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Evolution lesson

Robert J. Marks: Texas should let kids use critical analysis to explore whether Darwin got it right

There's a battle over evolution education in Texas right now.

The latest round is coming up soon in Austin, with the State Board of Education hearing testimony on both sides of the controversy.

There is a tug of war between those who want to teach only their corner on truth and those who would prefer to include critical analysis and discuss developments that challenge neo-Darwinian dogma.

This is unfortunate, because at least in areas of my specialization, using computers and mathematics to model evolution, the problems are fascinating and would be both fun and instructive to teach.

Gregory Chaitin, arguably the greatest and most creative mathematician of my generation, lays out the stakes: "The honor of mathematics requires us to come up with a mathematical theory of evolution and either prove that Darwin was wrong or right!"

To establish credibility, a science should be backed by mathematics and models wherever possible. Even some soft sciences, like finance, offer compelling mathematical and computer models that win Nobel Prizes.

And here's where it gets interesting for modern evolutionary theory: Mathematics has shown that blind evolution by itself is unable to create meaningful information. Instead, one or more available reservoirs of knowledge,

some of which are called *oracles* by computer science, guide all evolutionary simulations.

In other words, in every computer simulation of evolutionary models, one or more sources of embedded knowledge is tapped to give the illusion of astonishing evolutionary progress. In contrast, neo-Darwinian evolutionary theory posits a blind process. This simply doesn't work.

Many attempts have been made to simulate evolution on a computer. None has truly succeeded. For instance, the highly celebrated evolutionary computer program Tierra has, by the admission of its creator, failed to achieve anything close to what was anticipated. Despite numerous tweaks and many runs, the program was still-born with respect to its goal of re-creating the Cambrian explosion.

Avida, another attempt to simulate Darwinian evolution, is noteworthy because one of its creators, Robert Pennock, testified at the Kitzmiller vs. Dover trial of a Pennsylvania school district sued because its biology courses briefly mention the theory of intelligent design as an alternative to modern evolutionary theory. "In the [Avida] system, we're not simulating evolution," Pennock testified. "Evolution is actually happening." Research after the trial's conclusion showed that embedded oracles and careful tuning, not evolution, are responsible for the Avida's success.

Charles Darwin admitted the

need for mathematical modeling in science. "Every new body of discovery is mathematical in form," he wrote, "because there is no other guidance we can have." Darwin also confessed his own lack of skill in this area. "I have deeply regretted that I did not proceed far enough to understand something of the great leading principles of mathematics, for men thus endowed seem to have an extra sense."

I would agree, and I hope defenders of neo-Darwinian evolution respond to the challenges of mathematics and modeling with more than hand waving and anecdotes.

University of Chicago microbiologist James Shapiro complains in his book *Evolution: A View From the 21st Century*, "Most debates about evolution sound like the last fifty years of research in molecular biology had never occurred." This is certainly the case for the mathematical modeling of evolution. Texas educators need, at minimum, to help students evaluate developments in modern evolutionary theory.



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