20.109 Illustrations

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Photo credit: Theresa Walunas, http://www.keyboardbiologist.net/knitblog/

Do not include illustrations for the sake of including them.

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Table 2. Effect of temperature on growth of oak (*Quercus*) seedlings[a]

Temp (°C)	Growth in 48 h (mm)
−50	0
−40	0
−30	0
−20	0
−10	0
0	0
10	0
20	7
30	8
40	1
50	0
60	0
70	0
80	0
90	0
100	0

[a]Each individual seedling was maintained in an individual round pot, 10 cm in diameter and 100 m high, in a rich growth medium containing 50% Michigan peat and 50% dried horse manure. Actually, it wasn't "50% Michigan"; the peat was 100% "Michigan," all of it coming from that state. And the manure wasn't half-dried (50%); it was all dried. And, come to think about it, I should have said "50% dried manure (horse)"; I didn't dry the horse at all.

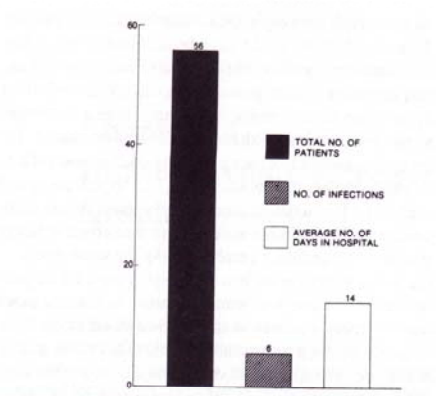

Figure 1. Incidence of hospital-acquired infections.
(Courtesy of Erwin F. Lessel.)

When a table or column can readily be put into words, do it. - R.A. Day

The table on the left is useless because the only useful (i.e., nonzero) data are found in a much smaller range of temperatures.

The graph on the right is useless because the numbers don't relate to each other.

Source: How to Write and Publish a Scientific Paper by Robert Day

Choose Illustrations according to a given goal.

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Table 9. Effect of streptomycin, isoniazid, and streptomycin plus isoniazid on *Mycobacterium tuberculosis*[a]

Treatment[b]	Percentage of negative cultures at:			
	2 wk	4 wk	6 wk	8 wk
Streptomycin	5	10	15	20
Isoniazid	8	12	15	15
Streptomycin + isoniazid	30	60	80	100

[a]The patient population, now somewhat less so, was described in a preceding paper (61).
[b]Highest quality available from our supplier (Town Pharmacy, Podunk, IA).

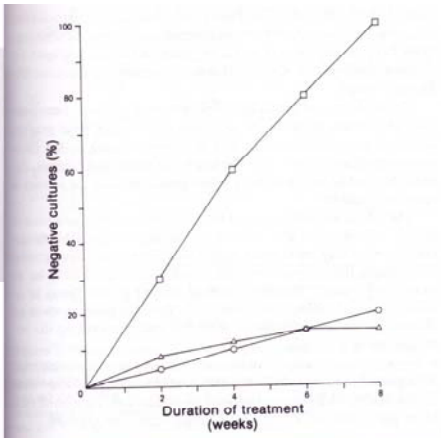


Figure 2. Effect of streptomycin (○), isoniazid (△), and streptomycin plus isoniazid (□) on *Mycobacterium tuberculosis*.
(Courtesy of Erwin F. Lessel.)

Types of illustrations and their uses:

-tables for specific numbers, or when repetitive data must be presented

-graphs for complex comparisons, or to present data in an organized way.

-line charts for trends

-pie charts for comparing a few values

-bar and dot charts to show items with different values

Elements of a table:

-Title (Heading): Single sentence or clause placed ABOVE table, right after the table number. Tables are the only illustrations where the title and number are placed above.

-Footnotes (Caption): BELOW table; gives enough detail to make data understandable.

-Headings (Columnhead and Subheads): Are clear and use abbreviations to conserve space.

-Cells (Data): Aligned properly and in a balanced manner, read down, and avoid white space.

Elements of a graph:

- Title and legend BELOW graph
- Font and symbols large enough to withstand reduction
- Scribe marks point inward
- Avoidance of color:
  - Filled and open shapes
  - Solid, dashed, dotted lines

An Illustration has an image and a legend.

