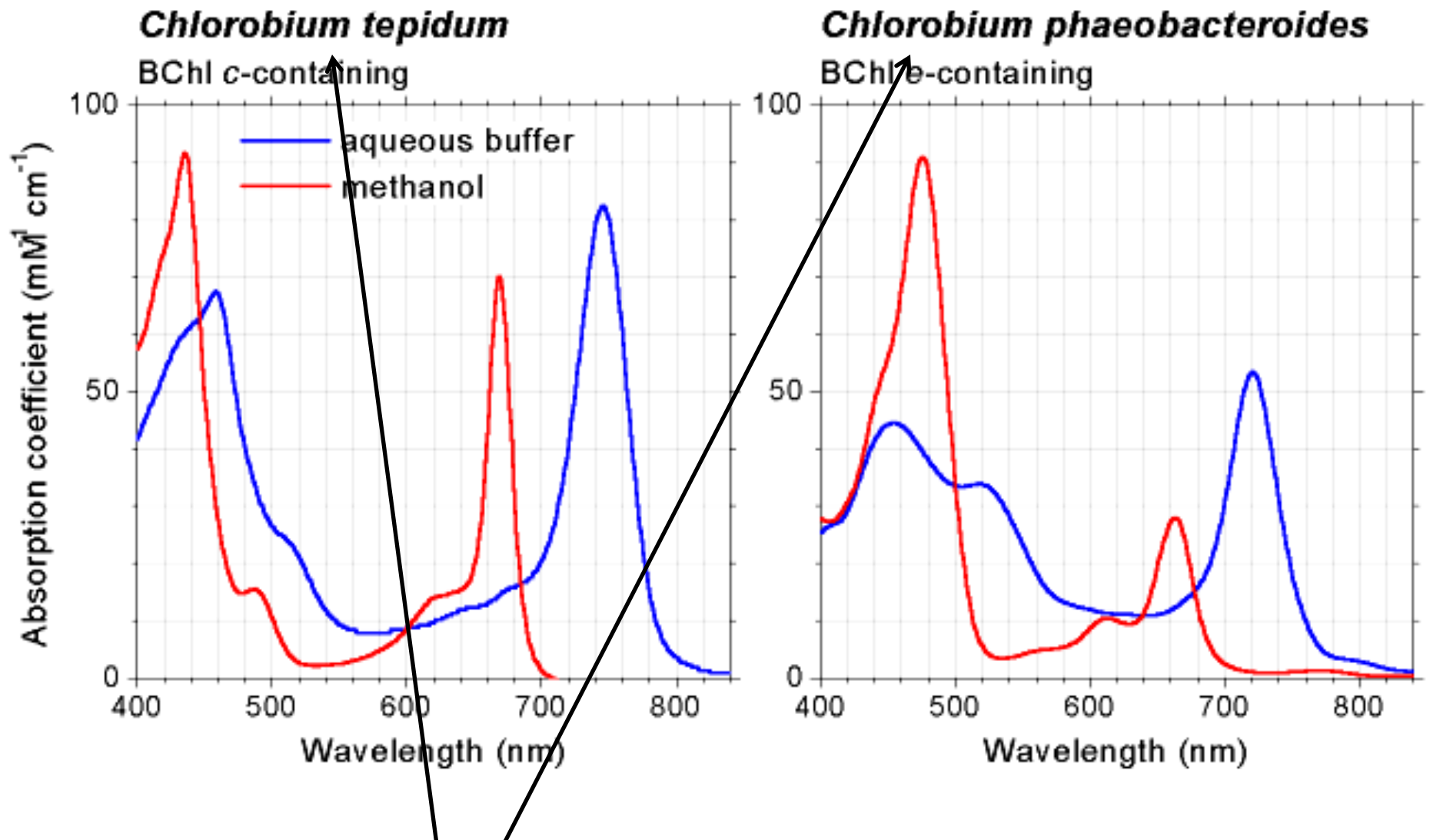
Figure 1 Surf Beaches of Phuket (Martin & Assenov, 2013b)



Typical example of Biochemistry – Molecular Biology Overload!

