

Kitchen classification

Chris Graham shares an idea for engaging students with the biology topic of classification



The variety of plant species present in the average kitchen provides a wonderful opportunity for students to relate what they learn about the classification of life in the classroom to what they see around them every day. This linking to everyday life can have several benefits. Students can gain enthusiasm for science by seeing how it relates to the world around them and they can review knowledge learnt in the classroom when reminded about it by the things they come across in their everyday life. In addition, providing these links for students can help them take steps towards appreciating that scientific knowledge can bring more wonder into our lives, something Richard Dawkins describes in his book *Unweaving the Rainbow* as ‘one of the highest experiences of which the human psyche is capable’.

I enjoy wondering at the classification, relationships and evolutionary history of the life I see around me. Peas, for example, are not just green spherical things that are tasty as part of a meal and even better eaten frozen! They are legumes, in the same family as the beans and peanuts in my kitchen, the lupins in my garden and even the acacia trees of the African savannah. They are dicotyledonous plants, plants with two seed leaves (those two hemispheres inside the seed coat of a pea), a characteristic they share with the carrots but not the sweetcorn (a monocotyledonous plant) in my bag of mixed veg. And they are angiosperms, flowering plants, something they share with all the plants in my kitchen apart from the pine

nuts and the juniper that flavours the gin (which are gymnosperms).

A classification homework assignment

After introducing the classification hierarchy of taxonomic levels (kingdom, phylum, class, order, family, genus, species) at whichever level it arises, one way to get students to rehearse the knowledge and use it in a novel context is to set them some homework to build a classification diagram of several species that they see regularly in the world around them.

One issue with asking students to explore the classification of life in the world around them is a lack of ability to identify species. However, they will be very familiar with the common names of many different types of plant in their kitchen (or they will be labelled for them). From herbs and spices, to fruit, vegetables, and staple sources of carbohydrate, there are numerous species easily identifiable by students in their own kitchens.

Another issue is to find the scientific name of a species and the taxa that it belongs to at each taxonomic level. This is made harder by the variety of classification systems used by different taxonomists. To overcome this I have made an Excel spreadsheet of over 200 species of edible plant, using the ‘Catalogue of Life’ classification system (see *Useful links*), so students can easily browse through lists ordered by classification or alphabetically by common name, or search through them using the ‘Find’ function (Figure 1).

Kingdom	Phylum	Class	Order	Family	Common name / use (Genus and specific epithet = scientific name)
Plantae	Tracheophyta	Liliopsida	Pandanales	Pandanaceae	Karukas (<i>Pandanus julianettii</i>)
Plantae	Tracheophyta	Liliopsida	Liliales	Alstroemeriaceae	Salsilla (<i>Bomarea edulis</i>)
Plantae	Tracheophyta	Liliopsida	Asparagales	Orchidaceae	Vanilla (<i>Vanilla</i> spp.)
Plantae	Tracheophyta	Liliopsida	Asparagales	Orchidaceae	Salep (<i>Orchis</i> spp.)
Plantae	Tracheophyta	Liliopsida	Asparagales	Asparagaceae	Saffron (<i>Crocus sativus</i>)
Plantae	Tracheophyta	Liliopsida	Asparagales	Asparagaceae	Asparagus (<i>Asparagus officinalis</i>)
Plantae	Tracheophyta	Liliopsida	Asparagales	Asparagaceae	Garlic (<i>Allium sativum</i>)
Plantae	Tracheophyta	Liliopsida	Asparagales	Asparagaceae	Leeks (<i>Allium ampeloprasum</i>)
Plantae	Tracheophyta	Liliopsida	Asparagales	Asparagaceae	Onions (<i>Allium cepa</i>)
Plantae	Tracheophyta	Liliopsida	Asparagales	Asparagaceae	Shallots (<i>Allium cepa</i>)
Plantae	Tracheophyta	Liliopsida	Asparagales	Asparagaceae	Chives (<i>Allium schoenoprasum</i>)
Plantae	Tracheophyta	Liliopsida	Asparagales	Asparagaceae	Pineapples (<i>Ananas comosus</i>)
Plantae	Tracheophyta	Liliopsida	Asparagales	Asparagaceae	Water chestnuts (<i>Eleocharis dulcis</i>)
Plantae	Tracheophyta	Liliopsida	Asparagales	Asparagaceae	Maize (<i>Zea mays</i>)
Plantae	Tracheophyta	Liliopsida	Poales	Poaceae	Wheat (e.g. <i>Triticum aestivum</i>)
Plantae	Tracheophyta	Liliopsida	Poales	Poaceae	Rice (e.g. <i>Oryza sativa</i>)
Plantae	Tracheophyta	Liliopsida	Poales	Poaceae	Barley (<i>Hordeum vulgare</i>)
Plantae	Tracheophyta	Liliopsida	Poales	Poaceae	Millet (e.g. <i>Panicum miliaceum</i>)
Plantae	Tracheophyta	Liliopsida	Poales	Poaceae	Oats (<i>Avena sativa</i>)
Plantae	Tracheophyta	Liliopsida	Poales	Poaceae	Sugarcane (e.g. <i>Saccharum officinarum</i>)
Plantae	Tracheophyta	Liliopsida	Poales	Poaceae	Sorghum (<i>Sorghum bicolor</i>)
Plantae	Tracheophyta	Liliopsida	Arecales	Arecaceae	Palm oil (<i>Elaeis guineensis</i> , <i>Elaeis oleifera</i>)
Plantae	Tracheophyta	Liliopsida	Arecales	Arecaceae	Dates (<i>Phoenix dactylifera</i>)
Plantae	Tracheophyta	Liliopsida	Arecales	Arecaceae	Coconuts (<i>Cocos nucifera</i>)