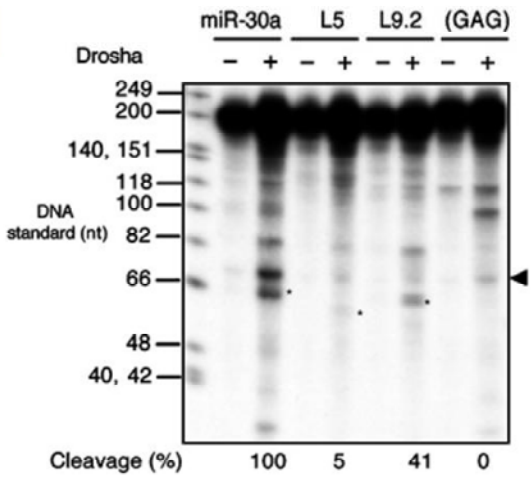
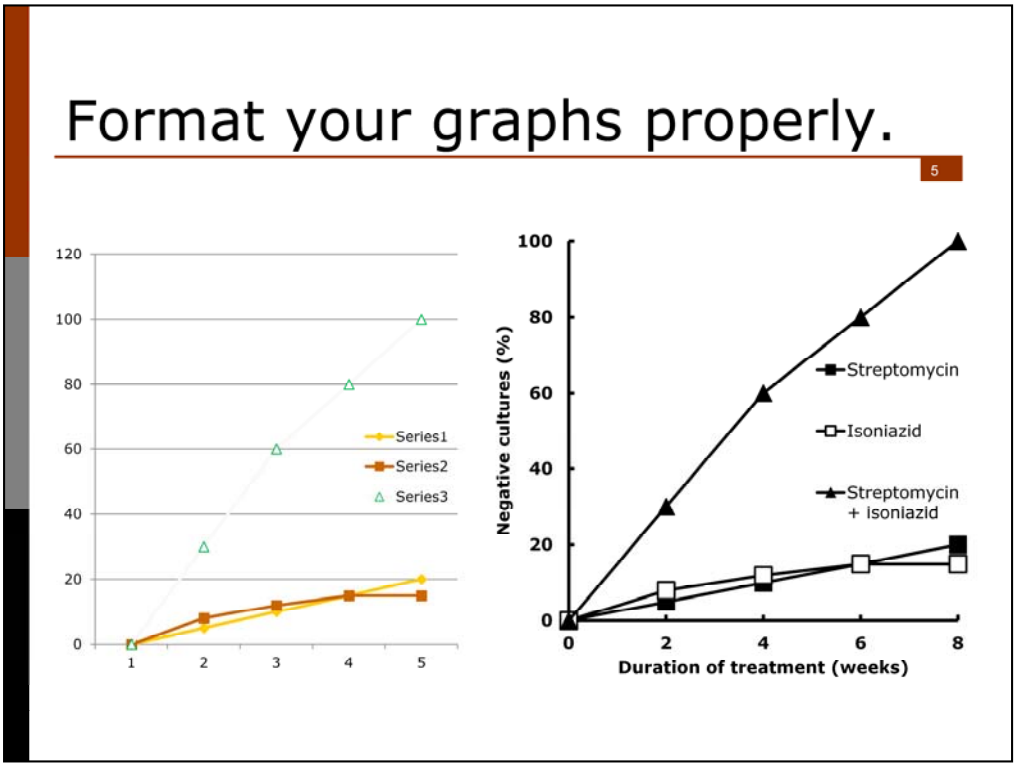


Figure 5. *In vitro* Drosha cleavage of pri-miR-30a transcripts. FLAG immuno-precipitates from mock-transfected 293T cells (–) or cells transfected with pCK-Drosha-FLAG(+) were incubated with a ^{32}P-labeled ~202 nt RNA probe encoding the indicated miR-30a variants. RNA cleavage products were recovered and resolved on a denaturing 10% polyacrylamide gel. The pre-miRNA band is indicated by an asterisk, and the background band running slightly above by an arrowhead.

