

Below is correspondence from Rabbi Blue (a pseudonym). Rabbi Blue is a Johannesburg educator. He teaches at the school which features in the *Concerned Parent* post on my website, *Torah Explorer* ([www.TorahExplorerer.com](http://www.TorahExplorerer.com)). Rabbi Blue refers to correspondence that he has had with Professor James Shapiro of the University of Chicago (<http://shapiro.bsd.uchicago.edu/>). The structure of this response is as follows. First, Rabbi Blue's email, followed by my response to some of his points. Then follows the correspondence between Rabbi Blue and Professor Shapiro, interspersed with my comments. At all points, my words begin with the heading *My response: ...*

Yoram Bogacz

Johannesburg, July 2010

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**Email from Rabbi Blue to me:**

Dear

Yoram,

I hope this e-mail finds you well. I must begin with an apology for not contacting you earlier and continuing our dialogue since early last year. My work – both at Shul and school – has been overwhelming, leaving little time to indulge in this type of communication. The discussion we had (so long ago) was centred around Torah and Evolution. Unfortunately, I have not investigated the matter much further than when we left off. The one thing I did manage to do was to have a correspondence with Professor James Shapiro. The reason for this correspondence is because in previous e-mails you listed a few academics who dispute Evolution and one of the names was Prof Shapiro. I decided to investigate the list and found that most of them were prejudiced to the subject from the outset (all of their biases were due to their religious beliefs – some Christian and others Muslim) and therefore (in my mind) disqualified themselves from having an honest and objective view point. The one academic who I found fascinating was Prof Jim Shapiro and therefore

decided to trace him down and ask him for his position myself. Attached is our correspondence.

I have not changed my position on the matter that Evolution is in no-way heretical and can be (and for educational purposes, should be) taught in Torah schools.

Hashem should bless you and your family with much success in all you do.

דליבא

מעומקה

בברכה,

Rabbi Blue

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### **My response:**

Dear Rabbi Blue,

I am delighted that you have gone to the trouble of corresponding with Professor Shapiro. It indicates a level of involvement and interest which is sadly missing in the majority of cases of people who formulate opinions in this area.

No apology is necessary as far as I am concerned. The students in your school, however, are a different matter. Let me explain. I find one statement in your email disturbing. You write, “...*leaving little time to indulge in this type of communication.*” I consider it a grave error to describe this correspondence as an indulgence. Not because of you or me, but because of the students who are being affected. The school’s decision to accept the new biology syllabus as is (without supplementary material) is quite possibly one of the fateful moments in their lives, whether they are aware of this or not. I wrote in *Genesis & the Big Bluff* that the (non)reaction of the South African rabbinate and the South African Board of Jewish Education to this syllabus change was unfortunate. If the Department of Education had changed the English syllabus to introduce a film study of *Basic Instinct*, there would have been an uproar, and justifiably so. No administrator, teacher or principal would have been able to postpone action on this matter due to being too busy to *indulge* in the debate. Regardless of your convictions, and those of the school administration, this material is controversial, and is opposed vehemently by eminent Torah

personalities. It should never have happened that decisions about such weighty matters would be made in the ho-hum manner suggested by your reference to *indulgence*. This is far more important than anything like teaching (including שיעורים in Talmud, חומש and הלכה), writing report cards and parent-teacher meetings.

I find it remarkable that the USA is periodically convulsed by court cases about the admissibility of supplementary material for school biology courses. I do not think that the litigious route followed by the USA is the way to go. But at least the participants in the debate there know what's at stake. It is so different to the apathy characteristic of South African Jewry in this matter. That is why I wrote the following passage in *Genesis & the Big Bluff*:

Other schools, however, which are ostensibly committed to Torah ideals, took a different approach. In one case, after initially displaying enthusiasm for the audio-visual seminar, the school administration back-pedalled. A brief email to me from the teacher concerned explained that *concerning your presentation to the kids, I have spoken to both the Principal and the Biology teacher and they both felt that there is not enough time in the schedule to facilitate the presentation. So there is enough time in the school's schedule to teach material which can have the most serious repercussions to the students' אמונה*. But there is not enough time to afford the children a glimpse of the many serious difficulties inherent in Neo-Darwinism. A principal and a teacher took a decision that may adversely affect the spiritual health of hundreds of children over the coming years using the same criterion that would be used if the subject at hand were the next school outing.

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**Rabbi Blue next wrote:**

The reason for this correspondence is because in previous e-mails you listed a few academics who dispute Evolution and one of the names was Prof Shapiro. I decided to investigate the list and found that most of them were prejudiced to the subject from the outset (all of their biases were due to their religious

beliefs – some Christian and others Muslim) and therefore (in my mind) disqualified themselves from having an honest and objective view point.

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**My response:**

This is what your approach would amount to in a different context: I would like to investigate the possibility of drilling for oil in the Gulf of Mexico. I found that all the so-called experts were biased. So I spoke to nobody from the energy sector, and also to nobody in the environmental lobby. Their biases were due to their economic interests and environmental concerns and they therefore (in my mind) disqualified themselves from having an honest and objective viewpoint. Sounds ridiculous? It does to me.

Having religious convictions does not *ipso facto* mean that one's analysis is faulty. *You*, as the investigator, must make sure that *you* are objective. You do that by scrutinising as wide an array of opinions of people who are technical experts in their fields. You deliberately seek out arguments from both sides of the spectrum and apply the best analysis that you can, to see whether or not the arguments hold water. You don't achieve objectivity by speaking to one expert because he is a nice chap who answers your emails while ignoring other experts – without even considering their opinion – because you consider them to be biased.

Furthermore, seeing that you disqualify all religious people from participating in the debate, what makes you take notice of Professor Shapiro's opinions? On his web page, in the CV section, Professor Shapiro lists the following information about himself:

Board, University of Chicago B'nai-Brith Hillel Foundation, 1983-88,  
1996- (Chairman, Finance Committee, 1984-1988; Chairman,  
Fundraising Committee, 1996-2000)

Board, KAM-Isaiah Israel Congregation, 1990-1995, 1998-2002

I have no intention of scrutinising Professor Shapiro's precise level of religiosity. But being a member of a board of a synagogue suggests that he has at least a rudimentary belief in a Creator, and yet you deemed *his* views

objective. What is the threshold of religiosity that disqualifies others but not him?

Furthermore, how do you justify your own efforts in Jewish outreach (kiruv, קירוב)? For example, in the early days of Chai FM, you gave a series of talks based on Rabbi Dr. Dovid Gottlieb's exposition of the Kuzari Principle (see [www.dovidgottlieb.com](http://www.dovidgottlieb.com)). The idea, evidently, was to argue that there is unique evidence for Judaism. You were obviously hoping to present a cogent, coherent, *objective* argument. Why did you expect *anyone* to be convinced? Any agnostic or gentile (or just a sceptical Jew) could have brushed you off on the grounds of religious bias. You are an Orthodox Jew, aren't you? So you *must* be biased and incapable of presenting a reasoned argument! Such a critic would have been perfectly correct in refusing to even lend you an ear, given your approach to the investigation of biological evolution.

Furthermore, the critics of Neo-Darwinism come in all stripes. Some are religious, but some are agnostics, and others are atheists. Prominent examples of the last two categories are David Berlinski, Thomas Nagel, Antony Flew, Bradley Monton, Jerry Fodor and Steve Fuller.

