AN INTERVIEW WITH DR. DANNY FAULKNER
CREATION ASTRONOMER

After the CER annual board meeting on January 8th, Richard Overman interviewed CER board member, Dr. Danny Faulkner, about current issues in astronomy. Dr Faulkner is a Professor of Astronomy at the University of South Carolina, Lancaster. He has a Ph.D. in astronomy from Indiana University and has published dozens of papers in various astronomy, astrophysics, and creation journals. Dr. Faulkner was previously interviewed in *Creation Ex Nihilo* magazine Vol.19, Number 4, September- November 1997. This interview does not cover the same subjects as the *Creation Ex Nihilo* interview. We recommend that you read the previous interview to learn more about Danny Faulkner the man. (Ed.)

CER: Over the last few years there have been many reports of planets around other stars. Do you think the evidence is conclusive enough to say that there are other planets out there?

DF: The wobbling evidence is not good evidence to me. As a planet orbits a star, the star would also orbit the planet. What they have looked for is called Doppler motion in the stars. The amount of motion we are talking about might be a few tens of meters per second or so. Other motions inside the atmosphere of the star dwarf those motions when the spectral lines are formed. The atmospheric motions can be several orders of magnitude larger than the Doppler motion. Just observing these motions is virtually impossible. It would be like trying to carry on a whispered conversation in a very loud rock concert. In recent years they have applied very sophisticated statistical methods to look for the small periodicities. It is like winnowing out all of the hay to find the needle. There have been claims of a few dozen of these planets. The claims have not been universally accepted. One of the problems is whether or not the motions are real. They are tweaking such feeble signals out of such noisy data that one has to wonder. There are other explanations– like pulsations. Even if it is a real effect, we do know that stars pulsate at various frequencies.

The one thing that caught my eye recently was the announcement of an eclipse of one of these stars. If the orbit were nearly edge on, then a planet would periodically pass in front of the star as seen from the earth and would block out 1% or 2% of the star's light. I have experience with this, as I do research with eclipsing binary stars. When two stars orbit each other and one passes in front of the other you get an eclipse. Stellar eclipses are usually much deeper than just one or two percent, but the principal is the same. When the announcement was made of an actual eclipse observed in one of the stars, this seemed to me to be a more clean observation. A one or two percent variation is pretty easy to see and pretty easy to confirm. I have not actually seen the light curves yet and will reserve total judgment until then, but if what I have read is correct, then at least one of these planets is indeed real.

How were the observations of the eclipse made? Were they indirect like the statistical studies?

The statistical studies were done with radial velocities from Doppler curves, looking at shifts in spectral lines as the object moves toward and away from us. The eclipse observations were just plain old photometry, which is just measuring light. You put a photometer on a telescope and measure how much light you are receiving. If the star is of constant brightness, the star remains constant in the amount of light you receive. If something passes in front of it you can measure very accurately how much light is lost. The researchers calculated the orbital period based on the spectral data and anticipated that an eclipse might occur and when it would occur. They looked for the time when it should occur and it did. A one or two percent variation is something that is quite measurable. This is a very real thing that we could have discovered years ago if we had known which star to look at. If the light curve looks good, this in my estimation would clinch it. I would consider this the first confirmed discovery of an extra solar planet.

Could it have been something other than a planet, maybe a dim star or asteroid?

An asteroid would not have been big enough. Based on the numbers, this object was a significant fraction of the size of the star. It was five to ten percent the size of the star, which would mean it is planet size. It is supposed to be larger than Jupiter.

One little caveat is the fact that in recent years the division between planets and stars has been blurred a bit. Classically speaking a star is at least seven or eight percent the mass of the sun. In recent years we have discovered evidence of what we call “brown dwarfs”. These are stars that are just below the threshold for what a star ought to be but are glowing by converting gravitational potential energy. If these extra solar planets are real, and many of them are 3 or 4 times the mass of Jupiter, you reach a point very quickly where the distinction between a planet and a star is not so clear. Planets are typically cool objects compared to stars. This particular planet would be rather warm because it is close to the star. The question becomes, is it hot because it is close to the star or because it has it’s own internal energy source?

If this is in fact a planet that is orbiting the star, what impact would that have on your creationist beliefs?

It does not cause a problem at all. I do not think our creation model predicts the existence of extra solar planets, nor does it predict the non-existence of extra solar planets. Our model is rather silent on the issue. Our creation model is not threatened either way. An evolutionist on the other hand has to have other planets and they have to be very common. Otherwise our solar system becomes unique. Although for us it does not matter, for evolutionists it is vitally important that other planets exist. For our purposes, it might be easier for us if there are no other planets, but it really does not matter.

Understanding that there is not yet a good creationist cosmological model, which we will come back to, would the model being silent on the issue of extra solar planets be considered a weakness in the model.

