

On November 20, 2014, I had the honor of interviewing Dr. Miller by phone. The following is the “close to verbatim” transcript of a conversation that we had:

**Q: What does your lab do now?**

I’m in the process of moving my lab from one building to another. I have not been actively been doing research for about a year and a half now. I have been interested in the structure and function of membranes, mostly with photosynthetic membranes. We have been particularly interested in how the major complexes - photosystem I, II and ATP synthase – how they interact with each other and how they carry out the light dependent reactions of photosynthesis. I’ve also been interested in membrane protein organization, especially in the translocon channel which is a channel membrane protein through which a protein is threaded in the ER. I’m also interested in Biology education, as you know. I teach a large Biology course at Brown University and write textbooks. I occasionally go around the country and shoot my mouth off about evolution.

**Q: How did you get involved in science education, specifically, writing textbooks?**

I’ll give you the short version. I received my PhD at the University of Colorado. I went to Harvard and became an assistant professor there for six years, did research and taught a number of classes. After that, in 1980, I took a position at Brown University. I got a call from a former student and TA at Harvard (Joe Levine). Joe had been approached by a publisher to write a high school Biology textbook. He said that he couldn’t write the book entirely. I wondered how this concerned me. He told me that he wanted me to write the other half of the book where his expertise was not as strong as mine. I told him to get lost. I had no interest in that. I was close to tenure and I was concerned with renewing my grant. Joe was very persistent. After about six months, he convinced me. We rolled up our sleeves and wrote the first chapter. They liked what we wrote. It took us about two and a half years to write the manuscript. Then, the publisher couldn’t publish it because of internal squabbles. We got it back from the publisher. Prentice Hall was wildly enthusiastic.

**Q: Are there copyright issues when you write a manuscript and then have it published with a company other than the one that you signed the contract?**

The inside story is that the original publisher sat on the manuscript and couldn’t publish it. After about two years of waiting, our attorney was able to construct a letter convincing the original publisher to unhand the rights to the manuscript. They reassigned the manuscript, gave us a letter wishing us well, and asked us not to sue them. Joe and I were able to do something that rarely happens in the publishing world. We sold our book twice. It was all on the up and up!

**Q: Does writing a book (about evolution) seem like a daunting task when you had not done anything like that at the time?**

I had some really good English teachers. They encouraged my writing. I really liked writing, short stories and poetry. I’m glad I decided to have a career in science rather than in the humanities. I think that only a few people in the country can make a living as a poet. When Joe approached me and eventually convinced me to write the textbook, I treated each chapter as if it were a scientific paper, and since I had written quite a few research papers up to that time, it wasn’t very daunting. I also had to realize that I was writing for a bunch of 14-year olds. Fortunately, I had a 13-year old daughter at home. I asked her if any of it made sense to her. She calibrated my early writing. The first version was published in 1990 with the second edition in 1996.

At that time, I was being asked to speak about evolution and issues surrounding it and religion. The literary agent knew about this and asked if I wanted to write a trade book (one that you would find out at a bookstore). I sent him an outline. I was told that it stinks. After two more revisions, he told me that he auctioned my book off. Of ten publishers, six of them bid for the rights to publish his book. Of course, once I accepted the one from Harper Collins, I realized that I now have to write this thing.

I took an unpaid leave and a summer to finish the book. It was not daunting, unless I had tried to teach and write the book.

**Q: You obviously had to talk to other experts to write the book. What was particularly challenging in that respect?**

I wanted to develop my criticisms of ID. I wanted to understand blood clotting better. I was at a meeting in San Francisco. I took a day off to go and meet Russell Doolittle in San Diego. He was very generous with his time. I had to find an expert to talk about the Kansas-Nebraska Act so that I could build the analogy that I used near the end of the book. Essentially, every time I wanted to talk about something that I didn't understand thoroughly, I had to seek assistance from an expert in that field.

**Q: How did you become involved in the Dover case?**

After I wrote "Finding Darwin's God", I was interviewed on NPR and other outlets. I had lots of invitations to speak at universities. I was known as someone who could counter the ID arguments. When Michael Beehe wrote "Darwin's Black Box", I wrote a critical review that was circulated online. I was on William F. Buckley's "Firing Line", and people thought I was very effective. I had developed a reputation.

Also, the situation that led to the case in Dover, PA was precipitated by the fact that the Biology textbook they picked was ours! When the case was filed, I was asked to testify because I could answer any question about the textbook, since I was involved in writing it.

