When I heard the learn’d astronomer,
When the proof, the figures, were ranged in columns before me,
When I was shown the charts and diagrams,
    to add, divide, and measure them,
When I sitting heard the astronomer where he lectured
    with much applause in the lecture-room,
How soon unaccountable I became tired and sick,
Till rising and gliding out I wander’d off by myself,
In the mystical moist night air, and from time to time,
Look’d up in perfect silence at the stars.

Walt Whitman (1819-1892)

Analysis and Wonder
Gale Rhodes

I provide this poem at the end of the last class on enzyme kinetics, because I usually can see that you are sick and tired and hoping we will shortly turn from mathematical concerns, with symbolic E's and S's, to some "real" enzymes, "real" substrates, and some at least visually concrete models of enzyme action. Perhaps, I am guessing, you have had enough, for now, of my reducing all of biology to the Michaelis-Menten equation, and you might well heed the poet's invitation to simply go out and look in wonder at some natural object, and see that the beauty accessible to naive wonder is still there. In my view, it is still there, but now there is more.

I am not content with the seemingly plausible interpretation that the narrator of this poem is completely unreceptive to any analysis of natural processes. Even if tired and sick of the Astronomer's presentation, our narrator must see more in the stars now than before the lecture. The narrator is curious; after all, he or she attended the lecture.

To me, part of the beauty of scientific knowledge is that it opens a window on the unseen world, and the seen world no longer looks the same. The world of our immediate senses is not reduced to "nothing but" the analytical model, it is enriched
by containing the model within its outer beauty. What we see encompasses the fruits of analysis, and thus is larger, not smaller, for being analyzed. The student can look with new respect at sky, leaf, or insect, recognizing that their outward intricacy is not superficial, but that they are intricate at every level of observation or analysis.

It has not escaped my notice that the poem can also be taken to advocate active, rather than passive, approaches to learning.

[GR: See marked passage in Dethier, To Know a Fly.]