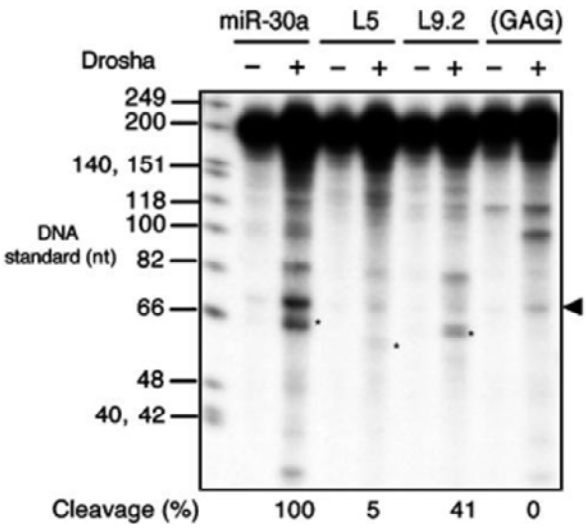
Zeng et al. (2005) EMBO J. 24: 138.



The graph on the left was copied straight from Excel 2010. The graph on the right was modified using the same program:

- Added axis titles and “series”; modified values of the x-axis
- Removed horizontal lines and useless tick marks on the axes (e.g., 120% on y-axis)
- Enlarged data points and labels for the axes (though should still be at least 18 point for an oral presentation)
- Used black for the lines

Gels should also be formatted properly.



Format your gels properly:

-Gel is properly positioned and cropped; show wells, not edges

-Title and legend below gel.

-Labels:

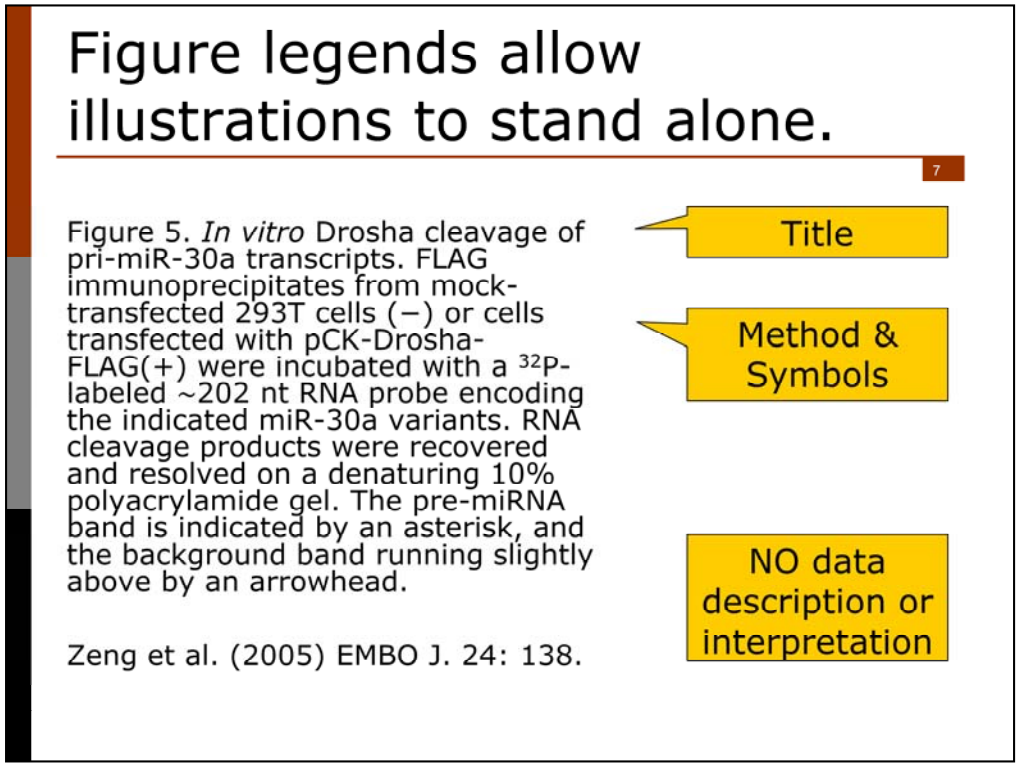
--Above each lane; use abbreviations. Note that the labels of this gel are almost like a table.

--(Lane numbers below – this helps you refer to specific lanes in the Results section)

--Molecular weight markers, with units.

--Font big enough to withstand reduction.

Two free programs that could help you format your gels are Inkscape (http://inkscape.org/) and Gimp (http://www.gimp.org/). You could also try MS PowerPoint or MS Office Picture Manager in MS Office Tools.