**Q: The remainder of these questions relate to "Only a Theory". Before I read your book, I thought that ID was the idea that evolutionary processes are controlled by a "higher force". I didn't realize that ID was being sold in the place of creationism.**

I tell my students that if ID was being explained as the process of evolution being run by an intelligence in the universe, that it is possible to find meaning and intent in biological processes, then I would be an ID proponent, too.

ID is essentially the same as creationism, except it does not insist on the literal simultaneous creation as in the bible (does not depend on a young earth) and that all organisms were created in a six day creation week. Those two are extremely easy to prove incorrect. ID discards those. They keep others. All of the others they keep. They say that evolution does not have a way to generate complexity.

**Q: I was fascinated by the "evolution of nylonase activity" example you discussed in the book. It is a very concrete example of evolution in action, as the rock pocket mouse is (as shown in the Sean Carroll video produced by HHMI). Some your arguments in the book sounded Lamarckian (forgive me). Please talk about the idea that bacteria have to overcome the challenge of consuming nylon.**

Certainly, the bacteria as not thinking, "I see nylon, I have to consume it." It is not a conscious choice. If the chance of a frameshift mutation causing nylonase activity is one in a million, then it is entirely possible in a large population.

**Q: What in other countries allows the belief in evolution to be in more favor than in the US?**

Americans are at the top in science literacy. Our educational system is not as bad as you think. I think that the polling response of evolution in America has to do with the "culture wars". Science is an elite activity. A large part of the culture war is centered on religion. As a person of faith, I try to explain that evolution is not necessarily incompatible with religion.

**Q: I didn't realize until I read your book that ID proponents are using their arguments against evolution to attack the way science is done.**

I certainly think that's true. I've been outspoken about how evolution does not contradict religion, especially Christianity. I am trying to get people to accept mainstream scientific idea, evolution, but also the big-bang theory, climate change, etc. Opponents of climate change say that scientists are trying to get money for their grant proposals. That overlooks the fact that funding of evolution and climate change are two of the most poorly funded scientific endeavors. Work on heart disease, cancer, etc. There's plenty of money there.

**Q: Could you talk about your discussion about Gould and his philosophy of what happens when you wind the tape back on evolution? How does his view relate to your idea that niches have to be filled that may make the tape play back similarly to what it did the first time?**

I agree that with Gould that you wouldn't get the exactly same outcome if you did it again. We have learned about evolution, especially convergent evolution (organisms will solve similar problems in similar ways), that you have to have herbivores and carnivores and parasites, that camouflage has to be generated. Some organisms, I would argue, would gain the ability to reason as we do. Conway-Morris argues, as I stated in the book, that humans were inevitable. Convergent evolution really does show that an intelligent organism, like us, would have certainly shown up eventually.

**Q: I laughed when I read your statement about "the corrupting effect of meiosis".**

In their arguments against evolution, people say, "I can't believe that I was created by a random process." But meiosis is random. Separation of the two sets of chromosomes is random. The idea that you are pre-ordained, that when your parents had you, that it was going to be you is simply not true. The kinds of variations we see, even among brothers and sisters in the same family, are entirely reasonable and predictable based on the idea of the random segregation of chromosomes in meiosis.

**Q: In your discussion of evolution cosmology, you nicely bring together the ideas of these random processes working in concert. Do you think that humanity has the evolutionary tools to solve crises like global warming?**

I think that it's more appropriate to ask, "Do we have the political tools?" I am an optimist. Churchill once said, "Americans will do the right thing, once they do everything else first." I think that applies here. I am a believer in science and technology. We have already made cars more efficient, home heating more efficient. The price of solar panels has dropped dramatically. The solar panels on my home produce 15% more electricity than it uses. Now, I return that to the grid.

We are so far along with the amount of carbon dioxide in the atmosphere. We're already seeing the effects of global warming on the east coast. The navies of the world are preparing for the time when the sea ice in the Arctic melts. We are going to suffer the consequences of climate change. Ultimately, though we are developing solutions to how we create and use energy. We are going to suffer ill effects, but we are not going to kill the planet.

**Q: In discussions with my students about evolution, student ask if I believe in it. I tell them that it doesn't matter what you believe. It is like asking if you believe if the sky is blue. It doesn't matter what you believe. How do you phrase this?**

I say that people should understand the scientific evidence and that you accept the explanations based on that evidence. In science, we don't believe things, we accept or reject them based on evidence.

**Q: Are you coming to NSTA Chicago in the Spring.**

Yes. Absolutely.

**Q: You have an open invitation to visit with my students at Amundsen High School.**

Do me a favor. About a month before that, contact me and reiterate the invitation, and I'll see what I can do.