Choosing a Topic for the Biology Internal Assessment

The investigation you design must…

...have a clear connection to the IB Biology syllabus
...be realistic (in the time available, with the materials available in our school's lab)
...respect ethical, safety and environmental expectations
...fit the criteria (Personal Engagement, Exploration, Analysis, Evaluation, Communication)

Be sure to look through the whole program for ideas, not just what we have covered so far.

- look at the syllabus in the official IB Biology guide - any topics jump out at you?
- look through the whole book, including the option we have chosen as well as options we will not cover - you are allowed to choose from something we don't do in class
- look at the colored boxes at the end of this document with ideas organized by theme

Check with me at regular stages to make sure that...

- the topic / theme is heading in the right direction
- it is realistic and doable (as well as safe!)
- it is original enough to qualify for the personal engagement criteria
- it permits you to collect data that is sufficient and will lead to interesting analysis

How to make the investigation "personal" and show some originality?

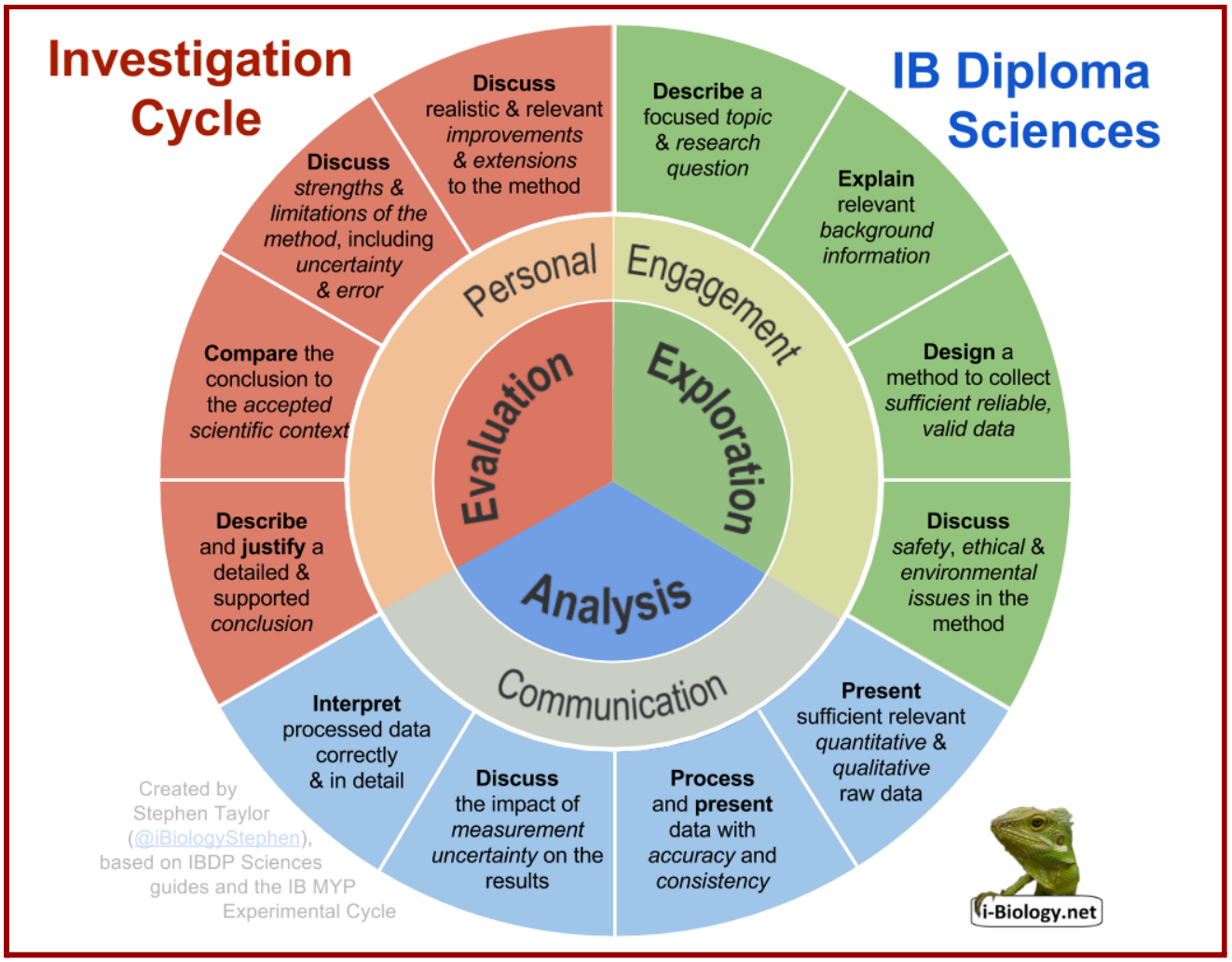
- Somewhere between these two extremes is what you want:
    - Extremely original: "I'm going to invent a brand new experiment that no one has ever tried before in Biology!" (bad idea - too much time will be wasted trying things that do not generate usable results)
    - Extremely unoriginal: "I'm going to copy an investigation from a book or web site and not make any adjustments" (bad idea - this does not follow the criteria for Personal Engagement)
- Suggestion for finding a middle ground: use techniques that you have already used in the lab and that you know work well but apply them to something we have not worked with.
- Often the way scientific inquiry works is that while doing one experiment, a scientist will get an idea for another one. Look back at the investigations we have done - which ones did you enjoy the most? Which ones generated the most questions for you?
- Sometimes ideas come from the most unlikely places, such as mistakes and sources of error. Think about all the laboratory practical you have done so far, and interesting issues or problems that came up… could you investigate further?

