Of Cosmic Proportions

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Abstract

The weaknesses of the Standard Cosmological Model (the Big Bang) are discussed and a model based on a center oriented relativistic expansion (CORE) is introduced. By first reviewing the fundamentals of the Special and General Theories of Relativity the CORE model is shown to be perfectly compatible with Biblical creation. Unlike some earlier models, it rejects the notion of expanded space, and requires no dark energy. Hubble's Law is discussed and the Hubble Constant derived theoretically is shown to be in agreement with the observed value.

Introduction

It is one of the great tragedies of modern science that ideology often stands in the way of legitimate scientific inquiry. This unfortunate circumstance is by no means unique to our own age but is made especially tragic because we seem to have learned little from the prejudices of the past.

It was over two thousand years ago that the great astronomer and mathematician Aristarchus of Samos first proposed a heliocentric solar system. Not only was this revolutionary idea met with scorn and ridicule, but Aristarchus himself was denounced for impiety. Centuries later Galileo Galilei had a similar experience for supporting the same idea of heliocentrism. The cast of characters was different but the intolerance was the same.

The field of cosmology today offers an interesting modern parallel. Cosmology's Standard Model known colloquially as the "Big Bang" is built more on ideology than it is on science. Most people would be surprised to hear that, but most people are not aware of the assumptions that serve as the very foundation of the Standard Model. If they were, I suspect they would hold the theory in significantly less esteem.

Perhaps the greatest of these assumptions is what used to be called the *cosmological principle* but today is more often referred to as the *copernican principle* (named after Nicolaus Copernicus, the famed Polish astronomer who reintroduced Aristarchus' idea of heliocentrism). It holds that there are no privileged observers in the universe and that the universe is homogeneous. What does this mean? When we observe the universe on a large scale from the Earth it appears isotropic, that is, the matter distribution and the cosmic microwave background (CMB) appear pretty much the same in every direction. Two possible explanations for this are 1) the Earth is at or near the center of the universe, and 2) the universe is homogeneous, that is no matter where you are in the universe it would appear isotropic. The universe would therefore have no center and no boundaries. Since under the copernican principle there can be no privileged observers in the universe the first explanation is dismissed out of hand, and as a result the universe must be homogeneous.

It is true that isotropy could be due to homogeneity, but it cannot be said that homogeneity is a necessary result of isotropy. The claim that the universe is homogeneous therefore is not based on observation, but rather on speculation. In addition, it is this speculation that serves as the very cornerstone of the Standard Model.

When most people think of the "Big Bang," they think of matter exploding from a central point into pre-existing space. This seems logical enough, but it is only a popular

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misconception of the Standard Model. What the Standard Model actually says is that the universe never had a center and that the expansion it is undergoing is not an expansion of matter in pre-existing space, but rather an expansion of space itself which creates a kind of illusion of matter expanding out into space. It also states that not only is the universe boundless, but it was always boundless even when it was many times smaller than it is today. Proponents of the Standard Model believe the universe was both smaller and boundless at the same time. As a matter of fact the Standard Model holds that the universe was boundless at the instant of the "Big Bang" and has been getting bigger ever since! This seems counter to all reason and logic, but it is another cornerstone of the Standard Model.

Another serious problem with homogeneity is the problem of horizons. This problem arises because the universe began at a specific point in time. We know this to be true because of the expansion of the universe and the dark night sky. If the universe were eternal and infinite the night sky would be white instead of black. Every square inch of the night sky would be filled with starlight and the sky would be as bright as the surface of the sun. But the sky is dark at night. This is Olbers' famous paradox, and the logical conclusion is that we can only see those stars and galaxies whose light has had enough time to reach the Earth. Coupled with this of course is the possibility that the universe not only is of finite age but could also be of limited size. However, since an edge to the universe would contradict the principle of homogeneity, most cosmologists will not even consider this possibility. So what does this have to do with horizons? Well, since the Standard Model holds that the universe is without boundary but of finite age it has created a very interesting problem for itself, it has painted itself into a corner. If we can only see those objects whose light has had enough time to reach us, and if we assume a constant speed of light, logic would dictate that the universe is divided into a number of disconnected regions each limited by a horizon. Beyond the horizon there can be no interaction, visible or otherwise, with another region. The horizon is defined by the age of the universe as well as the history of its expansion, and no matter how far back in time you go, you will always be inside a horizon. Even at the very instant of the "Big Bang" the universe would be divided into a number of disconnected regions. Their horizons would be much smaller but just as real.