You could look at it like that, I suppose, but I wouldn't. It just does not make a prediction there. You could criticize it as a weakness, but I do not think it is.

I think the question then comes up about life on other planets. My creation model, and I think the correct creation model, would not allow for life on other planets. If we had absolute proof of life elsewhere in the universe, that would be a problem for our creation model. I think that is a very good prediction on our part. On this point the evolution model waffles some. There are some evolutionists who believe that life is common in the universe. Otherwise, why would it happen here? There are other ardent, atheistic evolutionists who are so convinced that life is such an incredible event that it probably did not happen anywhere else in the universe. So, the evolution model waffles on the concept of life elsewhere. I do not think life of any kind is anywhere else in the universe. That seems to be the push behind looking for all of these planets – to look for life on these planets.
I must point out that all of the alleged planets people have found so far have been very strange. They have been very massive and they orbit very close to their parent stars. This causes a couple of problems. First, you cannot have life on these planets. Second, these planets do not seem to fit the rules. These are strange planets. That is one thing that gets lost in the shuffle. People think this is a marvelous confirmation of current theories of planet formation and it is not. We are finding indications of planets of the type and locations where theory would not suggest they should be. That is a negative on current planet formation theories.

With the advent of the Hubble telescope, there have been reports of stars that seem to be older than the universe. This reportedly has caused a re-evaluation of the Hubble constant.

That is getting it a little backwards. Actually, the first step was to increase the Hubble constant, which decreased the maximum age of the universe, called the Hubble time. The Hubble constant was around 50 km/s Mpc for decades. In the early 1990's there was a push to move it up to closer to 100 km/s Mpc, which would almost halve the age of the universe. This would take the age of the universe down to around 10 or 12 billion years rather than 16 or 18 billion years. However, it was pretty well agreed that globular star clusters had an age of 15 or 16 billion years based on some pretty well understood astrophysics. There have been 2 approaches to try to rectify this disparity. One is to re-evaluate the Hubble constant data and shave back the figure from close to 100 km/s Mpc to more like 75 km/s Mpc. That would get you down to an age for the universe of about 14 billion years. This does not leave time to form stars, especially when they are supposed to be 15 billion years old.

I suspected that what astronomers would do was re-evaluate the atmospheric models of the stars. As it turns out, they did not do that, although I think that door could still be opened. They ended up doing further observations of the globular clusters and determined that they had poorly calibrated their measurements. The way they measure these ages is rather tricky. They had to adjust the distances to some of these globular

clusters, which then changed their age. It made them closer than they thought, brighter than they thought, hence younger than they thought. The consensus now has been to move the age of the universe down by moving the Hubble constant up and adjust the age of the globular clusters down as well. What strikes me is that had someone 10 years ago made the case to move the age of the globular clusters down prematurely, it would have been shouted down by the astronomical community. Once they had a necessity to do so, they were looking for any method they could to do that. I have to question their objectivity. I'm not saying it is wrong, I am simply saying that some objectivity is lost. It appears to the satisfaction of most astronomers that that problem has been resolved though it has not really filtered down. I think it is important that we as creationists make a point of that. If we want to criticize this, I think we need to criticize the process and make some commentary on just how science works. It works very differently from how most people perceive science, including scientists. There is an agenda with biases built in.

I have heard that the moon is receding from the earth and that the earth is slowing down. How close would the moon have been, say, 6,000 years ago?

Not much closer than it is today. The moon is receding from the earth at a close to linear rate (not exactly linear). Interestingly enough, about a billion years ago the rate would have undergone a tremendous acceleration. Given all that we know about the lunar recession rate, the moon would have been in contact, scarcely 1.4 billion years ago. Between 1.4 and 1 billion years ago the moon would have moved most of the way out to where it is now then would have slowed tremendously. The most rapid changes would have been early on. That would put a very severe upper limit on the age of the earth-moon system. It could not be more than 1.4 billion years. There are compelling reasons to make it less than that. Long before that, with the moon and earth in close proximity or touching, you would have had mile high tides and there is no evidence of that in any kind of geological records. That seems to put an upper limit at not even a third of what people usually think of the age of the earth-moon system. While it does not tell us it is 6,000 years old, it tells us it cannot be 4.5 billion years old.

The Russ Humphrey's cosmology was put forth in 1994. Since then it has received a lot of discussion. Where does the Humphrey's cosmology stand and where do you stand on the Humphrey's cosmology.

It has been controversial. There are people who like it and people who do not like it. What Russ has attempted to do is use general relativity. This is contrary to what some creationists think, but relativity is a very good model. It has been tested many times, and it has held up very well. Russ applied it to the universe as a whole with a creation-based approach, taking Genesis seriously. He attempted to come up with an alternative cosmology and cosmogony. I think that what he has done is interesting and bears looking at. He is trying to solve the light travel time problem besides giving us a creation based cosmology and cosmogony, which has not been done before. I suspect that the best explanation for the light time problem is something akin to the Humphrey's cosmology. It may not be exactly what he is proposing but something along those lines. I applaud his

effort and would like to see people pursue the details. He has not really offered a detailed model, but only a bare outline of a model. There are many details to be worked out.