What if you really don't like lab work and you are more of a research person? The IB allows for 3 'flavors' of IAs listed here, although I encourage you to do lab-based investigations.

1. Based solely on observations collected by the student during lab work.
2. Based solely on raw data found in databases or generated by computer simulations.
3. Based on a combination of the first two, i.e. seeing if lab work can confirm what a database or computer simulation says should happen.

Here's a nice overview of what you are are expected to do - it's from Stephen Taylor at the Canadian Academy of Japan. Knowing what is expected of you is a good way to help you decide if the idea you want to pursue is a good one. If the investigation will lead you to be able to do all these things in the timeframe available, you should be on the road to a successful IA.

Source: http://i-biology.net/2014/08/24/ibdp-sciences-investigation-cycle/



See the next page for ideas of where you might start your investigation...

Possible Starting Points

The ideas in the colored boxes below are suggestions of possible starting points for an IA. They are adapted from a document provided by Richard Scarr at an IB Workshop. They are arranged by general biological themes rather than by IB syllabus sections.

Cells	
Cell size	Comparison of cell sizes of plant organs or tissues using a micrometer eyepiece
Osmolarity	water potential of tissues with particular treatments (e.g. water loss, hormone)
Mitosis/Mitotic index	Rooting hormone treatment and mitotic index
Surface Area to Volume ratios	Comparison of bacterial cells and eukaryotic cells using photo analysis ie. Vernier software and light microscopes. Continuation with microvilli, lung structure or organelles. Gelatin cubes.
Factors affecting the integrity of cell membranes	Investigating beetroot plus another plant tissue under a single independent variable

Biochemistry	
Denaturation	modifying proteins by varying environmental conditions
Enzymes	Immobilised lipase /yeast/amylase e.t.c. comparison with enzyme solution/organism
	Efficacy of digestive enzyme food supplements
	Enzyme function and metal ions
	Comparisons of enzyme function from different sources
Nutrient tests	Changes in the relative amounts of starch, reducing sugar and protein at different early stages of germination in a seed cotyledon
	Vitamin C assay and storage methods/temperatures for different sources of Vitamin C e.g. natural/artificial
	determining energy contents of foods by combustion
Respirometer	What factors influence the production of CO_2?
Chromatography	Separating pigments in various plants

Photosynthesis	environmental factors that affect the rate of photosynthesis
Fermentation	making yogurt, bread or beer

Genetics	
Genetic crosses	Counting traits visible in corn cobs or mounted fruit flies
Rooting powder	Rate of growth

Ecology	
Transects or counting frames	Application in a particular environment or comparison between environments e.g. Lichen coverage on tree trunks/rocks/walls Biotic index using lichens Algal types/building surfaces cemetery tombstones Trampling
pitfall traps	
catching insects with nets or pooters	

Animal Physiology	
Digestive enzymes	Model gut and amylase action using a blood glucose meter, using oats/inhibitors e.g. acarbose
Defense	antibodies
Gas exchange	use of spirometer, CO_2 probe, gas pressure sensor with belt that goes around the chest to measure breathing
Neurobiology	Reaction times & reflexes, dilation of pupil
	Measuring behavior in animals (in a city park or zoo)
Human health	Calculation of BMI, measure heart rate according to an environmental factor
	Heat loss models

Plants	
Growth	Growth of seeds/corms/bulbs and an anatomical feature, environmental factor
Tropisms	Investigate factors leading to tropisms (plants growing towards or away from light or gravity)
Transpiration	Combination of transpiration simulation and actual experiments measuring how quickly water evaporates from leaves
Photosynthesis	Combination of photosynthesis simulation and actual experiments

Data gathered from databases or computer simulations (it is suggested that these should compliment rather than replace lab work - students are encouraged to take advantage of the exceptional lab materials available to them for hands-on work)	
Genetics	Comparing genetic sequences using genome data, use of a virtual lab (i.e. Virtual Fly Lab)
Human health	epidemiological study of a disease, analysis of diets or foods using online databases of nutrients.
Climate change	analysis of CO_2 data and comparison with ecological data

Remember, these lists are only suggestions. You may have other ideas. Just check with me how realistic your idea is.