-Provides a title

-Explains how data was obtained, in this case the reaction performed and the electrophoresis conditions

-Defines abbreviations and symbols

Pitfalls to avoid:

-Reiterate results section, i.e., describes the data.

-Written in shorthand, abbreviated form rather than whole sentences

-Do not allow illustration to stand on its own, e.g. lack aspects of methods

-Contain self-referential language, e.g. “In this table/graph...” or “This figure shows...”

Label the figure according to what we've learned.

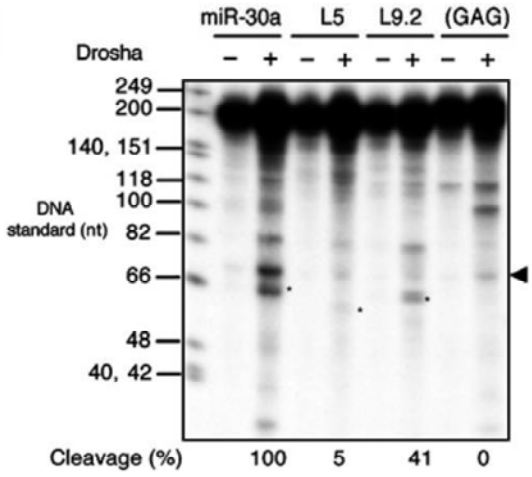
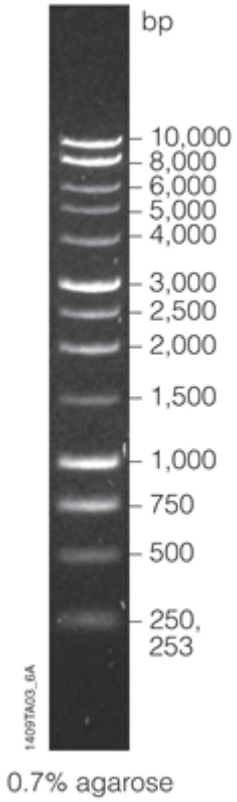


Figure 5. *In vitro* Drosha cleavage of pri-miR-30a transcripts. FLAG immunoprecipitates from mock-transfected 293T cells (–) or cells transfected with pCK-Drosha-FLAG(+) were incubated with a ^{32}P-labeled ~202 nt RNA probe encoding the indicated miR-30a variants. RNA cleavage products were recovered and resolved on a denaturing 10% polyacrylamide gel. The pre-miRNA band is indicated by an asterisk, and the background band running slightly above by an arrowhead.

Zeng et al. (2005) EMBO J. 24: 138.

Running your gel

You will use a 0.7% agarose gel (prepared by the teaching faculty), running four samples as well as a reference lane of molecular weight markers (also called a DNA ladder).



1. Add 2.5 µL loading dye to the pGEM-5Zf digested by NotI, as well as to the pSP72 digested by EcoRI.
   - Loading dye contains xylene cyanol as a tracking dye to follow the progress of the electrophoresis (so you don't run the smallest fragments off the end of your gel!) as well as glycerol to help the samples sink into the well.
2. Flick the eppendorf tubes to mix the contents, then quick spin them in the microfuge to bring the contents of the tubes to the bottom.
3. Load the gel in the order shown in the table below.
   - To load your samples, draw the volume listed on the table below into the tip of your P200. Lower the tip below the surface of the buffer and directly over the well. You risk puncturing the bottom of the well if you lower the tip too far into the well itself (puncturing well = bad!). Expel your sample into the well. Do not release the pipet plunger until after you have removed the tip from the gel box (or you'll draw your sample back into the tip!).
4. Once all the samples have been loaded, attach the gel box to the power supply and run the gel at 125 V for no more than 45 minutes.
5. You will be shown how to photograph your gel and excise the relevant bands of DNA.