It is a shame that many creationists reject general relativity. I am not sure exactly why. Part of the reason is that they think that general relativity leads naturally to the "big bang", just like expansion of the universe leads to the "big bang". I like to point out that general relativity and expansion of the universe can lead you to the "steady state" theory as well. There are many different cosmological models that one can spin. That is the neat thing about cosmology, you can spin all sorts of neat theories. What Russ is attempting to do is spin an alternative theory.

The concept of the "big bang" was originally taught to be some sort of explosion out of a primordial atom. More recently, the "big bang" is considered to be more like matter, energy, space, and time just suddenly appeared. What has led to that shift and how is that significant to creationists.

DF: Lemaitre was the first one to talk about the cosmic egg or atom. This was in the 1920's. That idea stuck around for a long while. I do not think the shift was an attempt to try to solve problems as much as a better realization of the model. The idea as you described it about not being an explosion really has been around for 5 decades. The shift has taken this long to filter down to the average person. Even many scientists do not understand that the "big bang" is a misnomer. It is not an explosion, it is a sudden appearance of matter, energy, space, and time in a hot, dense, rapidly expanding situation. That is not exactly an explosion.

The biggest problem we have in creation circles when talking about the "big bang" is what I call "big bang bashing". This amounts to a straw man. You put together a picture of what the "big bang" is supposed to be, then attack the picture. The problem is that the picture is not really an accurate depiction of what the "big bang" model is. I think it is vitally important that we correctly identify the model and then critique that model. I take it upon myself to try to educate people about what the "big bang" model is and what it is not.

One of the "evidences" for the "big bang" is the red shift in light. I understand that the red shift characteristics have slowed or changed?

I want to make it more fundamental than that. Cosmologists usually give three evidences for the "big bang". One is the expansion of the universe or red shift. I insist, and have insisted for a long time, that red shift is not a prediction of the "big bang". In order for a model or theory of science to be good, it must do 2 things. It must have explanatory power and predictive power. Explanatory power means that it can explain the data that we now have in our possession or explain the world as we now understand it. The second is how well can it anticipate new results. Can you go out and do a new experiment that has never been done before, see what the result is, and compare it to the prediction? The expansion of the universe was actually discovered as early as 1912 but really was not appreciated until 1928 at the time of Edwin Hubble. The modern "big bang" model was

developed around 1948. You can see that the expansion of the universe was discovered two decades before the "big bang" model was formulated. How you can call the expansion of the universe a prediction of the "big bang" model is beyond me. The "big bang" model, I insist, was put together to explain the expansion of the universe. Minus the expansion of the universe, we would not be having this conversation. Most books get that wrong.

About a year ago, I attended a conference where evidence that the rate of the universe has accelerated was presented. The studies indicate that the red shift is getting larger. The increasing red shift could not be directly measured, so the researchers had to develop a very clever approach. Generally, they found that as you go farther and farther out into the universe, things are moving at slower rates. The idea is that the expansion rate is increasing with time.

What other explanations might there be for the red shift?

People have suggested various things, gravitational red shift, which I do not think works. Some have suggested "tired light". I think the most plausible explanation is expansion. Russ Humphrey's model talks about this. The Psalms speak about the heavens being stretched like a tent. That seems to be a poetic description of what we appear to see. My creation approach has no problem with an expanding universe. Where I have a problem is when you try to run it backward and ask, "what happened in the past" and "how did it all start". Those are philosophical and theological questions, not scientific questions. Many times creationists confuse the two. They think that the "big bang" model is bad because it is based on expansion of the universe. Therefore, an expansion of the universe is bad. I think that is throwing the baby out with the bath water. Expansion of the universe itself could be a very important clue as to what is really going on in the universe. If we want to develop a creation model of astronomy and cosmology, we would be very foolish to throw out one of the most important physical clues. Absent compelling evidence to the contrary or a compelling alternative explanation, which I have not seen yet, I have no problem with expansion of the universe taking place.

How does background radiation fit into all of this?

I mentioned that there are three predictions of the "big bang" model that are put forth. The one clean prediction is the cosmic background radiation (CBR). It was qualitatively predicted as early as 1948. In the early 1960's, the CBR was discovered. The CBR appears to be real, and it appears to have a temperature of less than 3K coming from every direction. It appears to be a very real effect and the "big bang" model does predict such a thing. That is a very clean prediction and is the thing that caused almost everyone to drop the "steady state" theory in the 1960's. If there is one thing that would make me a "big banger", that would be it. I have not seen a creation-based explanation yet that I have liked.