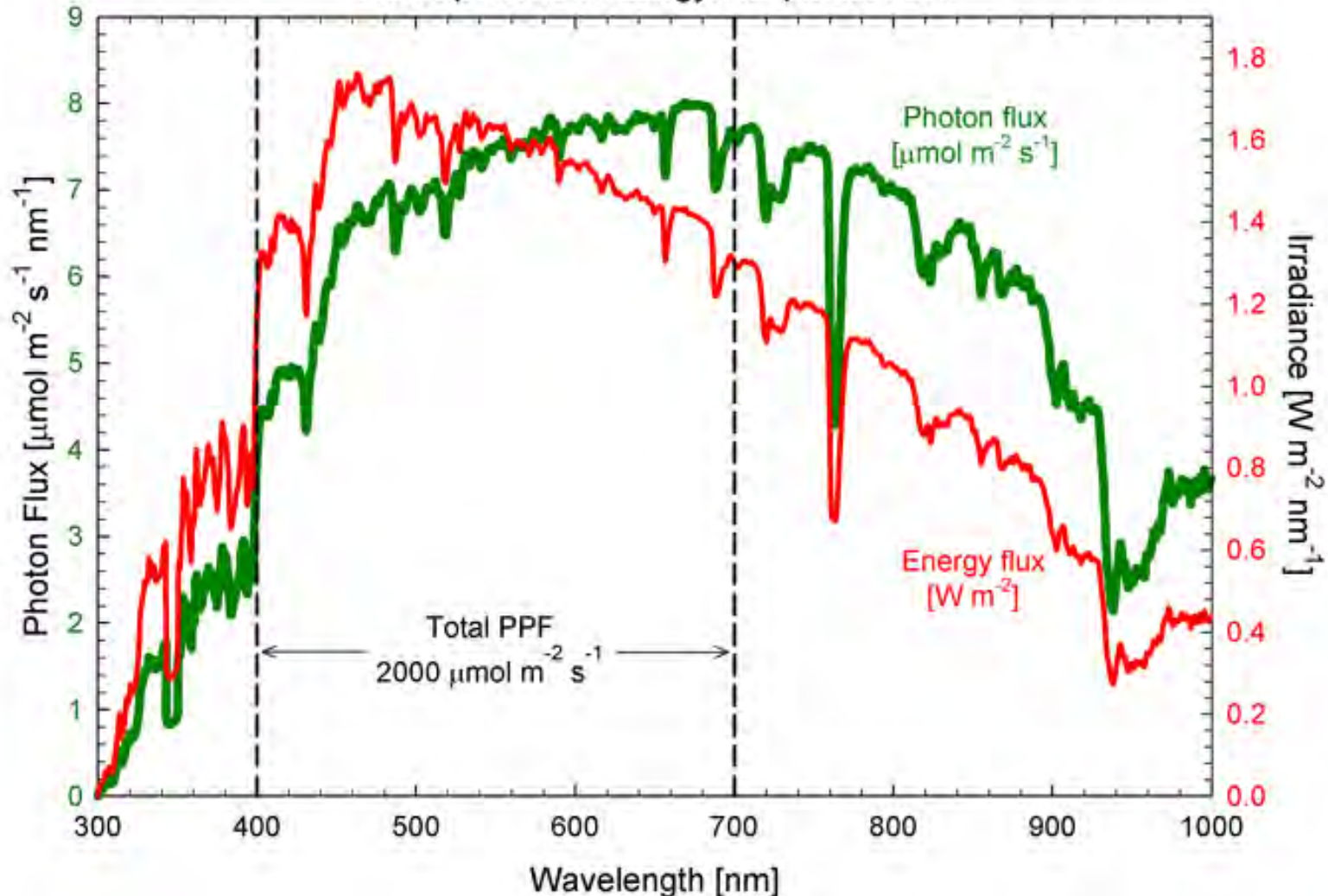


Good set of Figures indicating trends in Greenhouse gases. Notice though that it has lost resolution because of the file type used. Not publishable because it has gone fuzzy.