Loading a gel

Lane	Sample	Volume to load
1	1 kb DNA ladder	20 µL
2	uncut pGEM-5Zf	10 µL
3	pGEM-5Zf NotI	5 µL
4	uncut pSP72	10 µL
5	pSP72 EcoRI	5 µL

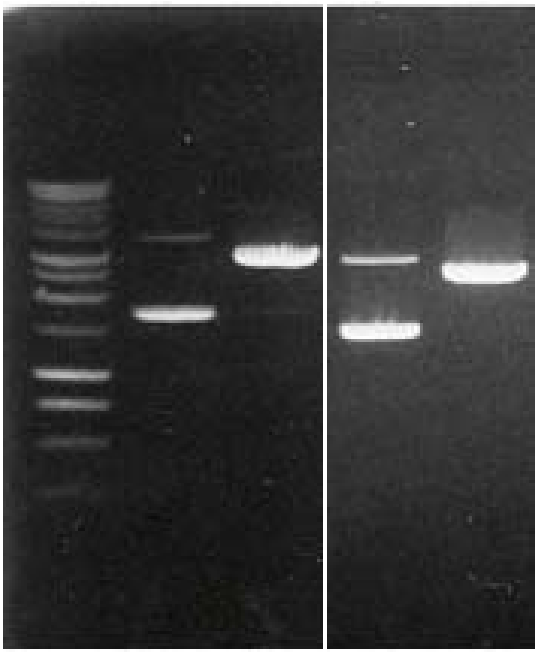
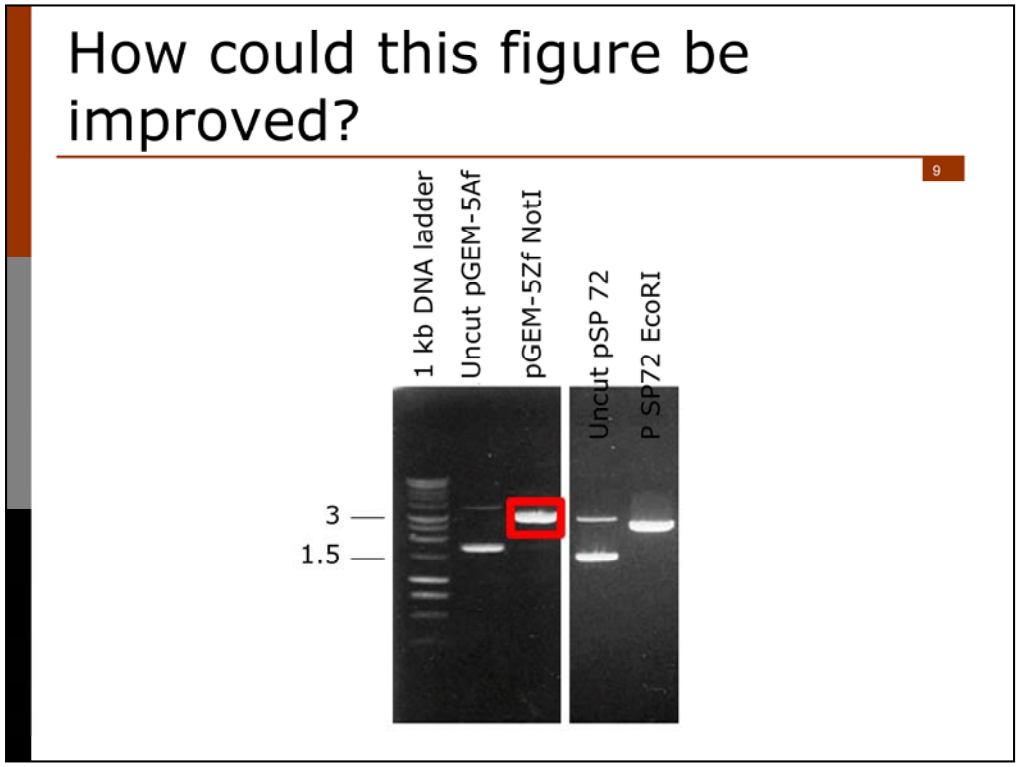


Figure 1.



MW markers:

-Label the bands are bigger and smaller than the bands of interest, plus one of the higher MW bands.

