1. What is *the scientific method*? Is there such a thing?
2. Is Bichat's characterization of life and death fatally circular? Do other things offer resistance in the same way as living things do?
3. What, in the end, is the significance of glycogenesis? How is Bernard's model of a animal machine different from Descartes'?
4. Is Bernard right that vitalism is antithetical to experimental science?
5. LaFollette and Shanks: are they right that clinical studies are devalued? Is Bernard responsible for this?
6. Can clinical studies provide better data than animal experiments? What does it take for clinical medicine to count as scientific research?
7. Is there an important role for animal experiments?
8. Does evolution clearly count against the relevance of animals for human medicine?
9. What are the limits of machines?

how does one go about deciding [whether] their observations are without error, and how does one go about making a claim that their hypothesis is correct? Pasteur explained that he thought he was doing something wrong at first. You gave the example of fudging data in a lab class. At what point can one decide their observations are correct enough to go out on a limb and say they're right when everyone else is wrong?

The concept then goes on to involve sentiments expressed by Schwann who wrote, "...when a certain series of phenomena is proved by observation, some provisional explanation should be conceived that will suit them as nearly as possible, even though it be in danger of being overthrown by subsequent observations; for it is only in this manner that we are rationally led to new discoveries, which either establish or refute the explanation." As Schwann explained, often hypotheses are later found to be inaccurate. How can one decide that the observations they have made will stand the tests of time when countless scientists before them thought they were doing the exact same thing and turned out to be completely wrong?

It just seems a little egotistical to think you have seen things differently than everyone else and that you are right, even though history has proven wrong countless scientists just like you who also thought they were completely right.

Yet he still eventually has to call for faith in the principles of the scientific method. Is the claim that experimentation can bring you closer to the truth (i.e. more complete and reproducible theories) a theory in itself? Why should we believe in experimentation? From my present day perspective, it seems to be the best method we have for learning how the world works (if we can't rely on reproducibility and consistency, what can we rely on?), but is this something that is worthy of consideration? Perhaps a more useful question is how do we know when we have a fact? I think we touched on this in class. How do we know the result we see is actually the result of the factor we modified? How do we know what we are observing? I was surprised when you told me in your response to last week's comments that blood will come out from the heart side of a vein if the vein is cut. I think this illustrates a problem in observation in general, that in an attempt to observe some phenomena, we change the phenomena. I'm sure that if Galen had been able to observe the blood flow in an intact vein, he would not have concluded that the blood was flowing from the heart. Perhaps this is particularly problematic for biology because in order to observe bodily processes, we usually need to disrupt them.