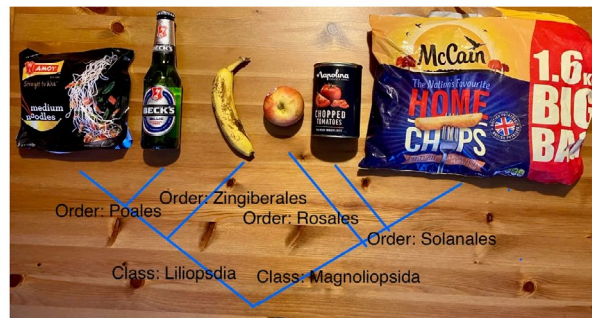
Figure 1 Using the ‘Find’ function to search the spreadsheet for ‘sugar’ (which finds both sugarcane and sugar beet)

Homework

To complete this task, I

- 1) used the spreadsheet of classification information to help me choose my kitchen items
- 2) used the spreadsheet to work out the classification of all the items
- 3) laid them out in a way which allowed me to draw a classification diagram
- 4) took a photo and drew the classification diagram on the photo
- 5) did a bit of labelling on the photo
- 6) typed up the classification into excel
- 7) inserted the photo into excel
- 8) took a snip of excel
- 9) posted it on Teams

- Create a Kitchen classification of at least 3 items and post in on Teams



Taxonomic level	Noodles (Wheat)	Beer (Barley)	Banana	Apple	Tinned tomatoes	Chips (Potato)
Kingdom	Plantae	Plantae	Plantae	Plantae	Plantae	Plantae
Phylum	Tracheophyta	Tracheophyta	Tracheophyta	Tracheophyta	Tracheophyta	Tracheophyta
Class	Liliopsida	Liliopsida	Liliopsida	Magnoliopsida	Magnoliopsida	Magnoliopsida
Order	Poales	Poales	Zingiberales	Rosales	Solanales	Solanales
Family	Poaceae	Poaceae	Musaceae	Rosaceae	Solanaceae	Solanaceae
Genus	<i>Triticum</i>	<i>Hordeum</i>	<i>Musa</i>	<i>Malus</i>	<i>Solanum</i>	<i>Solanum</i>
Species	<i>aestivum</i>	<i>vulgare</i>	sp.	<i>domesticus</i>	<i>lycopersicum</i>	<i>tuberosum</i>

Figure 2 Instructions to students for the kitchen classification homework task

Kitchen classification

The task I gave students was to identify at least three different plant species from their kitchen, find out their full classification and then use this to arrange them in a suitable way to take a photo that can be used to create a classification diagram of the species.

To set the task I showed the students how I had gone about the task. I chose six different products from my kitchen to represent six different species, compiled the full classification of each species using the spreadsheet and then created a classification diagram of them. The final image was shared with students along with details of how I created it and how I wanted students to share it (Figure 2).

The students were asked to share their work via Microsoft Teams although this could be done equally well electronically in other ways or on paper.

Students' work

Classifications created by students (Figure 3) consisted of 3–5 species. All students submitted classification tables with the correct hierarchy of taxonomic levels and all labels in the classification diagrams adhered to this hierarchy. However, four students used a different classification system to the one suggested and four other students had slight errors in their classifications (e.g. placing one species in the wrong class, calling Magnoliopsida an order in the image rather than a class, and classing the Tracheophyta as a kingdom in the image rather than a phylum). As a consequence

of some of the errors made by some students, the Excel spreadsheet was modified from the original version to the present one to make it easier to read and more easily searchable.

Reflections

This homework task aimed to link the classification system learnt in lessons to the species students see in the world around them every day; clearly this occurred for between three and five species for each student. I think it would be possible to have higher expectations of students and ask them to use at least six species rather than the minimum of three that I suggested.

All students engaged well with the classification hierarchy and the related technical terminology, gaining practice using the terms. By linking the classification hierarchy to everyday food items, I hope that students will consider classification outside of lessons from time to time, thereby sneaking in a bit of revision of the terms. This was clearly the case for one student who stated, when asked for reflections on the task, that:

I found that task to be very enlightening as it made me consider the way that the biology we were studying impacted my everyday life through the foods found in my kitchen. I remember finding myself considering the classification and possible relation between various things I ate in the following few weeks as a result.