Furthermore, what's sauce for the goose is sauce for the gander. Proponents of Neo-Darwinism are overwhelmingly atheists, and many are militant anti-religious warriors. Here is a short list: Richard Dawkins, Eugenie Scott, Daniel Dennett, William Provine, Barbara Forrester, Jerry Coyne, Richard Lewontin, and E. O. Wilson. In the July-August 2007 edition of *American Scientist*, Professor Provine describes the results of a survey he conducted among American biologists to gauge their attitudes to religion. More than 95% are atheists. Similar numbers apply to the National Academy of Sciences in the USA. The idea that in such a community the conclusions drawn from the facts can be expected to be more objective than the interpretation of scientists with religious convictions is ludicrous.

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### **The correspondence between Rabbi Blue and Professor Shapiro**

Here is Rabbi Blue's first email to Professor Shapiro:

Dear Professor Shapiro,

I hope this e-mail finds you well.

I recently got into a serious debate with a colleague concerning the validity of Darwinian Evolution (serious in that it has major implications on our school's syllabus). Without boring you with the details of the debate, I will tell you quickly the essence of our debate: My position is that there is overwhelming evidence for Evolution and therefore we – as Orthodox Rabbis – should embrace it and not shy away from any possible theological problems. He – on the other hand – says that there is enough dissention in the scientific community as to the whether evolution is acceptable or not and therefore we are not compelled to accept Evolution. He – by the way – is a qualified chemical engineer, where I am merely an Orthodox Rabbi.

The reason I am contacting you, is that my colleague referred to you as one of the opponents of Evolution – to bolster his claim. Now, I'm not asking for your theological opinion, but I am asking you for your views on Darwinian Evolution specifically and Evolution in general (or is there is difference?).

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**My response:**

The statement that *there is overwhelming evidence for Evolution and therefore we – as Orthodox Rabbis – should embrace it and not shy away from any possible theological problems* is simply incorrect. No classical Torah authority would subscribe to the position that because the scientific community accepts a certain paradigm, the Torah community should embrace the concept. The Torah has its own dynamics and its own methodology as far as determining whether a given concept is compatible with its teachings or not (and therefore, whether it is true or not).

This would be true regardless of the existence (or lack) of historical precedents. But it just so happens that there *is* a perfect illustration of the folly of this line of reasoning. I am referring, of course, to the Big Bang. Until very recently, the entrenched paradigm within the scientific community was that the universe was eternal (for an introduction to the subject, see S. Brush, *How Cosmology became a Science*, Scientific American, August 1992). This view was promoted with the same conviction that now characterises the adherence to Neo-Darwinism within the scientific community, including the denigration of any dissenters. *Nobody* in the Torah world doubted for one moment that this

paradigm was wrong. *Nobody* took the erroneous position of Rabbi Blue, that we should embrace this worldview because the community of scientists believed that there was overwhelming evidence for it. Science has its limitations, and when the *mesoroh* (our received tradition) presents a position which is at odds with contemporary paradigms, we follow the *mesoroh* without reservation. In the case of the Big Bang, the last forty years have validated this approach, as the eternal-universe paradigm collapsed<sup>1</sup>.

Furthermore, the phrase *shy away* is misleading. Nobody is shying away from anything. Rather, after careful consideration, we *reject* the view of the scientific community in this case, and therefore insist on introducing biology students to *more than* the standard material in the syllabus would expose them to.

Finally, I think that it is regrettable that you described yourself as *merely an Orthodox Rabbi*, even if it was only meant as an expression of humility. Rabbi Blue, evolutionary biology is not quantum electrodynamics! The basic arguments of evolutionary biologists can be grasped – and their validity assessed - by the average high school student. Strip away the jargon – allopatric speciation and sympatric speciation, for example – and you get a simple proposition about how speciation is supposed to work. Those properly trained in Talmudic studies have no trouble assessing this evidence. The *Aw shucks* attitude towards highly-trained scientists is, in this case, unwarranted.

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This is how Rabbi Blue described my position to Professor Shapiro: that there is *enough dissent in the scientific community as to the whether evolution is acceptable or not and therefore we are not compelled to accept Evolution*.

This is an *entirely erroneous* description of my position. The two decisive questions are: What do Torah sources say about the issue at hand? What does the scientific evidence indicate?

The first question is answered by evaluating the relevant Torah sources objectively, without constantly peeking behind one's shoulders to see where the scientific community is heading. The second question is answered by analysing the scientific evidence to the best of one's ability, *regardless* of the numbers of scientists on each side of the issue. This takes cognizance of the

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<sup>1</sup> And, yes, I am aware of oscillating-universe and multiverse cosmologies. I shall not address those in this exchange.

fact that in the history of science, there have been numerous instances in which a minority (or even one individual) turned out to be correct and the majority (often scathing and derogatory in its attitude to the dissenters) ends up being wrong.

In the case of Neo-Darwinism, the answer to both questions makes it clear that the major claims of Neo-Darwinism are hollow. Without question, the Torah is incompatible with Neo-Darwinism<sup>2</sup>. And, the evidence for Neo-Darwinism is scarce (to use a charitable term), while the problems with it are legion. These are the factors that determine my attitude to the issue. The fact that there is also dissent within the scientific community comes in a distant third. I would advocate the same views even if all scientists were committed to Neo-Darwinism.

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Rabbi Blue wrote to Professor Shapiro that, “The reason I am contacting you, is that my colleague referred to you as one of the opponents of Evolution – to bolster his claim.”

This statement has the potential to impugn my integrity. A person who reads this sentence in Rabbi Blue’s email and then Professor Shapiro’s reply might get the impression that I misquoted Professor Shapiro or that I claimed that he promotes a position that he in fact does not subscribe to. I am sure that Rabbi Blue did not intend to do this, but I must correct the misimpression.

Here is Professor Shapiro’s statement that I use in my audio-visual presentations:

There are no detailed Darwinian accounts for the evolution of any fundamental biochemical or cellular system, only a variety of wishful speculations. It is remarkable that Darwinism is accepted as a satisfactory explanation for such a vast subject – evolution – with so little rigorous examination of how well its basic theses work in illuminating specific instances of biological adaptation or diversity. [James Shapiro, *In the Details... What?* National Review (September 16, 1996): 62-65]

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<sup>2</sup> I am also referring to those Torah scholars who lived long before Darwin, but whose teachings make the incompatibility obvious.

