2A: Introduction to the nature of explanatory models: 
Handout 1-What is a Scientific Model?

So far in the evolution course you have looked at the relationship between data, inferences, and prior knowledge and beliefs and how these are used in science. One type of prior knowledge that scientists always bring to their investigations is that of important scientific models. You may have learned about scientific models before, but this reading will serve as a short summary of what is meant by the term scientific model.

A scientific model is simply an idea that allows us to create explanations of how we think some part of the world works.

Think back to your understanding of chemistry. One of the most important models in chemistry was that of the atom, in which there were subatomic particles (protons and neutrons) in a nucleus and electrons (organized into electron shells) that orbit the nucleus. This basic model of the atom allows scientists to explain why certain atoms (or molecules) combine in the ways that they do and to make predictions about which atoms (or molecules) will or won’t combine when brought into contact with one another.

It is important to understand that a scientific model is not the picture of protons and neutrons surrounded by electrons that is found in chemistry textbooks, nor is it a physical structure that you can ever hold in your hand. The scientific model is simply the idea that particles such as protons, neutrons, and electrons exist and behave in certain ways.

Protons, neutrons, and electrons, in this sense, are not necessarily real in the way that soda bottles and basketballs are. Rather, they are ideas that humans have developed to help explain what we see and to make predictions about what may yet be seen. Since they are invented by scientists, it is important to question whether or not they really do help us understand the world. In the case of the model of the atom, scientists feel quite strongly that it is a useful model (it has proven to be very useful in explaining and predicting).

In this class you will have the opportunity to use and assess scientific models. When using and assessing models it is important to consider their:

- Ability to explain data
- Ability to predict new data
- Consistency with other knowledge including other scientific models