We have discussed red shift and background radiation. What is the third "evidence" of the "big bang"?

It is the abundance of light elements– hydrogen, helium, lithium, and things like this in the universe. Those are generally put out as proofs of the "big bang". The problem is that we knew those abundances beforehand and computed the model to give us those abundances. To then claim it as a prediction is not correct. Of the three major predictions of the "big bang", I discount two of them as explanations. One is a prediction, and it is an impressive result. As a creationist, I have to admit that. Otherwise I am not being honest.

With regard to our discussion of the "big bang" theory, what affect if any, does that have on the theories of planet formation such as the nebular hypothesis? Is the nebular hypothesis a valid hypothesis?

I do not like to see the "big bang" and the solar system formation lumped together. I think they are two very different theories trying to do two very different things. One is trying to explain the origin of the universe; the other is trying to explain the origin of the solar system. One purportedly happened about 15 billion years ago, the other about five billion years ago. One is very big; the other is very small actually. They really should not be lumped together. Also, I would be reluctant to use the words "nebular hypothesis". I do not think they use that term anymore. It is about 200 years old. The modern theory is the ideological descendant of that model, and it has problems. The angular momentum problem has not been successfully solved. There are other problems that have to be worked out. That is something that we need to look at and be prepared to criticize using the latest arguments and the latest information.

What do they call it now if they do not call it the "nebular hypothesis"?

I am not quite sure what they call it. I have just not seen the term "nebular hypothesis" used. I know the name "planetesimal" comes up real fast. If you are talking about a solar nebular or pre-solar nebular, they do not really call it the "nebular hypothesis" anymore. I do not think it really has a name. I can not say that using the term is wrong, but it is somewhat dated and could get you into trouble at some point.

Have the evolutionists changed any beliefs about how planets form from 200 years ago?

Only in detail, the basics are the same. You start with a rotating gas cloud with some dust mixed in and it slowly contracts. Much of the material sinks to the center to form a proto-sun, and the rest of the material flattens into a disk. Out of that disk chunks called planetesimals coalesce to form larger bodies, which eventually form planets. The theories are a little more fleshed in than years ago but are essentially the same.

Where does the idea of cold dark matter fit into all of this and is there cold dark matter?

Where dark matter starts to matter to creationists is when we talk about the break-up of clusters of galaxies. That has been a long-term argument for the recent origin of the universe. That is that individual members of a galaxy cluster are flying apart. In the 1930's Fritz Zwicky measured the dispersion in the velocities in clusters of galaxies and calculated how much matter would be necessary to gravitationally bind the clusters so they do not just fly apart. When he figured how much gravitational mass was there, he compared that mass to the number of galaxies visible and average mass of a typical galaxy measured by other means. He found that the gravitational mass that he measured was about ten times more than the mass visible in galaxies. Therefore he called the extra mass dark matter. Many creationists say there is no such thing as dark matter because the galaxies are indeed flying apart and are not gravitationally bound. If they are flying apart, they could not be doing so for more than, say, a few hundred million years, otherwise they would be completely flown apart by now and the universe would be filled with galaxies all over the place and not in clumps as we see them. If that were the end of the story, that would be very significant, the problem is that people have gotten very clever at looking for dark matter. By looking at nearby galaxies and within our own galaxy, astronomers have found that there must be some matter between the regions of space where the light ends and where objects further out are speeding up. But there is nothing there that we can see. If that is true, it seems that the light in galaxies is just the tip of the iceberg. Of course if dark matter exists, then it must be important in the history of the universe. If a cosmological model only accounts for ten percent of the matter in the universe, then it would be wrong. I do not think dark matter poses a lot of problems with regard to a creationist cosmology. As we develop a cosmological model, we might need to consider that information. I stress that when creationists talk about the break up of galaxy clusters as being evidence of a recent creation that it could be if dark matter does not exist in these clusters. But I think there is evidence that dark matter does exist, at least locally, and I think we need to talk about that possibility.

What conclusions have you drawn with regard to Setterfield's change in the speed of light theories?

Interesting idea– Barry has done a lot of work on this. He knows his arguments. He is not the kind of guy you want to argue with because he knows what he is talking about. However, I am not convinced at this point. I think the earliest observations are the most important, yet they are the ones with the greatest error. Barry has pointed out more recent measurements taken around the turn of the century that seem to suggest a decrease over a few decades. Even more important to me is the fact that the speed of light is not an arbitrary constant of nature that you can set at any value you want. The speed of light is a fundamental constant that determines the structure of matter. If you change the speed of light any significant amount, you dramatically change the structure of matter, chemistry, and spectroscopy. I see no evidence of any of these kinds of changes. I understand the power and attraction it has, but I have a real problem with that line of argument. However, I applaud his effort.