This is true. There are *no* detailed Darwinian accounts for the evolution of *any* biochemical or cellular system. What *does* exist in abundance are “explanations” that the late Harvard paleontologist Stephen J. Gould referred to as *just-so stories*. “The blood-clotting cascade evolved through the accumulations of numerous, successive, slight modifications of the genome” the student will be told. Oh? Can you actually cite a single example of one such sequence of events? No. This is what Professor Shapiro emphasizes in the above statement, and it constitutes a significant weakness in the Neo-Darwinian position. Most students do not have any notion that what their textbook tells them about the evolution of intricate, sophisticated cellular machinery is nothing more than wishful thinking. This indeed bolsters my argument. **But at no point do I say, imply or suggest that Professor Shapiro shares my overall rejection of Neo-Darwinism.** In fact, **on the very same slide** in which I present the above quotation I cite Franklin Harold, a distinguished cell biologist. I **always** point out that he is a proponent of Neo-Darwinism, and that this is evident from the way he begins his sentence – *We must concede*. *Concede* indicates his reluctance in this respect. Here is Harold’s statement:

We must concede that there are presently no detailed Darwinian accounts of the evolution of any biochemical or cellular system, only a variety of wishful speculations. [Franklin Harold, *The Way of the Cell: Molecules, Organisms and the Order of Life* (Oxford :Oxford University Press, 2001), 205]

The reason for quoting these two scientists on the same slide should be obvious. They both make the same point, and do so in strikingly similar terms, using the phrase *only a variety of wishful speculations* to describe what Neo-Darwinian propaganda assures us is nothing less than certain.

I make a point of quoting as many proponents of Neo-Darwinism as possible in my presentations. Obviously, when proponents of this ideology acknowledge its weaknesses, this has a stronger effect than merely quoting opponents of the ideology. Thus, I quote Lynn Margulis regarding the utter lack of efficacy of mutations in leading to speciation.<sup>3</sup> I point out to the audience that overall, Margulis does not share my perspective. In my discussion of the Cambrian explosion, I quote Simon Conway Morris and James Valentine. Both are committed to the Neo-Darwinian paradigm, but acknowledge the extreme difficulties posed to the standard account of evolution by the Cambrian layer of fossils. I quote Gilbert *et al* in the context of my discussion of speciation,

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<sup>3</sup> Her statement is quoted later in this document.

taking care to point out to the audience that they are evolutionary biologists, and that the comment is taken from a run-of-the-mill journal whose editors, contributors and readers overwhelmingly subscribe to the Neo-Darwinian paradigm. Here is their statement:

Microevolution looks at adaptations that concern the survival of the fittest, not the arrival of the fittest... The origin of species – Darwin's problem – remains unsolved. [Scott Gilbert, John Optiz and Rudolf Raff ,*Resynthesizing Evolutionary and Developmental Biology*, Developmental Biology 173 (1996): 357-72.]

I could go on, but I think that the point is clear. I do not misquote Professor Shapiro, nor do I quote him out of context. As can be seen from his email responses to Rabbi Blue, he agrees that there are significant problems with Neo-Darwinism. Later on in this correspondence we shall see him making the following statements:

Darwin's natural selection of "numerous, successive, slight variations" is neither accurate nor adequate to account for the dramatic genome changes we can document through DNA sequencing.

And

However, we do know for certain that macro events have occurred which could not simply have been a long succession of small changes, such as Darwin postulated.

Again, I must emphasise that I take great care when presenting the seminars to point out frequently that I am quoting scientists who do not necessarily share my overall views. I also, of course, cite scientists who *do* reject Neo-Darwinism completely.

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**Here is Professor Shapiro's response to Rabbi Blue's email:**

Dear Rabbi Blue,

You are right. There is overwhelming evidence for evolution. The more we

learn and the more powerful our technologies become, the greater our insight is into the relationship of all living organisms, past and present.

Not surprisingly, however, the most recent molecular evidence tells us that the gradualist process envisioned by Darwin in the mid-19th Century cannot account for major events in evolutionary history. These include the horizontal transfer of large amounts of DNA between distant organisms, cell fusions to generate organelles such as mitochondria and chloroplasts, and whole genome duplications at key evolutionary divergences, such as the origins and radiation of flowering plants (what Darwin called "that abominable mystery") and the origins of vertebrates. These sudden events affecting many characters at the same time are well-documented in the DNA record, and they require an alternative view of the evolutionary process.

It is essential to separate out three issues in the evolution-creationism debate: the origin of life, the fact of evolution, the mechanisms of evolution. We do not yet have enough information to discuss the origin of life scientifically. All the evidence we have tells us that evolution by descent with modification has taken place and continues today (think about bacterial antibiotic resistance). Our molecular insights tell us that we need to formulate new theories about the processes behind evolution. Darwin's natural selection of "numerous, successive, slight variations" is neither accurate nor adequate to account for the dramatic genome changes we can document through DNA sequencing.

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**My comment:** It is refreshing (and rare) to see a contemporary biologist acknowledge *any* weaknesses within the Neo-Darwinian paradigm, much less that important chunks of it are *neither accurate nor adequate*. Nonetheless, there is much to say.

In about fifteen years of investigating Neo-Darwinism, I have come across the mantra of *overwhelming evidence* too many times to count. It's like getting a cheque for a million dollars: mouth-watering when you see it, bitter when it bounces. When you ask evolutionary biologists to present their overwhelming evidence, the only thing that is overwhelming about their response is the sheer paucity of convincing evidence. Of course, in this short correspondence, Professor Shapiro did not set out to demonstrate to Rabbi Blue what evidence led him to his conclusions. But his one reference to evidence for descent with modification is telling. He refers to bacterial antibiotic resistance. This is a well-known phenomenon, and has been studied to bits all over the world. But it is

hardly evidence for descent with modification. That putative process requires, *inter alia*, *speciation* – the accumulation of a sufficient number of mutations that leads to the divergence of a daughter species from its mother species. If there were a case in which the mutations seen in bacterial colonies led to changes which indicated speciation, it would count as superb evidence for Neo-Darwinism. But there isn't. No matter how long and how hard these bacterial mutations are studied, the bugs stay bugs. To state that these mutations can accumulate until speciation occurs, as Professor Shapiro believes, is speculation. Maybe they will, and maybe they won't. We haven't seen it happen yet.

Professor Shapiro is a top-notch biologist. But he is not the *only* top-notch biologist. Here is what another first-rate researcher had to say on this very matter:

[No evidence] exists in the literature claiming that one species has been shown to evolve into another. Bacteria, the simplest form of independent life, are ideal for this kind of study, with generation times of twenty to thirty minutes... But throughout 150 years of the science of bacteriology, there is no evidence that one species of bacteria has changed into another... Since there is no evidence for species changes between the simplest forms of unicellular life, it is not surprising that there is no evidence for evolution... throughout the whole array of higher multicellular organisms. [Alan Linton, University of Bristol, *Scant Search for the Maker*, Times Higher Education Supplement, April 20, 2001, Book section, 29]

Here is another world-class researcher making much the same point:

Mutations, in summary, tend to induce sickness, death, or deficiencies. No evidence in the vast literature of heredity change shows unambiguous evidence that random mutation itself, even with geographical isolation of populations, leads to speciation. [Lynn Margulis, *Acquiring Genomes: The Theory of the Origins of the Species*, Basic Books, 2003, p. 29]

Here are first-rank biologists who read the evidence regarding mutations quite differently to Professor Shapiro. They do not assume that mutations can be accumulated until a daughter species forms. They take the evidence as it is. Lots of bacterial mutations have been documented. Many are interesting, but

certainly do not demonstrate that one species of bacteria can mutate into another species.

