Interview Preparation Questions

In April 2007, Dave Simon of Quinnipiac University set up a radio interview about the revised edition of *Scientists Confront Creationism: Intelligent Design and Beyond.* Here are the pre-interview **questions** (in bold) and *answers* (in italic).

Dr. Andrew Petto, you have co-edited a new book published by W.W. Norton & Co. titled Scientists Confront Intelligent Design and Creationism. Why this book? Why now?

There are 2 main points we wish to make in the book.

1. *Science is solidly in support of evolution — all the revelant scientific disciplines provide unequivocal support; they all have the opportunity to reject evolutionary ideas and they do not do so.*
2. *Objections to evolution are primarily social, political, cultural, religious, and so on. The so-called controversy that exists is not a controversy within the sciences, but within our culture.*
3. *What makes something scientific — this is a basic aspect of scientific literacy. The goal here is to help people understand that what makes something scientific is not the stuff that we learn — the facts themselves— but the way we go about learning the facts and testing our knowledge. Many of us learned science as a collection of facts — about rocks, plants, the weather, the planets and so on — but it really isn't that; it is a process of understanding that knowledge and putting in into a perspective.*

When the first edition was written, Gallup polls showed that about half of the people who had an opinion agreed that humans were created pretty much in their present form about 10,000 years ago. In the intervening years, repeats of the this poll — and the findings of other polls by CNN, CBS, NY Times, Fox, Pew, BBC, and so on — show that this has not changed at all. One thing we wondered was why? And in putting together the new edition, we focus a lot more on the cultural and historical issues compared to the scientific ones. After all, the basic findings of the science from the 1980s have not been rejected, but many have been modified, refined, and extended since then. Yet, the general public still thinks that evolution is scientifically controversial. We want to make it clear that the controversy is in the political and cultural realm, and not in the scientific realm.

I probably need to start with a brief description of what we mean by biological evolution: It is the scientific theory that is concerned with

understanding the pattern of similarities and differences in living things on earth over all the time and in all the different places that life has ever appeared on this planet.

We have the "fact" of evolution: what we see alive on earth now is different from what we see in the past.
We have the "process" of evolution: the different ways that biological change in organisms and populations can lead to the patterns that we observe over time and place.
We have the "theory" of evolution: models that describe how these process produce the observed change and that make testable predictions about how living things ought to be related biologically and what sorts of evidence we ought to look for (and find) of the history of those relationships.

What is "the evolutionary constriction?" Ronald numbers writes in his chapter that it is "increasingly difficult" to maintain religious faith "on the basis of the scientific evidence for evolution." [pp. 34-35].

The science-religion thing is certainly the elephant in the living room, isn't it?

The constriction is the opposite of the "God of the Gaps" solution (see Pennock). It means that the gaps are getting smaller.

I think this is an important issue, but this is not really what Numbers is saying. He is saying that the so-called "scientific evidences" for creation cannot be the basis for religious faith. However, that is begging the question, isn't it? After all, why should scientific research provide the evidence for religious faith? In fact, you can find at least 19 official, on-the-record statements in support of evolution from Christian and Jewish denominations and organizations at the NCSE web site: http://www.ncseweb.org/resources/articles/3677_statements_from_religious_org_12_19_2002.asp

The other thing you need to remember is that those folks who are justifying their atheism on the basis of scientific evidence are (in my humble opinion) equally misguided. It was Carl Sagan who used to remind us that "Absence of evidence is not evidence of absence." Besides, there is never anything in the process of scientific inquiry that is going to answer these ultimate questions of the meaning of life or human existence. That's for philosophers. The caveat is, however, that

we ignore the natural world and the laws that govern it at our peril. So, if there is a message for the religious community from the scientific community, it is that it is important to understand the way the universe works — whether we think that God is the ultimate source of its existence or not. If Christians believe that they must be good stewards of the earth and all that is within it, then ignoring what science has learned about nature actually inhibits that mission. And in some views, that sort of arrogance and pride is the foundation of the original separation of humans from their spiritual side that stories like the one about the Fall from Grace in Eden are all about.

Does this mean that one cannot believe in both evolution and religion?