In effect the Standard Model is saying that the universe as a whole never had a common past. There is no point in time when the entire universe could have interacted and thus homogeneity seems to defy a physical explanation. However, the Standard Model is the only way cosmologists can hold on to the copernican principle. Once you allow for a center you must allow for privileged observers and come up with a new explanation for isotropy. Notions like purpose and intelligent design start to creep in and the whole ideology behind the model collapses. These theoretical contortions cannot go on forever. With each new discovery, the Standard Model will require an ever-increasing dose of imagination to sustain itself.

This does not mean that all cosmologists walk in lockstep and are incapable of independent thought. Cosmologists tend to be highly intelligent people with a sincere desire to understand the universe. But the ideological pressure within the community to conform to the Standard Model must be great, and as a result new ideas are always introduced within the context of the Standard Model. There is no other explanation for their devotion to a theory that is so flawed on so many levels. It seems that any new model that does not conform to the ideology of the Standard Model is just not taken seriously. The lessons from Aristarchus and Galileo still do not seem to have been totally learned.

There are other models, however, that explain the phenomena that have been observed.

The New Cosmos

In 1887, an American physicist named Albert Michelson and a chemistry professor named Edward Morley set out to measure the effect of the Earth's motion on the speed of light. At that time physicists believed that space was filled with an invisible substance called ether. They had no other way to explain how light, which appeared to move in waves, could travel through the vacuum of space. Michelson and Morley believed that by measuring the effect of the Earth's motion on the speed of light, they could then measure the absolute motion of the Earth with respect to the ether. What they found was completely unexpected: The speed of light appeared to be unaffected by the motion of the Earth.

Picture for a moment two spaceships, A and B, moving through space parallel to each other in opposite directions, both traveling at 40,000 mph. An astronaut in spaceship B calculates that spaceship A rushed passed his window at 80,000 mph. The sum of the speeds of the two ships. Now let's replace spaceship A with a beam of light moving through space parallel to spaceship B in the opposite direction. Our astronaut wants to calculate the speed at which the beam rushes passed his window. He knows that he is traveling at 40,000 mph and the beam of light is traveling at 186,000 miles/second. He assumes that when the beam rushes passed his window he should calculate a speed equal to the sum of his own speed and the speed of light. To his astonishment the beam of light rushes passed his window at 186,000 miles/second. This is expressed mathematically as follows:

$$\frac{a+b}{1+\frac{ab}{c^2}} \tag{1}$$

where *a* and *b* are the two velocities and *c* is the velocity of light. (In the second example a=c).

The ability of light to travel at a constant speed regardless of the speed of the source and regardless of the speed of an observer was puzzling, to say the least. It was as if light were immune to the laws of physics. Many theories were put forward to explain the Michelson-Morley results, but none of them were able to pass muster. None of them, that is, until a young German scientist named Albert Einstein published his Special Theory of Relativity (STR) in 1905. Put simply, what the STR said was that space and time are relative; they are dependent on the observer. Space and time can expand and contract depending on who is doing the measuring and what is being measured. But not only can space and time no longer be viewed as absolute according to the STR, they can no longer be understood as distinct from each other. Space and time are woven together in what is referred to as space-time. The speed of light, however, is the same for all observers everywhere in the universe regardless of their relative motions. In addition to its constancy the speed of light (according to the STR) can never be exceeded. This can be seen by applying the Lorentz factor:

$$\frac{1}{\left(1-\frac{v^2}{c^2}\right)^{1/2}} \tag{2}$$

Named after the Dutch physicist Hendrik Lorentz, it is derived from the Pythagorean Theorem as follows (Einstein, 1961):