Richard Lenski was elected in 2006 to the USA National Academy of Sciences on the strength of his long experiment (running since 1988) in continuously culturing that ubiquitous laboratory warrior, *E. coli*. He has nurtured about 50 000 (fifty-thousand!) generations of this bacterium. Lenski has recorded the mutations that have been observed over these long years. These changes are overwhelmingly *degradative*. Here is an analogy to help the uninitiated to understand this term. Imagine that your car alarm goes off at 2 a.m. This is very annoying. Eventually, after futile tinkering under the hood, you snip the electrical wire that supplies power from the car battery to the alarm system. Peace reigns over the neighbourhood again. Now – was the act of cutting the wire productive? Yes and no. If you are talking about the *immediate* benefit, you could argue that it was. There was an immediate gain in that silence was restored. But could you argue that in the *long term*, this was a step which would possibly lead to increased complexity within the car's operating systems? No! The change was degradative. It degraded the functioning of the system, to give you instant gratification.<sup>4</sup>

The vast majority of mutations that have been observed are downright lethal or at least deleterious to the organism. Of those touted as beneficial by biologists, virtually all are degradative. Here is a specific example of such a mutation. In Lenski's experiment, one adaptation was an increase in cell size and in many cultures, a more rounded cell shape. However, although this mutation increased fitness under the specific laboratory conditions, it also "increased the bacteria's sensitivity to osmotic stress and decreased their ability to survive long periods in stationary phase cultures, so the phenotype of this adaptation depends on the environment of the cells."<sup>5</sup>

This is the trouble with bacterial mutations. The poor critters indeed mutate, but the overwhelming majority of mutations are deleterious to the organism. Those that are not are usually trivial. The tiny fraction that confer an advantage do so by paying the price of degrading the overall complexity of the organism. There is no indication whatsoever that an accumulation of such

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<sup>4</sup>See *Genetic Entropy & the Mystery of the Genome*, Dr. J.C. Sanford, Elim Publishing, 2005.

<sup>5</sup> Philippe N, Pelosi L, Lenski RE, Schneider D (February 2009). "Evolution of penicillin-binding protein 2 concentration and cell shape during a long-term experiment with *Escherichia coli*". *Journal of Bacteriology* 191 (3): 909–21. Another interesting mutation reported by Lenski concerns the ability of *E. coli* to use citrate. See this response by Dr. Michael Behe: <http://www.amazon.com/gp/blog/post/PLNK3U696N278Z93Q>.

mutations can lead to speciation. If all you do is cut wires under the bonnet, don't expect your alarm system to improve over time, no matter how satisfying your night sleep becomes.

The same point may be made for insect "resistance" to insecticides like *dieldrin*. The insects do not *gain* any resistance by mutations; they *lose sensitivity* to the drug. The price they pay is a more sluggish nervous response, hardly a promising avenue for the evolution of more advanced organisms.<sup>6</sup>

The same is true of millions of fruit flies in laboratories all over the world. Suffering infernal indignities, they have taught biologists a lot. They can mutate in a hundred different ways, sometimes producing grotesque creatures with legs growing where there should have been antennae. But they *never* become anything other than fruit flies. All you see is a rearrangement of existing genetic material.

In short, Professor Shapiro's reference to bacterial antibiotic resistance is about as relevant to descent with modification as is the claim that I can walk to the Moon because I have demonstrated the ability to walk across the room. If there *were* a case of unambiguous speciation, you can bet your life on the fact that it would be cited constantly by Neo-Darwinists. But Professor Shapiro and his colleagues are reduced to using examples – like bacterial antibiotic resistance - which are at best ambiguous and at worst deceptive.

It is the same with all examples of what forms the supposedly overwhelming evidence for Neo-Darwinism. Whether it is Kettlewell's moths, the Miller-Urey experiment or Darwin's finches, the common denominator is that they are meretricious. Once examined closely, they are exposed as so many layers of emperor garments – naked emperors, that is.

Rabbi Blue, one of the most enduring lessons in the history of science is that practising scientists are, by-and-large, ignorant of the history of science. Repeatedly, they make predictions about the fact that in their discipline, there are only loose ends to be tied, because the basic picture is so complete that there cannot be much more to do. Here is an egregious example to keep in mind when Professor Shapiro makes reassuring noises about the fact that all that remains to do is to fine-tune the mechanisms of evolution:

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<sup>6</sup> Dr. Lee Spetner's *Not By Chance!* is a comprehensive treatment of this subject.

When Max Planck was a twenty-year-old graduate student, he was unsure as to the field he should specialise in. One of his professors, Philip von Jolly, advised him against becoming a physicist. He argued that after the discovery of the two laws of thermodynamics, all that was left to do was to tie up loose ends.<sup>7</sup> This was not merely Jolly's own opinion. This is how the *physics community* saw things. Just in case you don't know – Planck is one of the giants of modern physics, credited with introducing the concept of quantization, which was instrumental - just a few years later - in the revolution involving quantum mechanics and relativity.

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Professor Shapiro's statement that *The more we learn and the more powerful our technologies become, the greater our insight is into the relationship of all living organisms, past and present* is even more unfortunate. That was the dogma taught to several generations of students. It went (and still goes) under the provocative name of the *Tree of Life*. Countless students have been shown images of alleged relationships between organisms depicted as points on a tree. At its base is LUCA, the Last Universal Common Ancestor. The trunk, branches, boughs and twigs all supposedly represent relationships between species, with the outermost twigs representing existing species, while extinct species lie lower. This image - the tree of life - is the icon of those biological relationships which Professor Shapiro claims are understood with crystal clarity. This picture is essential to Neo-Darwinism. It is telling that in the whole of *The Origin of Species*, there is but one illustration – that of the Tree of Life.

Things changed dramatically in the early 1990s, when it became possible to sequence actual bacterial genes rather than just RNA. Everybody in the community of evolutionary biologists expected these DNA sequences to confirm the RNA tree. Fast forward twenty years: on 21<sup>st</sup> January 2009, *New Scientist* published a cover story entitled *Darwin Was Wrong*. The subtitle was *Cutting down the Tree of Life*.<sup>8</sup> The cover story quoted Eric Baptiste, an evolutionary biologist at the Pierre and Marie Curie University in Paris, France, Michael Rose, an evolutionary biologist at the University of California, Irvine and John Dupré, a philosopher of biology at the University of Exeter, UK. All share Professor Shapiro's general loyalty to Neo-Darwinism.

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<sup>7</sup> *It Must Be Beautiful – Great Equations of Modern Science*, Graham Farmelo (editor), Granta Books, 2003, page 6.

<sup>8</sup> The editorial is genuinely funny.

The article begins with a review of the orthodoxy. "For a long time the holy grail was to build a tree of life," says Eric Bapteste... "A few years ago it looked as though the grail was within reach." In other words, exactly what Professor Shapiro says – the target of *insight into the relationship of all living organisms, past and present* was within sight.