This statement also hints at another valuable outcome of this task in that the students' new scientific knowledge made their experience of

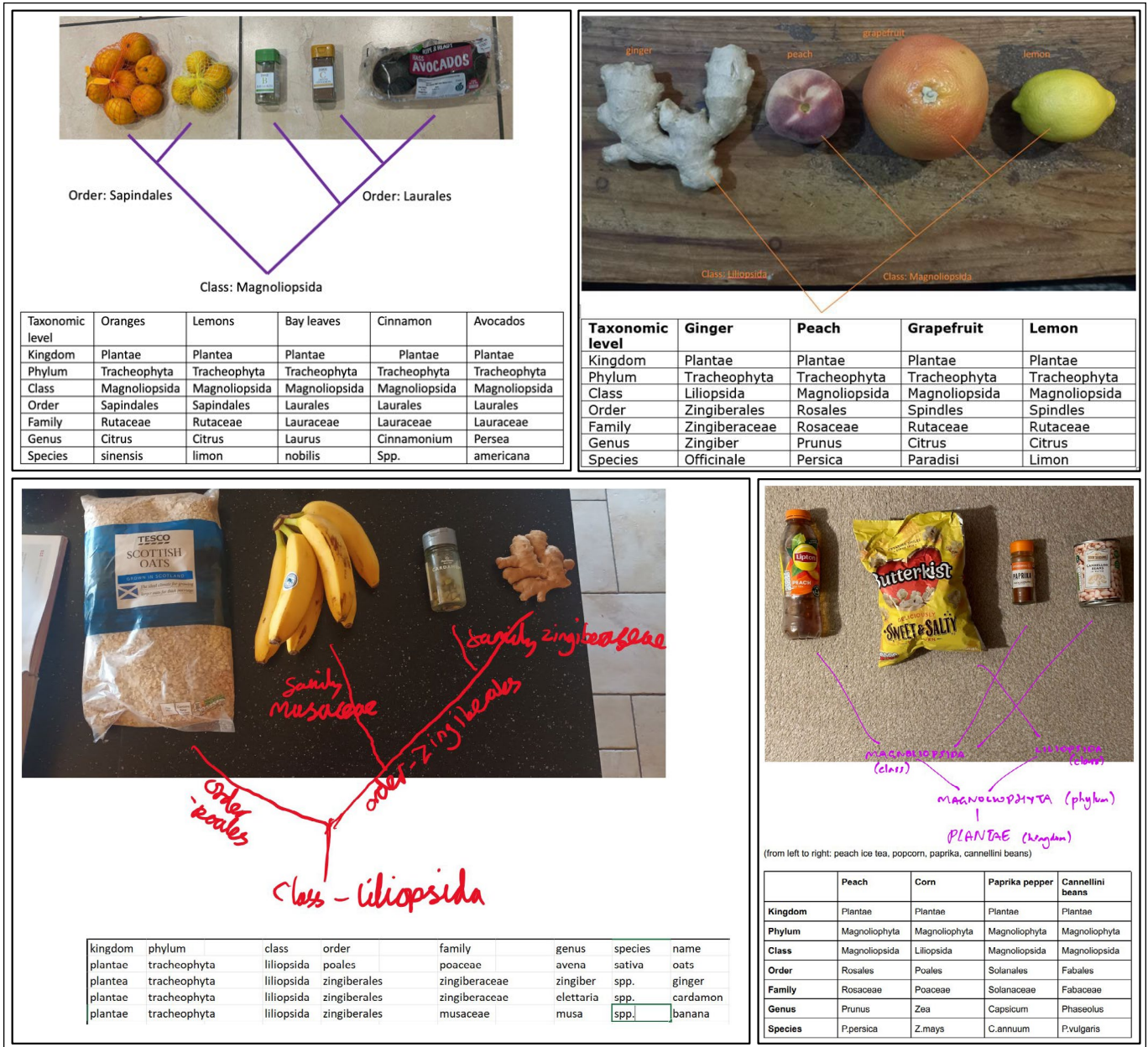


Figure 3 Some examples of student work

the food in their kitchens more interesting. People often think of science as solely a tool for advancing society's understanding of the world and to bring advancements in fields such as medicine and technology. However, it is also a cultural endeavour that enriches our experience of the world around us. I hope that this homework task helps students take a small step towards a deeper appreciation of how scientific knowledge can bring more wonder into their lives via the everyday items in their fridges and kitchen cupboards.

Acknowledgements

I would like to thank the students who allowed me to share their work in this article.

Useful links

The classification spreadsheet:

www.saps.org.uk/kitchen-classification

A useful, searchable database for the classification of life:

www.catalogueoflife.org

Reference

Dawkins, R. (1998) *Unweaving the Rainbow: Science, Delusion, and the Appetite for Wonder*. Boston: Houghton Mifflin.

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