Assume two reference systems K and K' in relative motion with velocity *v* along parallel x-axes. Let *t* represent time and assume a point P_1 (where x, x', and t all equal 0) as the origin of a light beam traveling along the y-axis of K' , y', to point P_2, and let *c* represent the constant speed of light. An observer at rest relative to K and an observer at rest relative to K' will observe distances traveled by the beam that vary by a factor of

$$\sqrt{1-\frac{v^2}{c^2}}$$

This has many implications. For example, by multiplying the rest mass of an object by the Lorentz factor we see that as the object approaches the speed of light its relativistic mass becomes enormous, and when light speed is reached

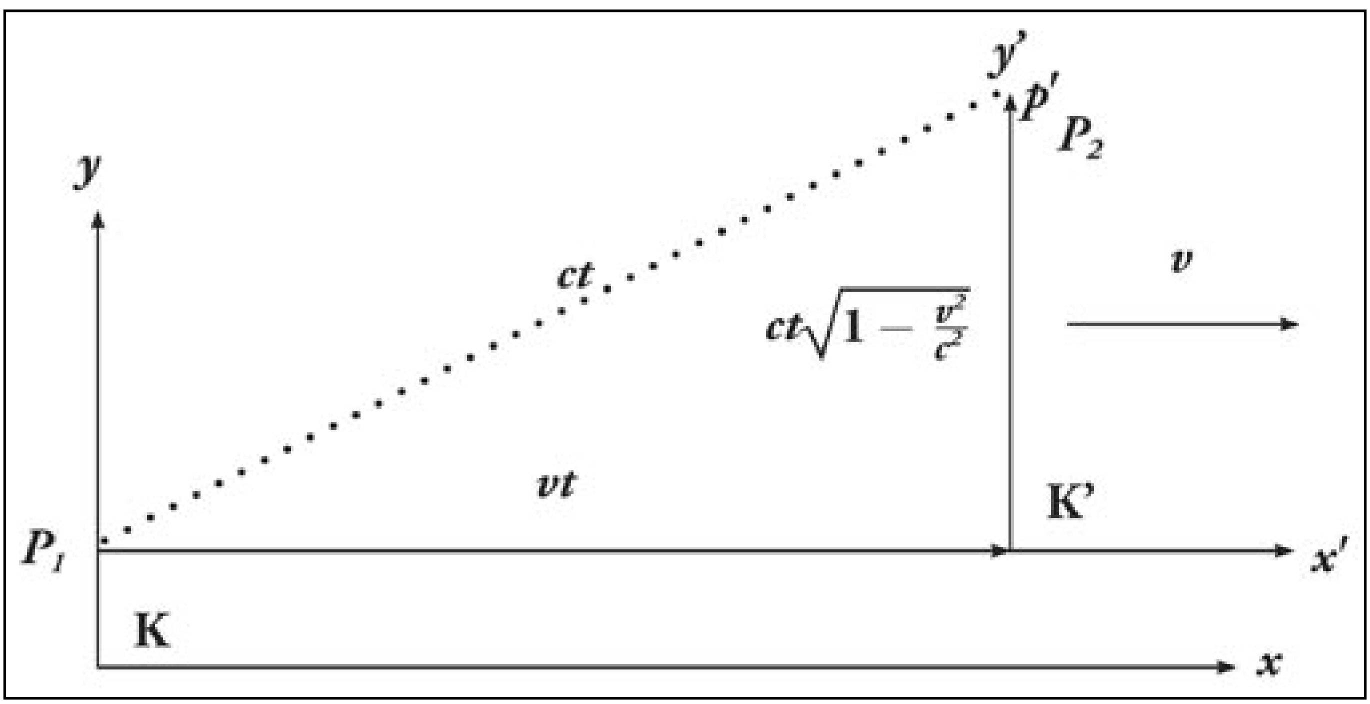

Figure 1. The primed and unprimed reference frames leading to the Lorentz factor.

the object has acquired an infinite mass. To accelerate an infinite mass beyond the speed of light would require more than an infinite amount of energy and this, of course, is impossible. By inverting the formula, we see that the object would contract at the same rate by which its mass increases. So when light speed is reached, the object would have contracted to a length of zero. It's as if it ceased to exist. Time would be affected by the Lorentz factor as well, so that when the speed of light is exceeded time would begin to move backwards, which raises a number of philosophical paradoxes. Therefore, the speed of light according to the STR is a universal barrier that cannot be exceeded and is the same for all observers. The absolutes of time and space were replaced by the absolute value of the speed of light. This is true for all electromagnetic radiation as given by Maxwell's

$$c = \frac{1}{\sqrt{\varepsilon_0 \mu_0}} \tag{3}$$

where velocity is dependent only on the electric permittivity (ε_0) and magnetic permeability (μ_0) of free space and is therefore independent of wavelength and frequency.