The article continues, "But today the project lies in tatters, torn to pieces by an onslaught of negative evidence. Many biologists now argue that the tree concept is obsolete and needs to be discarded." "We have no evidence at all that the tree of life is a reality," says Bapteste... **"The problem was that different genes told contradictory evolutionary stories."**<sup>9</sup>

A study published in *Science* tried to construct a picture of animal relationships but concluded that "[D]espite the amount of data and breadth of taxa analyzed, relationships among most [animal] phyla remained unresolved."<sup>10</sup>

Professor Carl Woese, a pioneer of evolutionary molecular systematics, observed that these problems extend well beyond the base of the tree of life: "Phylogenetic incongruities [read: contradictions in the relationships pictures] can be seen everywhere in the universal tree, from its root to the major branchings within and among the various taxa to the makeup of the primary groupings themselves."<sup>11</sup>

Of course, none of this led to evolutionary biologists deserting the paradigm en masse. Instead, the lingo changed - now they speak not of the *tree* of life but of the *web* of life or the *bush* of life. Well, this is exactly the problem with paradigms – they're much like fly paper: once stuck, it's hard to leave. But some biologists *are* using more dramatic language. The New Scientist article continues, "It's part of a revolutionary change in biology," says Dupré. "Our standard model of evolution is under enormous pressure." Rose goes even further. "The tree of life is being politely buried, we all know that," he says. "What's less accepted is that our whole fundamental view of biology needs to change." Biology is vastly more complex than we thought, he says, and facing up to this complexity will be as scary as the conceptual upheavals physicists had to take on board in the early 20<sup>th</sup> century.

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<sup>9</sup> Emphasis added.

<sup>10</sup> Antonis Rokas, Dirk Krueger, Sean B. Carroll, "Animal Evolution and the Molecular Signature of Radiations Compressed in Time," *Science*, Vol. 310:1933-1938 (Dec. 23, 2005).

<sup>11</sup> Carl Woese "The Universal Ancestor," *Proceedings of the National Academy of Sciences USA*, Vol. 95:6854-9859 (June, 1998).

One should keep in mind that New Scientist is a bastion of evolution diehards. This cover story was as surprising as reading a denunciation of Stalin in Pravda in 1937 would have been.

At any rate, these results and many others tell you something about the murkiness that characterizes current ideas about the relationships between organisms. Professor Shapiro's assurances that *The more we learn and the more powerful our technologies become, the greater our insight is into the relationship of all living organisms, past and present* should be paraphrased as follows: *The more we learn and the more powerful our technologies become, the clearer it becomes that common descent is entirely unsupported by the genetic data.*

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Professor Shapiro concluded his email to Rabbi Blue with these words:

Please let me know if you need further information. I attach a couple of .pdf files for your interest. I would not say that it is a small thing to be an Orthodox Rabbi, but I appreciate your modesty.

Best wishes,  
Jim Shapiro

**My comment:** The pdf files were not forwarded to me by Rabbi Blue.

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**Here is Rabbi Blue's second email to Professor Shapiro:**

Dear Professor Shapiro,

Thank you so much for your prompt and lucid reply.

In the Jewish (Orthodox) world there is lots of room to work with the latest scientific discoveries and observations including Evolution. I could refer you to some interesting material, if you are interested... But I don't want to preach; that's not the reason I contacted you.

I believe that many religious people are disturbed by the phrase "random mutations" – often used when describing Evolution – because they believe that

there is nothing random about the universe. They therefore have a knee-jerk reaction to it, without necessarily thinking deeply about the scientific endeavour in general and without looking at the evidence. What do scientists mean when they use the term “random mutations”? What role do random mutations play in the mechanisms of Evolution?

Best regards,  
Rabbi Blue

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**My Response:** Rabbi Blue has misconceived the issue of random mutations. It has nothing to do with a belief that nothing is random within the universe. To wit: nobody in the Torah world has ever kicked up a fuss over physicists’ constant use of the term *random* in the context of quantum mechanics. The fact that certain atomic nuclei decay with what appears to be a random pattern does not bother anyone in the Torah world. There is no problem with events that appear to *us* to be random (like the spontaneous disintegration of radioactive nuclei). It just means that these events are completely unpredictable (except on a statistical basis).

The problem is that Neo-Darwinism conceives of the history of life as *unguided*. This is the sense in which the word *random* is used. Unguided means that there is no purpose in biology; no end-goal; no direction; no certainty that human beings would ever appear on the planet. The late Stephen J. Gould described it as follows: if the “movie reel” describing the history of life on Earth were wound up and replayed, there is no reason to expect that it would resemble the first “screening”. It could be that no life would emerge, and even if it did, one would expect a completely different suite of life-forms to emerge. There is no reason to expect that human beings would emerge. *This* is certainly anathema to Torah Jews.

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**This is Professor Shapiro’s reply to Rabbi Blue’s second email:**

The origin of "random mutations" lies in ideology and ignorance, not science. The ideology was materialism (even though materialism is quite compatible with deterministic processes) in opposition to supernatural creationism. The ignorance was due to a lack of knowledge about the mechanisms of heredity.

Random mutation was simply a default assumption before we knew about DNA. Now that our knowledge of DNA allows us to study the processes of genetic change with molecular precision, we can see that it is not random but follows certain rules, which may be flexible. I have written extensively about this under the rubric of "natural genetic engineering." My work is an extension of Barbara McClintock's original discovery that living cells have built-in mechanisms for restructuring their genomes. The fact that genetic change results from internal biochemical action rather than chance subjects it to various kinds of regulation. One of the future research agenda items is to explore how far this regulation has played a role in the evolution of adaptive traits. My papers on this topic are rather technical; so I have not attached any of them. If you wish to pursue this matter further, they are available on my web page (<http://shapiro.bsd.uchicago.edu>).

I would appreciate knowing the interesting materials you mentioned concerning Judaism and science. I have some knowledge of this subject and know that textual literalism is a form of idolatry. But it never hurts to learn more.

Best wishes,  
Jim Shapiro

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### **My Response:**

Professor Shapiro writes, *Now that our knowledge of DNA allows us to study the processes of genetic change with molecular precision, we can see that it is not random but follows certain rules, which may be flexible.* Two important points need to be made:

Imagine an experiment in which several inkwells are tipped so that their contents spill onto paper. The claim is that the resulting patterns of ink are random. Professor Shapiro (this one is a physicist, not a biologist) counters, "There is nothing random about them. The blob is completely determined by factors such as the viscosity of the ink, the diffusion coefficient of the paper, the angle at which the inkwell was tilted, the ambient temperature, blah, blah, blah." This misses the point. Of course there are physical factors which influence the appearance of each blob of ink. In that sense, the resulting smudges *follow certain rules*. What is important is that the end result is not the

product of design or purpose. It could have been produced by the cat knocking over a jar of ink.

The *sine qua non* of Neo-Darwinism is that it is an *unguided* process. This is so basic that it is almost not worthwhile quoting relevant sources. But for the sake of completion, here are a few:

The late S.J. Gould repeatedly discussed the "radical philosophical content of Darwin's message" and its denial of purpose in the universe:

"First, Darwin argues that evolution has no purpose. . . . Second, Darwin maintained that evolution has no direction. . . . Third, Darwin applied a consistent philosophy of materialism to his interpretation of nature. Matter is the ground of all existence; mind, spirit, and God as well, are just words that express the wondrous results of neuronal complexity."<sup>12</sup>

A popular college evolutionary biology textbook declares that

"[B]y coupling undirected, purposeless variation to the blind, uncaring process of natural selection, Darwin made theological or spiritual explanations of the life processes superfluous."<sup>13</sup>

Even the theistic evolutionist Kenneth Miller has written in five editions of his popular high school biology textbook that the implication of evolution is that it works "without either plan or purpose" and is "random and undirected."<sup>14</sup>

The fact that there are certain mechanisms behind mutations, and that they are subject to rules, is beside the point. Neo-Darwinism is understood by its proponents to be, overall, an unguided process, much like spilling bottles of ink. There is simply no telling what sort of blot will emerge, regardless of physical-chemical processes that underlie the event.