First of all, we don't really expect people to "believe in" evolution any more than we ask them to believe in gravity. But if people don't understand a scientific theory, then they cannot really accept it. Here's an example that might make it clearer. Atomic theory tells us that atoms are made up of a number of particles, including electrons that are excitable and can absorb and release energy. Because of this theory it is possible to make telephone calls, use computers, watch television, listen to the radio, and so on. But no one has made a direct observation of an electron; they are only "theoretical".

This is true in other areas. Because of electromagnetic theory we are able to send radio and television signals; because of the theory of gravity, we can send spacecraft to distant worlds without the use of much fuel (or return Apollo 13 to earth after it lost most of its power).

The second point is that this is not primarily a conflict between science and religion — though many in our culture try to frame it that way. It is really a conflict between knowing how the world works and ignoring it — essentially a conflict between knowledge and ignorance. Religion is not the enemy of science; ignorance is. And ignorance is also the enemy of religion.

What is the difference between science / the scientific method and "creation science?" Is "creation science really science."

You find this easily in both the "classic" works by the old "creation scientists" and the newer "intelligent design" movement. It is basically a matter of how we respond to our ignorance — that is, what we do when we do not know something about nature. In the sciences, we ask questions, make predictions, and follow up with observations that will

confirm or refute those predictions, analyze the results, and then generate new, better questions that will fill the gaps of our ignorance. It is this process that validates our knowledge and reduces our ignorance. In the case of the creation scientists, the Bible is the ultimate authority, and all human knowledge must be in compliance with that authority. Therefore, anything that seems to contradict the biblical accounts is assumed to be false.

In ID, the overt religious language and references are removed, but the main difference is the same. Take Michael Behe's idea of "irreducible complexity" for example. He has decided that there is no "Darwinian" explanation for complex, highly integrated molecular structures and biochemical pathways. As true as that might have been in the early 1990s when he wrote Darwin's Black Box, the fact is that the evolution of these complex systems has been at the cutting edge of biological research for over 20 years. We are now seeing a convergence in the research fields toward a small set of possible solutions. One of the most interesting is that many of the models are distinctly non-Darwinian. So, whereas Behe may be correct that there is not a good explanation that uses Darwin's vision of the gradual accumulation of small changes over a long period of time, there are certainly a number of other ways that we know biological change appears and is passed along. So, even if he is technically correct that there is no Darwinian explanation, that does not mean that there is no naturalistic explanation. Behe and the ID crowd are exploiting a gap in the knowledge of evolutionary models among the general public.

Other aspects of this are important. Both ID and the older SC use "evidence against" evolution (a nice phrase introduced into the record by Justice Scalia). The idea is that just showing the unanswered questions and technical or research problems with evolution will weaken it and allow the "alternative" to be accepted by default. Plavcan treats this approach well in his chapter, showing that this is a residual of theological issues that arose in US Christianity in the early part of the 20th century, and one of the sides of THAT argument came down on the side of the Bible's being absolutely true and authoritative; therefore, if any one part of the Bible were disconfirmed, all of it would fall. This approach is evident in their approach to scientific theories, but, of course, this is not how scientific research works.

The other, nonscientific aspect of this is that it is based on the adversarial structure of the judicial system. In that environment, there are two opposing sides and if one side can weaken the arguments of its opponent, then it prevails — regardless of whether its own position

has any merit. It is not an accident that this approach is common among prominent antievolutionists, such as William Bird, Walter MacBeth, and more recently, Phillip Johnson and David DeWolf — all lawyers.

Can you give me an example how "creation science" is not really science in relation to "flood geology" (What is "flood geology?") and/or "young earth creationism?"

Young-earth creationists believe that the earth is 6,000–10,000 years old based on their interpretation of the material in Genesis and the historical record associated with the various kingdoms and verifiable events mentioned in the Bible. These are also likely to be Flood "geologists", looking for physical evidence of the Flood of Noah in the geological record. — because the Bible says that the earth was covered by flood waters for about a year and that all things with "the breath of life" perished except what was on the Ark. That was a major geological event, so it should leave some significant traces on the surface of the earth.