There was one problem with the STR, however, and that was gravity. Gravity seems to have an instantaneous effect. How can it be said that the speed of light cannot be exceeded if gravity acts in this way? In 1916 Einstein addressed this problem in his General Theory of Relativity (GTR). It was a radical departure from the classical Newtonian concept of gravity. Newton described gravity as a force of attraction between two objects which is proportional to the size of their masses. It is opposed by inertia in a tug of war in which gravity exerts greater force on more massive objects (Gardner, 1997). In this way he was able to explain Galileo's discovery that objects of different weights fall with the same velocity. In the GTR Einstein introduced what is known as the *equivalence principle*. It was a bold statement which claimed that the force of gravity does not exist. Gravity is not opposed by inertia, gravity *is* inertia. The GTR says that it was not the force of gravity that caused Newton's apple to fall to the ground. Newton's apple fell due to inertia operating in a Non-Euclidean space-time. Gravitation therefore is explained as massive objects curving the space-time that surrounds them. This process is propagated at light speed so according to Einstein gravitation does not contradict the STR.

Relativity underwent its first real test in 1919. A group of astronomers set out to measure the position of stars that would be situated near the disc of the sun during a solar eclipse. The idea was to see if the light from these stars would be deflected in such a way as to be consistent with Einstein's equations for the curvature of space-time around the sun. Their findings confirmed Einstein's predictions (in actuality, the results were claimed to be in agreement with GTR, but the resolution of the film emulsions was insufficient to make the claim. However, later experiments confirmed the theory with much greater resolution). Many experiments have been conducted since then to test various aspects of relativity. An electron was accelerated to speeds approaching light and the increase in its mass was measured in accordance with $E=mc^2$. Muons (heavier relatives of the electron), have also been accelerated to speeds approaching light but this time not to measure their mass but to measure their half-life. Muons have a fixed half-life (lifespan before they decay into electrons) of about 2 microseconds. However their half-life was extended to over 60 microseconds as a result of their high-speed acceleration (Calder, 1979).

Other astronomical experiments have also been carried out. One such experiment in 1955 measured the speed of light from both ends of the rotating sun. The result once again confirmed that the speed of light is not affected by the speed of its source. The entire field of Nuclear Energy can also be seen in part as a monument to relativity and to its most famous equation. In short, relativity is one of the most tested and confirmed theories in all of physics.

But, how is this related to cosmology? The importance of relativity will become more apparent as I explain the details of my cosmological model. First, however, it is necessary to consider the enormous size of the cosmos and how this has presented problems for those who believe in a young universe.

The Greek astronomer Aristarchus was probably the first person to have some understanding of the enormous size of the universe. The following formula is a good indication of how Aristarchus viewed the cosmos:

$$d = \frac{60\left(\frac{c}{2\pi}\right)}{(\cos 89.95)(\sin \theta / 2)} \tag{4}$$

Where d is stellar distance, c is the circumference of the Earth, and θ is stellar parallax. Of course he lived before the existence of trigonometric tables, and stellar parallax would not be observed until 1837, but the relationship expressed mathematically above is one he understood perfectly (see the translation of Aristarchus by Heath, 1913). It led him to conclude that the Sun was many times larger than the Earth and he became the first to propose a heliocentric solar system. Also, since he was unable to detect a stellar parallax he concluded that the stars were an unfathomable distance from the Earth. This thinking was well ahead of its time!