The second crucial point is that genomes contain enormous amounts of encoded information. The implication of Professor Shapiro's statement i.e. that

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<sup>12</sup> Stephen Jay Gould, *Ever Since Darwin: Reflections in Natural History*, pg. 12–13 (W.W. Norton & Co. 1977).

<sup>13</sup> Douglas J. Futuyma, *Evolutionary Biology*, pg. 5 (3d ed., Sinauer Associates, 1998).

<sup>14</sup> Kenneth R. Miller & Joseph S. Levine, *Biology* (1st ed., Prentice Hall, 1991), pg. 658; (2nd ed., Prentice Hall, 1993), pg. 658; (3rd ed., Prentice Hall, 1995), pg. 658; (4th ed., Prentice Hall, 1998), pg. 658; (5th ed. Teachers Ed., Prentice Hall, 2000), pg. 658.

this information is merely due to *certain known rules* is dubious. I recommend Stephen Meyer's *Signature in the Cell* for those interested in pursuing this issue.

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Professor Shapiro concludes his email by writing *I have some knowledge of this subject [Judaism and science] and know that textual literalism is a form of idolatry.*

I do not know what Professor Shapiro's sources are. I would not be surprised to learn that he relies on the likes of Dr. Gerald Schroeder to formulate his opinions in this area. This is the main reason I wrote *Genesis and the Big Bluff*. It was in recognition of the fact that most readers of *Genesis and the Big Bang* labour under the illusion that Dr. Schroeder's conclusions are based on competent Torah scholarship.

The statement that *textual literalism is a form of idolatry* is preposterous. *Some* Biblical statements cannot be read literally – this often applies to statements about God (in particular, statements suggesting His corporeality). That does *not* mean that one may proceed to treat whatever one wishes as metaphor or allegory.

Has Professor Shapiro (or, for that matter, Rabbi Blue) conducted an investigation as to what classical Torah sources say about what may be allegorised? For example, have they studied Rav Saadiah Gaon's parameters for allegorization<sup>15</sup>? Have they studied the view of Yad Rama<sup>16</sup>? Have they distilled Maimonides' views on the matter from his voluminous discussions on the subject<sup>17</sup>? In the works that purport to show that Judaism and Neo-Darwinism are compatible (and, especially, in Internet writings on the subject) there is nothing remotely resembling a rigorous approach to this question. The only comprehensive treatment of the subject is Rabbi Dr. Moshe Meiselman's forthcoming *The Torah of Science*. It contains an exhaustive treatment of the approach of classical scholars to the question of allegory. The unequivocal conclusion is that the parameters are exacting. With few exceptions, Biblical passages are to be taken literally. Of course, this does *not* mean that *only* the literal level exists. Biblical texts contain many meanings. Nonetheless, the

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<sup>15</sup> רב סעדיה גאון, ספר אמונות ודעות ז"ב.

<sup>16</sup> ספר יד רמה על מסכת סנהדרין, אגרות הרמה בעניין תחיית המתים פסקא ברם זכור אותו האיש לטוב ורבנו סעדיה גאון ז"ל שמו...

<sup>17</sup> רמב"ם מורה נבוכים חלק ב פרק כט ובמאמר תחית המתים ובמקומות אחרים

literal meaning of most Biblical passages cannot be denied. There are no credible sources in classical Torah literature, for example, that take Adam ( אָדָם (הָרִאשׁוֹן) to be anything other than literally the first human being, made by God in a way that did not involve a lengthy evolutionary process.

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**Here is Rabbi Blue's next email to Professor Shapiro**

Professor Shapiro,

Thank you for that clarification, it helps understand these issues a lot.

May I bother you with a few more questions? I hope I'm not taking too much of your time.

Firstly, I've heard people say that there is a difference between Macro Evolution and Micro Evolution. Macro Evolution being the evolution from one species to the next; whereas Micro Evolution is the changes that occur within a species. Are these distinctions really valid? Or is the one merely a development of the other? What I mean to say is that given enough time, what appears to be a micro evolutionary changes within a species, eventually - given enough time - develops into a new species.

The other question I have, is that to what extent is Evolution really debated in the scientific community? The image my friend and colleague created is that Evolution is not universally accepted and there is much debate about the validity thereof. I've learned to understand from your E-mails and documents you've sent that the mechanisms of Classical Darwinian Evolution is contested but not Evolution as a whole - Micro or Macro.

I really appreciate your time and effort with answering my questions.

Warmest regards

Rabbi Blue

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**Here is Professor Shapiro's reply to Rabbi Blue:**

There is definitely a difference between macro events in evolution, when major new groups appear (e.g. plants, vertebrates), and micro events within species. We know from genome sequences that the major branches are often accompanied by cell fusions (two cells combining to make a new type of cell) or complete doublings of the genome (which typically happens when individuals of different species mate to form a hybrid). These macro events lead to changes throughout the genome and affect many characters at once. Microevolutionary changes involve single changes and affect only one or a few characters. In between, there exist a whole range of events which lead to greater or lesser changes in the genome, such as occurs when bacteria acquire a DNA molecule conferring antibiotic resistance or the ability to infect a new host. We really do not know where to draw a clear line between macro and micro events. However, we do know for certain that macro events have occurred which could not simply have been a long succession of small changes, such as Darwin postulated.

Evolution is not seriously debated in the scientific community, either as to whether it took place (just about everyone agrees it did and still does) or how it occurred (few question the neo-Darwinian gradualist explanation). The mechanism is nonetheless being investigated at many levels (such as genome sequencing and analysis) that will ultimately lead us to realize there have to be novel processes at work in evolution. As in many fields, we often are much slower to question and modify basic principles than we are to gather information which may be inconsistent with conventional wisdom.

Best wishes,  
Jim Shapiro

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**My response:**

Here is a slightly different definition of *micro-evolution* and *macro-evolution*. Micro-evolutionary changes are intra-species changes. They are small, have been known for centuries, and are entirely uncontroversial. The explanation for micro-evolution is straightforward: there is built-in flexibility within the genomes of all organisms. A classic example is the English sparrow, introduced into North America in 1850. Only a few individuals were introduced, and they were virtually identical to one another. Today, English sparrows live throughout most of the continental United States. Their body types vary according to the region of the US that they inhabit. In colder regions, they tend

to have a rounder, chubbier shape. In warmer regions, they are more slender and have longer tails (this is similar, by the way, to the fact that Inuit are plumper than Africans who live in the tropics). Many species seem to display this *polymorphism*.

Macro-evolution is a different kettle of fish. It refers to large-scale changes which, Neo-Darwinists claim, can lead to the process whereby the diversity of life seen today could have arisen from a unicellular ancestor. This is how Charles Darwin put it (in the first edition of *Origin of Species*):

I can see no difficulty in a race of bears being rendered, by natural selection, more and more aquatic in their habits, with larger and larger mouths, till a creature was produced as monstrous as a whale.