"Flood geologists" argue that all the geological features we see (the Grand Canyon is a favorite) were created as a result of the Flood during that one year. They often point to the effects that we see in the aftermath of Mt St Helens or Vesuvius as example of "catastrophic" events that reshape the earth's surface. Of course what stands out for these two events (and many others) is that they do stand out. They show something very different from the other geological processes that produce the earths features, and so we are able to recognize them because they are SO different from the "normal" formations.

There is a cottage industry of creationists doing calculations and examining "evidences" but they have massive problems — not the least of which is the amount of energy required for all these changes to occur in such a short time. A number of people have calculated that the heat alone would have boiled away the oceans and thoroughly cooked Noah, his family, and all the critters aboard the Ark. So, to explain all this, it is necessary to suspend natural laws — at least temporarily — to make all this work. For people whose primary authority is in the Bible, of course, God can do this without consequence. For the sciences, however, we do insist that any of our explanations be consistent with the normal operation of natural processes behaving in lawful ways.

What are "young earth creationists?" How old does the best science teach us our universe is? How old is planet earth based on science? [Contrast with how old YEC's say the earth and/or universe is/are]. [YEC timeline at p. 152].

Please explain isotopic or radiometric dating. How do we date rocks?

You'll see these two things handled very well in Dalrymple's chapter, but the most important point is not the particular method, but that all the different methods point to roughly the same result — the earth is 4.5 billion years old, give or take a few hundred million years; the solar system is a little bit older than that; and the universe is around 12 billion.

Isotopic decay dating methods are based on observations of the way that radioactive isotopes are converted to more stable products. Different isotopes of different elements do this at different rates and in different ways. Some elements are more useful for measuring ages of particular specimens than others; and each one has a range of dates for which it is most accurate.

Are you aware that, under the George W. Bush administration, park rangers at the National Park Service had been prohibited from telling visitors to the Grand Canyon how old the Grand Canyon is based on the best scientific evidence? Any thoughts on this matter?

*Actually, this characterization is not quite true. While the current administration is more permissive about the incursion of pseudoscientific ideas, the Part Service has <u>not</u> been specifically instructed to implement any such policy. Anti-evolutionists have been emboldened by the temporary placement of a creationist book on the Canyon in the *science* section of the NPS book store at the Canyon, but it has since been moved to the *inspirational* section. Park Rangers are still telling people that the canyon is millions of years old and are correctly identifying the ages and the geological origins of the various features and strata.*

As far as we can tell, no one has issued any policy that prohibits this activity.
http://www.ncseweb.org/resources/news/2007/US/699_renewed_concern_about_creation_1_4_2007.asp

What is “intelligent design?” Is it the same as creationism? If not, how do they differ?

Basically it is an argument from ignorance (or from personal incredulity). It says that current scientific models cannot explain certain aspects of the complexity and diversity of life (that part is true, but see the comment above on the ways that we respond to our ignorance). Therefore, IDers argue, the only reasonable conclusion is that they were purposely designed by an "intelligent agent" and inserted into living things. The explanation is that they "look" designed, therefore they must be.

ID artfully avoids naming the designer, but let's face it — the job description calls for someone who can override the laws of nature, making things happen that cannot occur under natural law or preventing things from happening that should occur according to natural law. There aren't many qualified candidates for the position — and even the dubious reference to a super-intelligent alien being doesn't cut it, because no matter how intelligent these critters were, they would still be subject to all the natural laws in the universe.

So, yes, it is really the same as creationism, though repackaged and relabeled. Wesley Elsberry once referred to it as "creationism in a cheap tuxedo".

Is evolution critical for the teaching of the scientific method? Why is it important (if it is important) to teach the scientific method, and/or evolution, in public schools?

One of the most famous statements ever uttered about evolution was by the prominent geneticist Theodosius Dobzhansky: He wrote, "Nothing in biology makes sense except in the light of evolution."

The short answer to your question is yes. The reason that scientists reject ID and SC is <u>not</u> because they are religiously based ideas (this is different from what happens in the courts, mind you, where there are First Amendment issues in play; but these are separate from the scientific issues). It is because they fail to follow the modern process of scientific inquiry (I like this term better than "<u>the</u> scientific method" because it is a more accurate reflection of what we are trying to convey). Evolution follows this process just as any other scientific field of inquiry.

