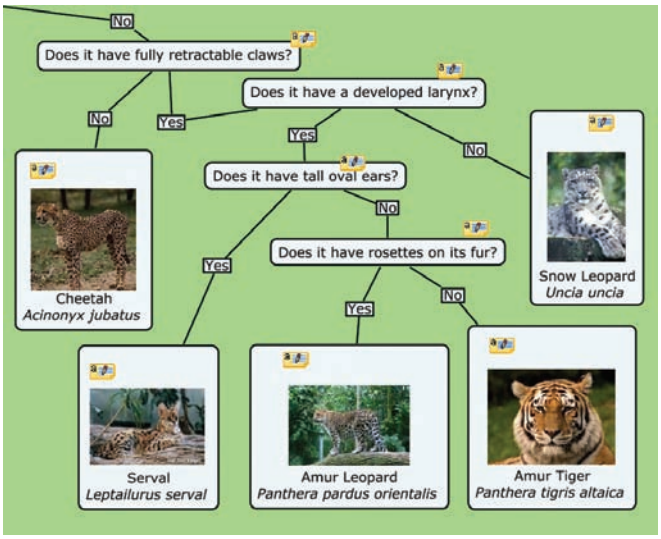
12 Going to the Zoo!

Many of us can remember a primary school visit to the zoo. One of my more vivid memories is of eating a peanut butter and jelly sandwich in the indoor elephant viewing area of the Portland Zoo, Oregon USA, not Dorset UK — the unmistakable smell of elephant dung hung heavy in the air. For most people, zoos are the only place to experience large animals from other parts of the world, but can a zoo be used as an educational resource for a large university class field trip? It has been attempted, but visits tend to become a walk around whilst students fill in a question sheet. At the School of Biological Sciences in the University of Southampton, we have gone beyond this and created a problem-based, authentic practical exercise to take advantage of our outstanding local zoo, Marwell Zoo.

The practical was created for Patterns of Life and their Evolution, a first year general biology course that focuses on how evolution has shaped the major groups of living organisms. The task is presented as essentially the same problem Darwin faced as he sailed around the world on the Beagle. Although we go to Marwell Zoo instead of the Galapagos Islands, our explorers are faced with determining the best way to organise the animals they observe. Hopefully, like Darwin, they will come to see that evolution can be the organising principle.

The assignment asked them to collect (through notes and pictures) at least 40 animals and then create a dichotomous key reflecting what is known about their evolutionary relationships. On the day, the students are given passports with a Zoo map showing the four areas of the zoo where they must obtain stamps. Demonstrators are positioned at the four locations to stamp the passports to ensure that the students are moving around the zoo. We assigned the students to small random groups of four. This arrangement is suitable for extremely large class sizes (>100) because the students disperse as soon as they find their groups. They can visit the four pre-assigned stamping areas in any order. The trip is run on an afternoon which gives the students plenty of time (~3 hours). Students are encouraged to take digital photos with their mobile phones.



After the trip, the groups have two weeks to research and organise their collection into a key. Students have to find online and library resources to complete their keys because many of the essential characteristics such as teeth and bone structure are not directly observable. Additionally, mammalian relationships are not intuitive, so require additional use of outside sources. The first time we ran this practical, keys were submitted either in paper form or on Blackboard using wiki with hyperlinks between questions and animals. Although many of the wiki submissions were outstanding and we received good student feedback, assessment of the wiki submissions was impractical due to the need to follow hyperlinks laboriously. After consultation with Adam Warren from our university Learning and Teaching Enhancement Unit, this year we switched to Concept Maps (Cmaps). Cmaps *(http://cmap.ihmc.us/)* is a free program that allows the students to work in a controlled external file stored over the internet. With Cmaps we could view an entire key and quickly follow the groupings, making it easy to assess a large number of keys. The program also allows students to hyperlink to websites, add comments and references, and upload digital images. Several students could work on a key at the same time so groups could collaborate and work from different computers.

Student feedback was extremely positive in the first year and this October's field trip seemed to go well. The quality of the keys varied, with bats and birds being grouped together incorrectly in a few keys, to near perfect groupings with detailed definitions of the criteria as well as pictures with links for each animal. The large range and high quality evident in some students work clearly demonstrates that this problem based learning exercise has gone beyond the school field trips I remember. The student handout is available at my website *(www.sbs.soton.ac.uk/staff/jdp/jdp.php)* and the instructor's version with a passport is available by contacting me.

My only regret is that there are no elephants at Marwell and thus no elephant house. But they do have a giraffe house; so perhaps I will try a Marmite sandwich next year!

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Bulletin 26: Spring 2009

Compiling Editor: Steve Maw

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