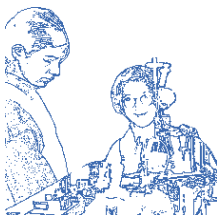

Explaining Taxonomy to Kids

Dave Roberts

Taxonomy is the framework within which we understand the natural sciences. It provides a context within which any aspect of natural science can be discussed. Without taxonomy, natural science would be a collection of fragmentary observations with little chance of developing a discipline-wide cohesion.[1] However, it is not an easy concept to convey to the non-scientific audience.

The Natural History Museum is primarily a research institution, currently employing about 350 research scientists within a total staff of more than 700, set up by Act of Parliament to take care of the National Collection of natural history objects and to educate the public. It was originally a department within the British Museum, until it outgrew the space available and moved to its present fine building in 1881. In exhibition and education we have developed an international reputation for the quality of our galleries which are the fifth most popular paying attraction in Britain after Alton Towers, Madame Tussaud's, Tower of London and St Paul's. In addition to the well-known gallery displays we also have an education staff who assist teachers in planning and organizing visits, and who run a small hands-on gallery called the Discovery Centre. Within the Discovery Centre, working scientists talk about their work to mixed audiences from the age of 5. What follows is my approach to teaching small children the principles of taxonomy and why nomenclature is necessarily unstable.

I usually begin my talk with a slide of a family of monkeys sitting under a tree (Fig. 1) and I ask "how many species can you see in this picture?". A common answer is one, the monkeys, but young children are less conditioned than many adults and will often give the correct answer of two. The point here is that many people's observation of the natural world is blinkered to the three F's: fur, flowers and feathers. If it doesn't have one of these, then it is easily overlooked. Next I hold up a large field mushroom and ask to which of the two species on the screen is the mushroom more closely related. This is designed to open a discussion of kingdoms, and how many there should be.

I then produce a basket and four clear plastic boxes (Fig. 2). The basket contains toys and the objective is to sort the toys into the boxes and to label each one as we go along. It is vital that the audience does not see what is in the bag in advance. As the toys are produced, they are placed at the audience's direction into one of the four boxes and labels are written and amended with audience suggestions. If suggestions are not forthcoming, then questions

Fig. 1. *Presbytis enteilus* from Kataragama, Sri Lanka.

Fig. 2. The author talking in the Natural History Museum's Discovery Centre during National Science Week 1995. The audience here was mixed ages from about 7 to seriously 'over 21'.

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Fig. 3. The toy-sorting exercise from National Science Week 1995.

of why that box and not another will usually reveal the common properties that the audience are seeing in the objects. If you are lucky, members of the audience will disagree about which properties are most appropriate. In the end you will have sorted the toys and will have ample evidence on the labels that the nomenclature is unstable (Fig. 3). When I prepared this for the first time I borrowed a selection of my son's toys but before giving his permission he demanded an explanation. I had chosen art objects, vehicles, animals and story books. "That's easy," he said, "there are metal toys, plastic toys, rubber toys and paper toys". No classification can please everyone!

From this metaphor you can now explain about the bacteria, archaea and the eukarya. I use cheese as my example of bacteria, bread and beer as examples of the eukarya and methanogens as archaea. The first two examples are older than written history and most children known that they formed the staple diet of many people throughout history. Is it not odd that they were formally recognized as being alive and distinct when Copeland[2] created the Kingdom Monera as recently as 1938? The methanogens are probably the most useful illustration, especially for children, of the archaea because methane is a major component of human flatulence as John Postgate rather delicately puts it.[3] Children can, however, correctly differentiate between the genuine article and a whoopee cushion by ear alone!

Around this basic theme I weave lectures for various general audiences. It is a straightforward matter to expand or focus on some area or other as time and interest allow. Over the years of giving such talks, I have always found the greatest difficulty in trying to overcome the barrier of unfamiliar names. This approach I have found successful because the message it conveys is that it is OK not to have heard of *Paramecium*, or whatever, before but here is something interesting about it anyway. It prevents audiences switching off before you have a chance to capture their imagination.

At a practical level, live demonstrations usually go down very well. Live bacteria are not very exciting, with a few exceptions such as magnetotactic cultures. Protists are bigger, easier to see and can illustrate many of the same points with a little arm-waving. Inexpensive cultures are available.[4] I have experience of liquid-helium-cool teenage schoolboys elbowing each other out of the way to see an amoeba crawling about under a microscope. Beware of video cameras mounted on microscopes. There are two problems: first, children do not take readily to the fact that what is on the screen is the same as what is under the microscope. Second, the quality of many video systems is not adequate to show anything clearly on the screen.

In summary, talking to very young and to general audiences can be great fun. Some of the most incisive questions have come from 7 and 8 year-olds. My aim is always try to sustain a dialogue with the audience, both to give me feedback but also to ensure that they haven't all fallen asleep! Preparing such talks obliges me to think carefully about what it is we microbiologists do and why. Without doubt, the most important single aspect of presenting such talks is to make frequent reference back to the everyday objects and events of a familiar world.

Dr D.McL. Roberts, Department of Zoology, The Natural History Museum, Cromwell Road, London SW7 5BD (Tel. 0171 938 8790; Fax 0171 938 9483; E-mail d.roberts@nhm.ac.uk).

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