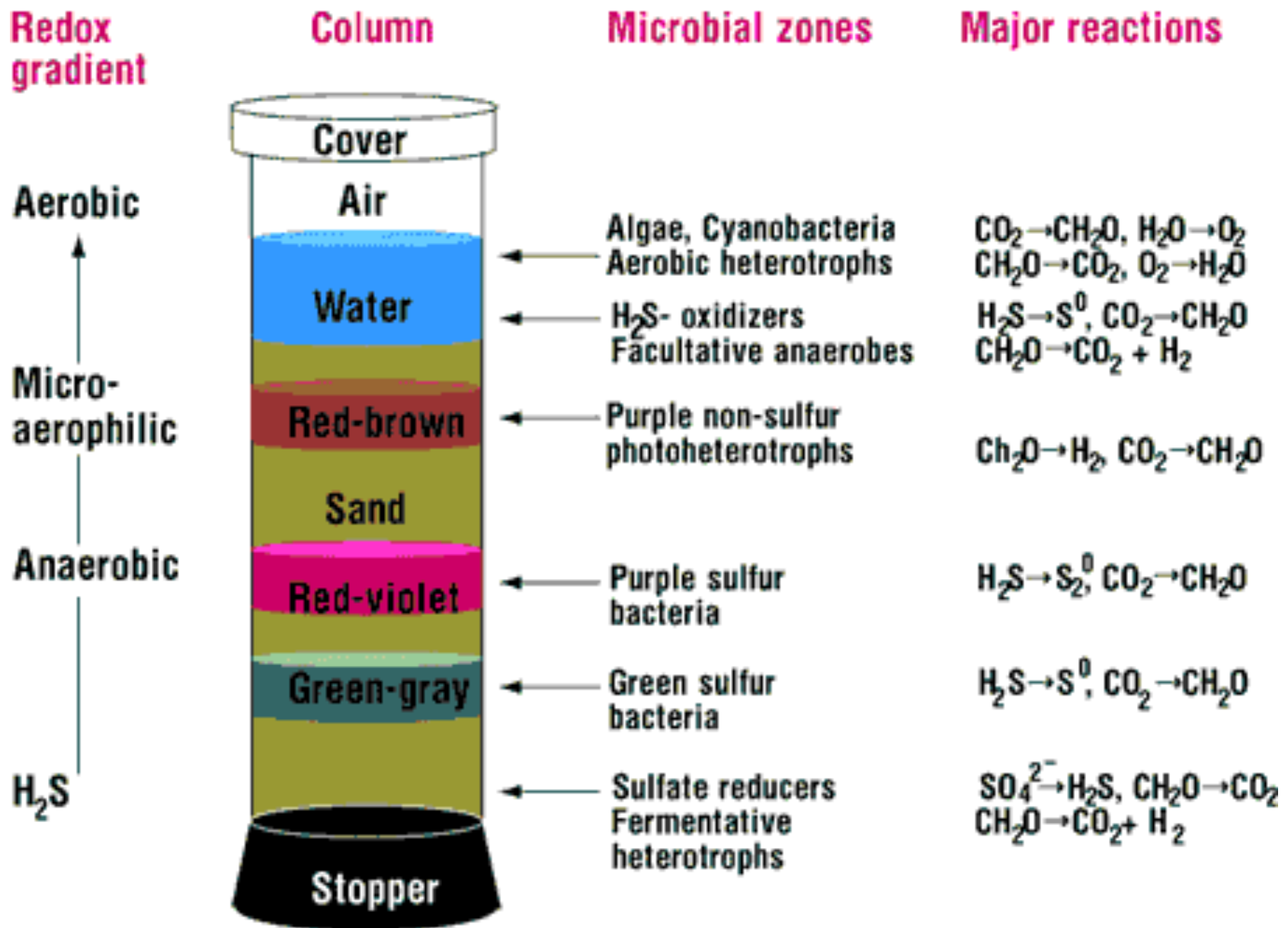
Nice Figures with good presentation. Usually journals like to put in their own headings. Red & Blue is OK for nearly all colour blind people but Red & Green is no good.

Sun spectrum at solar noon on the summer solstice, Logan, UT
A comparison of energy and photon flux