-Write out the numbers to the same number of significant digits, e.g., 4.0

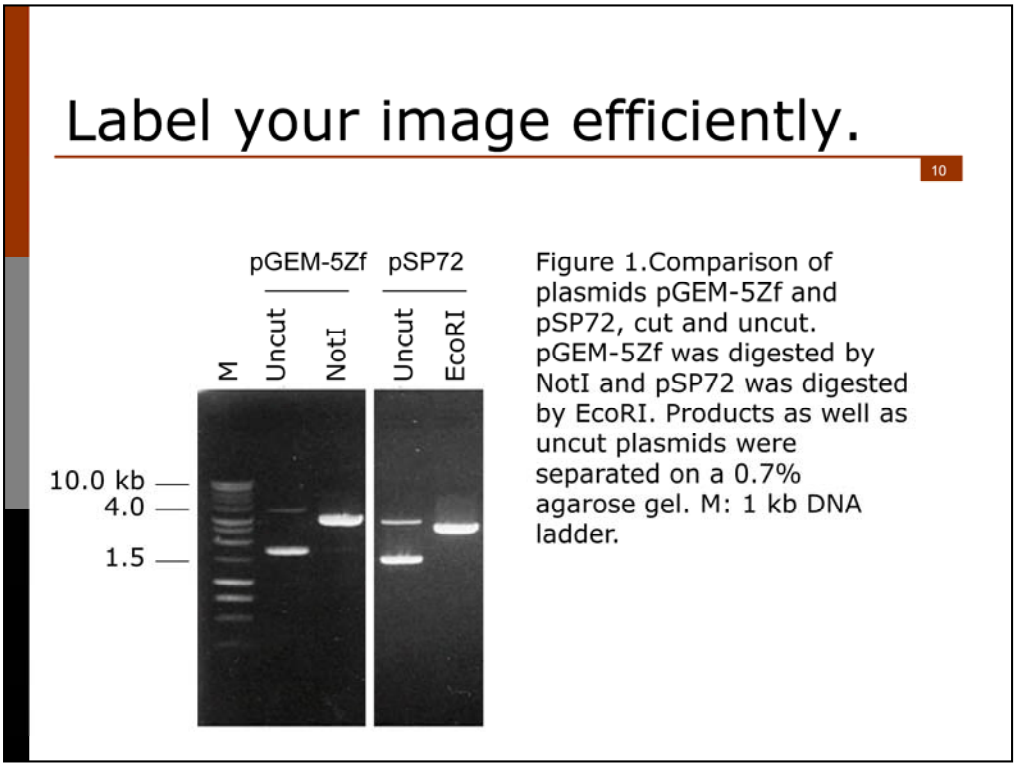
Sample labels:

-Label more efficiently. Some lanes can be grouped together because they share a common component such as a plasmid.

-Use abbreviations.

-Place labels outside of the image.

-Keep other marks on the image discreet; the red box potentially blocks other data, and could instead be replaced by a small asterisk or arrow off to the side of the image.



Notice that the image of the gel has been trimmed so that the reader does not see the edges of the gel, but can still see the wells.

Make sure to label at least a few of the MW marker bands, e.g., the bands are bigger and smaller than the bands of interest, plus one of the higher MW bands.

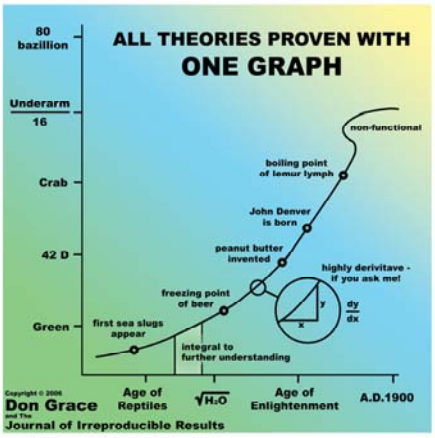
The figure legend below is very good because it has a title and describes how the image was created without describing the data.

“Figure 1. Electrophoresis of restriction-enzyme digested pGEM®-5Zf and pSP72 Vectors. NotI was used to digest the pGEM®-5Zf(+) Vector while EcoRI was used to cut the pSP72 Vector. The digestion products were analyzed on a 0.7% agarose gel. Lane M, 1kb DNA Ladder.”

Note that the title is specific (e.g., includes names of the plasmids), but does not contain all details (e.g., name of enzymes, type of gel used) because these details are in the legend. Basically, you want a title that helps the reader distinguish the illustration from other figures. A title that states the conclusion of the illustration would also be appropriate.

Photo: http://www.promega.com/resources/articles/pubhub/enotes/rapid-dna-digestion-using-promega-restriction-enzymes/

In summary, Illustrations should stand on their own.



- Consider type and remember format
- Label illustrations efficiently
- Describe methods, not data, in legends