In 1919, when Einstein's GTR received its first experimental confirmation, the universe was thought to be coextensive with the Milky Way. In the mid-1920's an American astronomer named Edwin Hubble would change that by discovering the existence of other galaxies. This discovery led to the most drastic revision in how man viewed the universe since the time of Copernicus. By 1929 Hubble also discovered that these galaxies are receding from the Earth (according to their redshift) at speeds that are proportional to their distance thus confirming the theory put forward seven years earlier by the Russian cosmologist Alexander Friedmann. This relationship is expressed in *Hubble's Law* ($v = d H_0$) where *v* is velocity, *d* is galactic distance, and H_0 is the Hubble Constant (more on this later). The implication is clear. If galaxies are moving away from the Earth at speeds proportional to their distance then at some point in the past they must all come together. Therefore the expansion of the universe must be the result of some great explosive event, a "big bang." This was the birth of the Standard Model. It was also the first astronomical evidence that the universe was created *ex nihilo* as Genesis claims. In discussing his theory of an expanding universe Friedmann writes: ". . . it also becomes possible to speak about the creation of the world from nothing" (Tropp, 1993, p. 157). In addition, the radial motion of galaxies away from the Earth suggests the Milky Way occupies the very center of the universe. Proponents of the Standard Model are quick to point out that galactic recession is due to the expansion of space itself and not due to the actual motion of galaxies. However, there is no independent support for this claim; it is purely an ideological assertion. An example of this bias comes from *Echo of the Big Bang* (Lemonick, 2003). In discussing the relationship between distance and redshift the author writes: "This relationship, which would eventually be known as Hubble's Law, suggested one of two things: either the Milky Way was at the center of the universe, with every other galaxy speeding away from it—a preposterous idea—or the entire universe was expanding uniformly, growing at a constant rate in all directions at once; still very hard to swallow, but at least in keeping with the Copernican principle that says we don't occupy a unique position" (p. 24). Preposterous idea? Unfortunately, it is more important for some to conform to the philosophy of the Copernican principle than to try to understand the true nature of the cosmos.

As long as the universe was thought to be coextensive with the Milky Way the travel time of light was not a major issue for those who believe in a young universe. The diameter of the Milky Way was measured in the thousands of light years and the universe was believed to be thousands of years old. The discovery of other galaxies however, galaxies that are millions and even billions of light years away raised serious questions about the age of the universe. The ability to see these galaxies means the universe would have to be billions of years old. For those who believe in a young universe this seems to be an insurmountable obstacle. Or is it?

The CORE of the Universe

In 1994 Dr. D. Russell Humphreys proposed a new cosmological model which in my opinion is one of the great landmarks in the history of cosmology. Termed "white-hole cosmology" it holds that the universe was once a giant white-hole (Humphreys, 1994). Though others had suggested this possibility before him (Gribbin, 1977), Humphreys was the first to pursue its implications. For those not familiar with the term white-hole it is basically a black-hole in reverse. Rather than having the effect of collapsing it has the effect of expelling matter. The equations of the GTR allow for the existence of both phenomena. In "white-hole cosmology" the universe is bounded and of finite size and therefore would have a physical center. This is the fundamental difference between "white-hole cosmology" and the Standard Model. The Standard Model assumes the universe has no edge and no center (the infamous copernican principle). But this assumption is based solely on ideology. It has nothing to do with science. By discarding this assumption an entirely different cosmological model emerges, one which Humphreys shows is completely compatible with Biblical creation.

Thanks to the work of Edwin Hubble in the 1920's we have evidence that the universe is expanding. Proponents of the Standard Model explain this by claiming that space itself is expanding, causing galaxies to appear to be receding from a central point, in this case the Earth. Every point in a homogeneous universe would appear to be the central point of recession however because the universe has no physical center. To understand this better picture two points on an inflating balloon. Each point would see itself at the center of the balloon's surface and see the other point receding from it, but in reality the balloon's surface has no actual center. If the arbitrary assumption of homogeneity is set aside, the isotropy and expansion that we observe paint a very different picture of the universe: a picture that has the Earth at or near the center of the cosmos.

One major implication of a center oriented cosmos given the expansion that has been observed is that at some point in the past the entire universe must have been inside its Schwarzschild radius (named after the German astronomer Karl Schwarzschild). This is the radius of the event horizon of a black-hole, and denotes the point of no return.

