In order to help our students see the practical reasons for the elaborate taxonomy that has evolved over time, it might be helpful to take them through a brief history of taxonomy so that they can see why we name organisms and place them into categories. This could be done with a PowerPoint lecture, or simply as a reading assignment with some check questions inserted or a quiz at the end.

People have long recognized the fairly conspicuous dichotomy of plants and animals, and it’s convenient at times to be able to refer to a particular plant or animal as such, and even to distinguish between them. We also find it convenient to give names to things, so that other people will know what we are referring to when we are referring to them, individually or collectively. These are simply part of our lexicon in order for us to convey useful or interesting information from person to person. Names of living things and their groupings are an important part of our language. [For this reason, and this reason alone, IMHO, an introduction to biological taxonomy should be a part of any life science or general biology course. I really can’t imagine anyone who might be interested in going into the health sciences, agriculture, horticulture, landscaping, environmental science, forensic science, public health, oceanography, paleontology, oil exploration, science teaching, science law, or science writing/journalism who is not conversant with some basic taxonomy. The place for that is in K-12, not college.]

Upon this relatively imprecise collection of vernacular names for this animal or that plant comes the fact that different groups of people have invented different names (even in the same language) for what is actually the same kind of organism. As a result, it’s not hard to see that considerable confusion can arise (as it has) when we announce to some visitors that there’s a puma (for example) in the area that has been attacking people, and they should be on the lookout for it. The visitors know about mountain lions (and some other strangers know about catamounts, and still others have seen cougars), but they have no idea what a puma is. But they really do, because those are all different names for the same animal. Of course, all of this can be cleared up, but if someone is writing about this creature, and uses only one of its names. it’s much more likely that someone will be confused, or assume that the writer is talking about some other strange creature.

Furthermore, when we want to know more about a particular organism, for any number of reasons, (e.g., it’s an important food), and we want to share what we learned with other interested people, it became obvious that there needs to be a common or standard way for naming them, using universal names that would be recognized by anyone interested in learning about those organisms. Eventually, such a standard system was devised, by Linnaeus. Every type of organism is assigned a specific name, in Latin, that is used by specialists all over the world, regardless of language; that is the scientific name of that species. Of course, there are rules to make sure that there’s only one universally accepted name for each species, but problems do arise. There is an internationally recognized group of specialists that resolves such problems.

As we have learned more and more details about living things, we have found that they tend to exist in natural groups, based on a number of traits. In fact, such natural groupings have lead to a natural hierarchy of groupings, with each two or more very similar species fitting into one larger group (genus), two or more similar genera fitting nicely into an even larger category (family), etc. Linnaeus saw this, and included this into his system of naming and classifying, and that’s the basic system we use today.

It’s still essentially a tool of language, so we can communicate accurately about any organism. It’s also a useful tool for purposes of agricultural and medical research, because it helps us to understand and even predict the characteristics of new species that clearly fit into an established group.
Furthermore, as we’ve discovered more details about organisms, and indeed discovered many new organisms, we’ve learned that our earlier criteria weren’t always helpful. As a result, those criteria were revised, and groups were revised to include groups that had not been included, or exclude groups that had once been included. New groups have been established, and some old groupings have been abandoned as our knowledge has grown. In fact, now that we’re able to probe the genomes of species and can trace their phylogenies in more detail, it looks as though the entire Linnaean system will be replaced with one based on descent with modification. Since Linnaeus based his system on the assumed fixity of species, it’s amazing that it has lasted as long as it has! Might as well let our students know that the changes are coming!

Teaching Strategies:
I always took my students through the historical sequence of 2 kingdom - 3 kingdom - 4 kingdom - 5 kingdom - systems, and the more recent higher levels of 3 domains. This perspective seemed to help them understand why these categorizations have changed, and, with future information, may change again. This may seem rather arbitrary, but there are always good solid reasons (both practical and biological) for the groupings established. As our perception of what are fundamental features has changed, this has led to changes in groupings. These changes increasingly reflect the reality of common descent.

One of the rather surprising results of classification is the discovery that there are always organisms that just don’t fit nicely into any of the assigned groups! We see these in both living and extinct species. Many seem to have traits that should place them equally into two different groups. This situation seems inconsistent with traditional ideas about the origin of species, but it has found a nicely accommodating explanation in evolution. With evolution, we would expect such “straddling” or “transitional” species.

A strategy that I used to provide a vivid and dramatic demonstration of the “boxes-within-boxes” hierarchical nature of biological classification was to enter the room with a huge box (labeled “The Living World”), open it carefully (with jungle noises - on tape - coming out of the box) to find 3 smaller boxes (from the 3-kingdom days: labeled Plants, Animals, and Protists), open the Animal box to find about 12 smaller Phylum boxes, etc. etc. etc.). I used different colored corn seeds in a little fuse box to represent the different species in the little Genus box, but if you can find two species of ants or flies to use there, that would be impressive. Maybe two species of *Drosophila* would work.

Lessons for teaching Classification on the ENSI site:
Primate Classification (Hierarchy of nested boxes)
http://www.indiana.edu/~ensiweb/lessons/primclas.html (I am developing a Peek at Primates lesson, to be added to the ENSI site sometime soon, that would be an even better interactive lesson than this one, where students place pictures of different types of primates, showing their distinguishing traits, onto a cladogram template. It will be announced on the FENSI listserve.)

Nuts & Bolts Classification - Arbitrary or Not? (This is a “MUST DO” lesson)
http://www.indiana.edu/~ensiweb/lessons/cl.intro.html

Cladistics is a Zip-Baggie (using nested zip bags to demo hierarchy)
http://www.indiana.edu/~ensiweb/lessons/clad.bag.html

Macroevolution (patterns and trends...see item #6 for phylo tree showing how evolution relates to classification)
http://www.indiana.edu/~ensiweb/lessons/macroev.html