Chemistry 466b
The Evolution of Chemical Thought

- A study of the machinery of chemistry, its practitioners, ideas, methods, tools, and dissemination; description of the evolution of chemistry

- learn to read things critically
- the important factor within this course is assessing if things make sense, based on the experimental evidence
- thus, we will attempt to learn with skepticism, and to think independently. Chemistry is a foundational science.

" The language of chemistry- an international language, a language without dialects, a language for all of time, and a language that explains where we came from, what we are, and where the physical world will allow us to go "

(Nobel Prize Winner, Arthur Kornberg, 2000)

What can a chemist learn from history??

- when describing the machinery of chemistry, we assume that chemistry is similar to any scientific body of knowledge. This knowledge begins with people, their observations, interpretations, and interactions

- within chemistry, as with any body of science, there are associated perceptions that are encouraged by people (including teachers), culture, and society.

- the common perceptions do not always fit historical evidence

Some examples:

perceptions (as encouraged)	historical evidence
a chemist:	
- is objective and impartial	not always so
- is receptive to rational argument	"
- is open to new ideas	"
- is intellectually independent	"
chemistry:	
- knowledge is cumulative	only true in the broadest sense
- experimental data are facts of nature	data has meaning only when interpreted

(eg, atomic wt of Cl, 1805 = 35, 1830 = 35.6, 1920 = 35 & 37, 1950 = 34.969 & 36.966)

- current theories are correct	theories evolve, & the fittest survive

☆ Historical hindsight ("anachronism")- the mistaken approval of past ideas by their correspondence with modern beliefs. BEWARE of making this historical error!

- the worth of past ideas is correctly judged only by evaluating the ideas against the evidence known at the time (eg, it is incorrect to translate "amount of matter" as "mass" before Newton introduced the concept of mass in the 17th century)

- theories can be proven to be "true"	"truth" as final, unchanging reality is unattainable

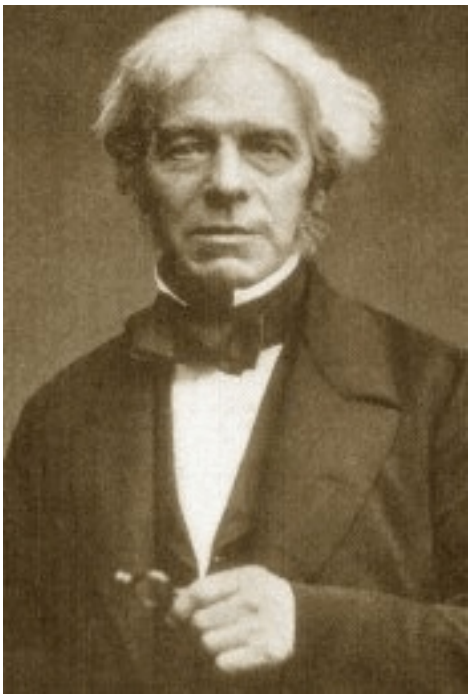
nearly all modern (and past) scientists have a view of nature that philosophers term “naive realism”, ie, they believe that the picture of nature constructed by scientists is “real” without seriously questioning the limits of their knowledge

-science is culture independent it is culturally shaped

(think of different national attitudes to global warming)

- there is a “scientific method” anything that works is OK
- theories have predictive value some do

Over the course of history many of the best scientists have recognized that scientific truth changes over time, as better theories replace poorer ones, eg, Michael Faraday



"Why our successors should not displace us in our opinions, as well as in our persons, it is difficult to say; it ever has been so, and from analogy would be supposed to continue so; and yet, with all this practical evidence of the fallibility of our opinions, all, and none more than philosophers, are ready to assert the real truth of their opinions."

(M. Faraday, 1819)