The Neo-Darwinian worldview – in which all species descend from one or a few ancestors – requires millions of macroevolutionary events. There is not the slightest evidence that such events can occur. The evidence offered to the public *always* consists of examples of microevolutionary events, with the promise that if you string enough such events together they will amount to macroevolutionary changes. Generations of students have thus been hoodwinked by the example of Darwin's finches. Small changes in beak size (which are temporary – the average beak size reverts to normal after ordinary rainy seasons) are cited as evidence for *evolution*. The students unfortunately do not know enough to distinguish between these trivial changes and the grand claims of common descent.

No microevolutionary events have ever been observed to combine into anything remotely resembling speciation. And there is plenty of evidence to suggest that organisms can only tolerate tiny amounts of changes to their genomes before they become sterile or revert to their ancestral genome spontaneously.

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As far as debate within the community of biologists is concerned, let us begin with a historical note: How much discussion of quantum mechanics was there in the 1920s within the community of physicists? Well, if you were not working in Cambridge, Göttingen or Copenhagen, then there was almost none. For most physicists, there was no such thing as Quantum Mechanics. If they even

heard of it, it was dismissed as extravagant and useless mathematics. There was nothing deeper than Newtonian Mechanics.

How much discussion of plate tectonics (or continental shift) was there in the 1930s? Virtually none. Its most vigorous proponent, Alfred Wegener, froze to death in a polar expedition in 1930 and it would be years before his ideas were considered anything but those of a nutcase.

When practising scientists say that a particular theory is not debated seriously within the scientific community, what they mean is that in any given field and at any given time, most scientists function *within the reigning paradigm*. The most influential philosopher of science in the twentieth century, Thomas Kuhn, did a marvellous job in describing how the most productive work done by the vast majority of scientists is in solving puzzles *within* the regnant ideology<sup>18</sup>. Little attention is paid to all the loose ends – those parts of the paradigm which are not explained and, indeed, unexplainable. It is only when the difficulties accumulate to the point where the theoretical structure of the theory collapses that the bulk of the community of scientists takes cognizance of dissenters.

Secondly, Rabbi Blue's question and Professor Shapiro's answer presuppose that all the dissent that exists is also openly expressed. Thus, if we find one in a hundred biologists expressing scepticism of Neo-Darwinism, it must be that the other 99 scientists adhere to the orthodoxy. This is part of a widespread romantic picture in which scientists are depicted as being perfectly objective, perfectly virtuous beings led only by the evidence. They have no agendas – no financial stakes (in the sale of textbooks, for example), no political or religious convictions, no background or training in which they were conditioned by their textbooks and professors to think in particular ways (they just start their research with a *tabula rasa*). Need I point out that this is about as accurate a description of scientists as it is of politicians? Part of the reason for there being less debate than is desirable is that open debate in this area is actively stifled. I am not going to use this brief correspondence to document this phenomenon. For an introduction to the subject, watch the documentary *Expelled* or contact Dr. Richard Sternberg, late of the Smithsonian (<http://www.rsternberg.net/>).

Having said all of this, the truth is that there is a voluminous literature concerning criticism of Neo-Darwinism. Of course, much of the discussion has had to take place *outside* of professional journals. In said journals, concepts

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<sup>18</sup> Thomas Kuhn, *The structure of Scientific Revolutions*, third edition, The University of Chicago Press, 1996.

such as *irreducible complexity* are verboten, unless you refer to it with the most derisive remarks (preferably, without stating any facts). Ever since the publication of *Darwin's Black Box* by Dr. Michael Behe, for example, there have been numerous papers in professional journals purporting to have demonstrated how irreducibly-complex cellular structures could have (or have) arisen (they all fail miserably, by the way).<sup>19</sup> A similar phenomenon followed Dr. Behe's publication of *The Edge of Evolution*. Dr. Stephen Meyer's *Signature in the Cell* has precipitated a deluge of responses regarding the ability of natural systems to produce significant amounts of information. [I am well aware that these books' primary purpose is to promote Intelligent Design. But the promotion of ID invariably involves a dismantling of Neo-Darwinism.]

Within the literature, there is constant criticism of major aspects of Neo-Darwinism. Here is a typical statement, from Michael Lynch of Indiana University:

...it is quite remarkable that most biologists continue to interpret nearly every aspect of biodiversity as an outcome of adaptive processes. This blind acceptance of natural selection as the only force relevant to evolution has led to a lot of sloppy thinking, and is probably the primary reason why evolution is viewed as a soft science by much of society.<sup>20</sup>

Here is the opinion of evolutionary theoretician Armin Moczek:

Given its importance and pervasiveness, the processes underlying evolutionary innovation are, however, remarkably poorly understood, which leaves us at a surprising conundrum: while biologists have made great progress over the past century and a half in understanding how existing traits diversify, we have made

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<sup>19</sup> Here is one example, by Jamie Bridgham, Sean Carroll and Joe Thornton: "Evolution of Hormone-Receptor Complexity by Molecular Exploitation," *Science* 312 (7 Apr 2006):97-101. Professor Thornton states on his University of Oregon website that one of his main research goals is to *illustrate how a complex, tightly integrated molecular system - one which appears to be 'irreducibly complex' - evolved by Darwinian processes hundreds of millions of years ago.*

<sup>20</sup> Lynch, Michael. 2007. *The Origins of Genome Architecture*. Sunderland, MA: Sinauer Associates, xiii

relatively little progress in understanding how novel traits come into being in the first place.<sup>21</sup>

These statements are acceptable to the community of biologists because overall, the writers pledge allegiance to the paradigm, much as Professor Shapiro does. But if you string together the numerous instances of such criticisms, you find that there is an enormous amount of dissatisfaction with the paradigm.

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In conclusion, I would like to address Rabbi Blue.

Think about these three statements made by Professor Shapiro:

There are no detailed Darwinian accounts for the evolution of any fundamental biochemical or cellular system, only a variety of wishful speculations. It is remarkable that Darwinism is accepted as a satisfactory explanation for such a vast subject – evolution – with so little rigorous examination of how well its basic theses work in illuminating specific instances of biological adaptation or diversity.

Darwin's natural selection of "numerous, successive, slight variations" is neither accurate nor adequate to account for the dramatic genome changes we can document through DNA sequencing.

However, we do know for certain that macro events have occurred which could not simply have been a long succession of small changes, such as Darwin postulated.

These criticisms go well beyond anything that the typical, tendentious textbook will convey to the biology students at your school. The students will be exposed only to the sanitized, white-washed version of Neo-Darwinism peddled by the likes of the NCSE.

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<sup>21</sup> Moczek, Armin. 2008. On the origins of novelty in development and evolution. *BioEssays* 30:432-47.

I assume that Professor Shapiro stands by his words. Furthermore, he does not consider himself to be a crank or someone on the fringes of science. I assume that he would want biology students to be exposed to the fact that competent scientists – such as he – reject the textbook picture that nothing but the accumulation of slight, successive modifications (in the form of unguided mutations) have led to the plethora of life forms that we see today. He is right. But having dealt with Professor Shapiro, I hope that you will still be able to appreciate that he is not the *only* voice of reason in this debate. Take a look at [www.dissentfromdarwin.org](http://www.dissentfromdarwin.org) and you will see a list of about 800 (eight-hundred) scientists who profess scepticism of Neo-Darwinism. Some of them reject only certain aspects of Neo-Darwinism, as does professor Shapiro, and some reject it altogether. Many are just as accomplished as he (for example, Philip Skell is a member of the US Academy of Sciences and Henry Schaefer has been nominated for the Nobel Prize 4 times). There is no reason to deny your students exposure to *their* views. This is true as far as their technical training is concerned - every good scientist is a sceptic, and the students at your school should be exposed to competing viewpoints simply as part of their training. As you indicated in your email, you are aware that you have not conducted a thorough investigation of this subject. I assure you that if you make an effort to contact dissenters from Neo-Darwinism, you will find many of them to be as approachable, knowledgeable and rational as you found Professor Shapiro to be.