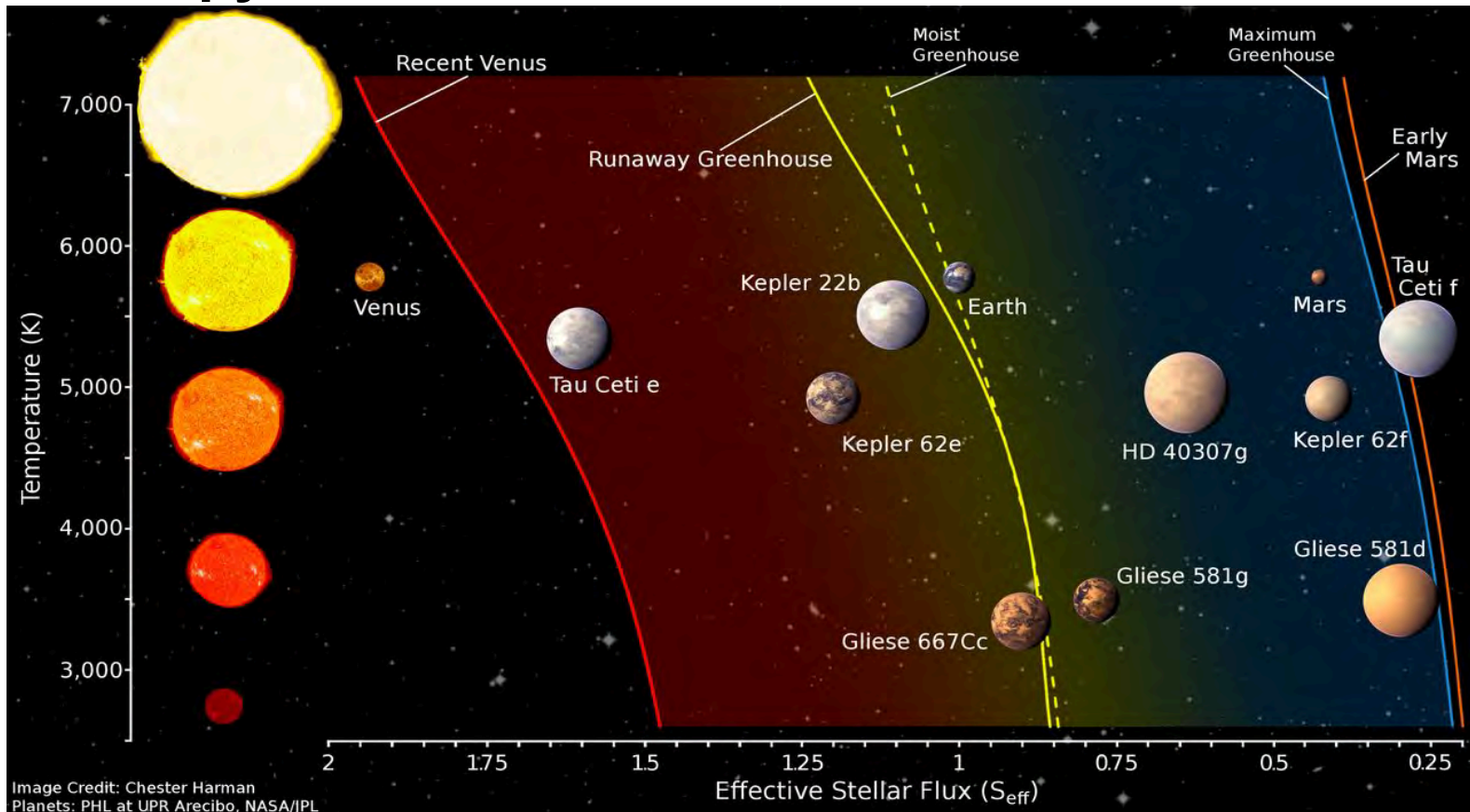
Data provided by Apogee Instruments, Inc. For more info, see www.apogeeinstruments.com

10% of Males are Red-Green Colour Blind. This figure is not appropriate.



Some of this is too crowded and there may be resolution issues.

Diagram showing different HZ boundaries for stars ranging in spectral type from F0 to M7. Does not photocopy well and looks dreadful in black & white.



James F. Kasting et al. PNAS 2014;111:12641-12646



Fig. 1. *"Congratulations, you are now capable of writing technical, impersonal and boring papers like myself and the other gentlemen – welcome to Academia"*. Drawing by Sverre Stein Nielsen.

from Sand-Jensen (2007)

References

- Beall, J. (2015) Beall's List: Potential, possible or probable predatory scholarly open-access publishers. [<http://scholarlyoa.com/publishers/>, accessed 24 Nov 2015]
- Cooper, B.M. (1975) Writing technical reports. Penguin Books, Hamondsworth, England.
- Day, R.A. (1998) How to Write & Publish a Scientific Paper 5th Edition. Oryx Press, Phoenix, Arizona 85012-3397 (Downloadable from Internet)
- Hodson, D (1998) Teaching and learning science. Open University Press, Buckingham, Philadelphia.
- Kaewsrikhaw, R., Ritchie, R.J., Prathep, A (2015) Variations of tidal exposures and seasons on growth, morphology, anatomy and physiology of the seagrass *Halophila ovalis* (R.Br.) Hook.f. in a seagrass bed in Trang Province, Southern Thailand. Aquatic Botany <http://dx.doi.org/10.1016/j.aquabot.2015.12.006>
- Lanham, R.A. (1974) Style: an antitextbook. Yale University Press, New Haven & London.
- McCain, G. and Segal, E.M. (1973) The game of science. Brooks/Cole Publishing, Monterey, California.
- Sand-Jensen, K. (2007) How to write consistently boring scientific literature. Oikos 116: 723727, 2007 doi: 10.1111/j.2007.0030-1299.15674.x
- Willingham, D.T. (2007) Critical Thinking Why Is It So Hard to Teach? American Educator 2007, 8 – 19.