The issue is that evolution is the way that life works — how the natural variation among individuals provides the basis for responding to changes in our environments, and how these local changes can have longer-term effects on the diversity of life. If we want to understand the world and be successful in it, we have to study these processes scientifically.

As a native New Englander, the one example of this process that jumps out at me is the Gypsy Moth. This is an invasive species that does not belong in New England, but a breeding population was transported there for research as an alternative source of silk and later escaped from a lab in Massachusetts due to the aftermath of a hurricane. Understanding why and how they are distributed where they are and where they are going is based in evolutionary science — variation, adaptation to the natural environment, genetic process of inheritance, differences in survival and reproduction among variants, control by predators, competition for resources from other species, and so all. This whole collection of ideas is what we call "evolutionary ecology" and it is vital to solving that problem.

There are similar issues in medicine, agriculture, climate change, fisheries — any field that you can name that has any connection to biology of living things can only be completely understood in terms of evolution.

What are meant by the terms microevolution and macroevolution [p. 197]?

These two terms are descriptions of different <u>perspectives</u> on evolutionary change. They are essentially the difference between what you get to see in a football game from the camera high up in the stands (or in the blimp) above the field compared to what you see from a sidelines camera. One is the long-range view, and the other is the close-up. The long range view give us the larger perspective — where the teams are on the field, how much change has occurred in their positions, and so on, <u>but</u> there is not much detail about the particular actions of individual players or the interactions among players on each play. The sidelines camera gives us these details on individual players and interactions among them, but very little information on the overall progress of the game and how the two teams' positions relate to each other. Just as nobody would seriously argue that what you see from the blimp and what you see from the sidelines are two entirely different games with different rules and actions, scientists understand that the difference in perspective shows

us different aspects of how the process of evolutionary change plays out in time and space.

Can the religious notion of mankind being created in God's image be reconciled with evolutionary theory?

First of all, I would argue that scientists have no business making this judgment. This is a matter for theologians to decide, in the same way that they had to come to grips with the idea that the earth is not the center of the universe. It is not a scientific question.

Second, the evidence from the Voices for Evolution *page at the NCSE or the "Clergy Project" and "Evolution Weekend" programs is that these authorities have already answered this question, and the answer is yes — at least for some theological traditions.*

Is science/evolution an atheist religion? How is science different from religion?

The main difference is that scientists don't "believe" in their theories, they accept them as working models of the universe. There is no statement of faith; there is no test of orthodoxy. By contrast, the Institute for Creation Research, BIOLA university, the new Answers in Genesis "Creation Museum", and other creationists organizations require that those working for them profess a specific religious view before being accepted as colleagues or workers.

To this end, our chapter (Petto and Godfrey) illustrates how important non-Darwinian ideas about evolution not only became commonplace among researchers, but also made their way into standard high school science textbooks — all based on their research results, not on some profession of faith or orthodoxy.

At the end of the day, how does one reconcile religious faith with science to give meaning to one's life?

Again, this is decidedly not a scientific question, so any answer I might give is unauthoritative in the extreme. However, there are people who are working on this. One very active place is the Metanexus Institute in Philadelphia.

The fact is that people do it; that denominations also do it. There is much less here than meets the eye.

One example, both the Old and New Testaments are pretty clear about what one should do if one has leprosy. However, no one would seriously argue that a leper in the 21st century should do these things instead of seeking antibiotic therapy to eliminate the bacterium that causes the disease. Isn't that an example of reconciling faith and science?

You can find information about the book and its contents at www.uwm.edu/~ajpetto/scc2.htm
You can also find out a lot about what I do and write at the root page: www.uwm.edu/~ajpetto.

I have a number of book reviews there about the science-religion issue.

You can also go to www.ncseweb.org, the National Center for Science Education for one-stop shopping on a variety of resources and links about this issue.

Finally, check out the Evolution 101 page at the Understanding Evolution website accessible from the UC Berkeley Museum of Paleontology (link is on the NCSE links page).