But there is more. **אמונת חכמים** does not mean that we pat **גדולי תורה** on the back when they happen to make pronouncements that conform to our prejudices. A school that purports to be a Torah institution should never have taken decisions as momentous as this – whether to accept the biology syllabus change – without guidance from **גדולים**. I doubt that this will now change. The horses have bolted and shutting the stable door won't do much good. But one fact remains. In South Africa, as opposed to the USA, integrating supplementary material into the syllabus is relatively fuss-free. Your influence can be used to ensure that my audio-visual seminars will be integrated into the biology syllabus. This will at least give the students some exposure to the fact that their textbooks (and course content) are deeply flawed and also introduce them to relevant Torah sources.

These were the last words in your email to me:

I have not changed my position on the matter that Evolution is in no-way heretical and can be (and for educational purposes, should

be)  
Torah schools.

taught

in

כפירה is very narrowly defined in הלכה. However, aside from כפירה, one need also consider the categories of מגלה פנים בתורה שלא כהלכה and דורש דרשות של דופי, מלגלג על דברי חכמים. They, too, carry a consequence of הבא לעולם הבא.

As I emphasised throughout this exchange, it is imperative that you consider the fact that we are talking about hundreds of teenagers (over the coming years) who will live with the consequences of the decisions taken by you and the school administration. Are you satisfied that those who were involved in taking this decision – the principal, you, and perhaps the biology teacher - have wide-enough shoulders to decide on issues whose consequence is possibly אין לו חלק לעולם הבא?

I wish you much הצלחה in your endeavours.

Yoram Bogacz

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#### POSTSCRIPT

I sent the above document to Professor Shapiro and received the following response:

Yoram,

You have committed a sin by putting words in my mouth and commenting negatively on them. I would have expected more care from a serious Jewish scholar. You might, for instance, have asked if I agreed with your interpretations of my statements (almost entirely incorrect, by the way). Instead you chose to misrepresent and slander. That is not the Jewish way.

Yours truly,

Jim Shapiro

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**My Response:**

Professor Shapiro is upset, and I genuinely regret that. I certainly never set out to deliberately upset anyone. Having said this, I must add that Professor Shapiro's response is deeply disappointing. After presenting thirty pages of cogent argument, supported by annotated sources and quotations, all he can muster is one paragraph of vague, unsubstantiated and entirely content-free accusations. Professor Shapiro - I did *not* put words into your mouth. I reacted to the comments you made in a published article and in your correspondence with Rabbi Blue. I can do no more than assume that what you write is what you mean. If you feel that you need to articulate your views more clearly, then, by all means, do so. [You can expect that they will be scrutinised with the rigour of a Talmudic scholar with fifteen years of experience.]

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### Comments from Rabbi Dr. Dovid Gottlieb ([www.dovidgottlieb.com](http://www.dovidgottlieb.com))

[Rabbi Gottlieb is commenting on the original document. He did not see Professor Shapiro's response, nor my rebuttal, when he wrote the following comments.]

Dear Yoram,

The material is excellent and beautifully expressed. I have a few minor comments below.

[Yoram Bogacz wrote:]

Finally, I think that it is regrettable that you described yourself as *merely an Orthodox Rabbi*, even if it was only meant as an expression of humility. Rabbi Blue, evolutionary biology is not quantum electrodynamics! The basic arguments of evolutionary biologists can be grasped – and their validity assessed - by the average high school student. Strip away the jargon – allopatric speciation and sympatric speciation, for example – and you get a simple proposition about how speciation is supposed to work. Those properly trained in Talmudic studies have no trouble assessing this evidence. The *Aw shucks* attitude towards highly-trained scientists is, in this case, unwarranted.

*[Rabbi Gottlieb:] I am inclined to be a little skeptical here. In my study of evolution I find many conceptual complexities [that are poorly grasped by the*

*believers, and often also by the critics]. It reminds me l'havdil of lomdus in a sugya. And then there are debates about evidence - one citing evidence in favor of his view, and another citing the very same evidence against that view. [I am thinking of species selection here.] So I do not know that a high school graduate can really appreciate these discussions.*

[My comment:] High-school students and the public-at-large are presented with a certain level of evidence, typically Kettlewell's moths, Darwin's finches, the Miller-Urey experiment and the like. At this level, there is corresponding counter-evidence. As one progresses up the ladder of understanding, the evidence becomes more sophisticated and so too the counter-arguments. I think that Rabbi Gottlieb's comparison to learning a סוגיא is spot-on. The same סוגיא can be learnt by a first-year yeshiva בחור and also by גדולי הדור, at different levels. My point to Rabbi Blue is that on the level of his students (which is also his level), the arguments can be readily grasped, and so can the counter-arguments. Professor Shapiro, too, did not present anything above the basic level of the debate.

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[Yoram Bogacz wrote:]

The second question is answered by analysing the scientific evidence to the best of one's ability, *regardless* of the numbers of scientists on each side of the issue. This takes cognizance of the fact that in the history of science, there have been numerous instances in which a minority (or even one individual) turned out to be correct and the majority (often scathing and derogatory in its attitude to the dissenters) ends up being wrong.

*[Rabbi Gottlieb:] I am little worried here. We do use appeal to expertise. Yes, the experts can be wrong, but when you consider the range of [crank] challenges that every theory faces, the experts are far more often right than wrong. And indeed - if the vast majority of experts can be wrong, so surely can the minority of critics! So I am not sure how much can be concluded from the fallibility of science.....*

[My comment:] I agree entirely, and that is why I advised Rabbi Blue that *both* sides of the argument should be studied. I did not say that we always favour the minority view. A cursory familiarity with the history of science suggests

that one should always be at least prepared to countenance the possibility of the majority being wrong.

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[Yoram Bogacz wrote:]

Richard Lenski was elected in 2006 to the USA National Academy of Sciences on the strength of his long experiment (running since 1988) in continuously culturing that ubiquitous laboratory warrior, *E. coli*. He has nurtured about 50 000 (fifty-thousand!) generations of this bacterium.

*[Rabbi Gottlieb:] I am not sure that 50 000 is a big number here. Imagine a generation time of 20 years - very long - still, 50000 generations is only 1m years. They are talking about evolution over hundreds of millions to billions of years. You would need many more generations of bacteria to simulate that. I seem to remember in Behe's book The Edge of Evolution he does such calculations - perhaps you can get better figures there.*

[My comment:] At the time of Lenski's election to the NAS, the reports I read seemed to make a lot of the extent of the experiment. Even though, as Rabbi Gottlieb points out, one million years is a pittance in comparison to the alleged billions of years of evolution, this is the most that has been done so far.