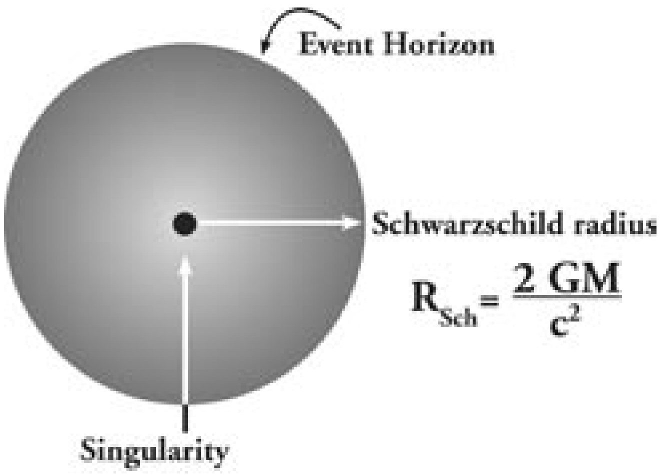

Figure 2. If a black hole is at the center, then there exists a radius larger than the black hole called the Schwarzschild radius. The event horizon has this radius.

Once inside the event horizon of a black hole nothing can escape, not even light. Taking Newton's formula for escape velocity: where G is the gravitational constant, M is mass, and R is radius, and solving for radius when the velocity is equal to the speed of light c, you get the Schwarzschild radius R_{sch}:

$$v_{esc} = \sqrt{\frac{2GM}{R}} \tag{5}$$

If the entire universe was once inside its Schwarzschild radius then it must have expanded out of a white-hole singularity. Earth, being at the center of such a universe, would have experienced an enormous gravitational time dilation with respect to the rest of the universe. Humphreys' model assumes a time dilation so great that light from distant galaxies could have traveled billions of light years to the Earth within a timescale that is consistent with Genesis. So from a reference point in a distant galaxy, billions of years would have transpired since the universe began to expand, but from the reference point of the Earth that same expansion would have begun only thousands of years ago. But which reference point is correct? According to Relativity both reference points are equally correct.

The General Relativity result for gravitational time dilation may be obtained mathematically by inserting the formula for escape velocity into the Lorentz factor. The result is:

$$T = \frac{T_0}{\sqrt{1 - \frac{2GM}{Rc^2}}} \tag{6}$$

where T is the time interval measured by a clock far away from the gravitational source. Therefore when escape velocity is equal to the speed of light (at the event horizon) there is an infinite time dilation. Time would stand still. Unlike a black-hole whose event horizon continues to grow as more matter falls inward, the event horizon of a white-hole is constantly shrinking as matter expands outward. When the Schwarzschild radius reaches zero the white-hole ceases to exist. All that is left is matter expanding away from a central point. This is the universe we live in today.

When Dr. Humphreys proposed his theory in 1994 he accounted for the observed Hubble Constant (which is actually only constant at a specific point in time) and the CMB by acknowledging an expansion of space. He cites Genesis 1:6–8 as justification. But this passage can also be understood as describing the expansion of matter out of the singularity. According to this interpretation, there is no need for an expansion of space. Classical dynamics alone can account for the Hubble Constant and the CMB. In addition, recent observations of type Ia supernovae, which suggest an accelerating universe can be seen as the natural result of a finite spherical cosmos with no need for any dark energy.

A white-hole is characterized by gravitation running in reverse. To express this mathematically one can rewrite the formula for gravitational acceleration in terms of the density of a sphere. Given the following:

$$D = \frac{M}{V}, \quad V = \frac{4}{3}\pi r^3, \; g = \frac{GM}{r^2} \tag{7}$$

where D is density, V is the volume of a sphere, M is mass, r is radius, g is gravitational acceleration, and G is the gravitational constant, then g can be rewritten as:

$$g = k\bar{\rho}\, r, \quad k = \frac{4\pi G}{3}, \; \bar{\rho} = \rho_0 \frac{r_0^3}{r^3} \tag{8}$$

where ρ_0 is the density of a spherical body with radius r_0, and $\bar{\rho}$ is the average density of an object with discontinuous mass and radius r.

Matter initially ejected out of the white-hole would be traveling at an enormous speed, but as the event horizon decreases in size the velocity of matter being ejected would

decrease proportionately. So when the white-hole ceases to exist, all matter would be traveling at a speed that is proportional to its distance from the cosmic center. This is the Hubble Constant (H). The value of H resulting from gravitation can be derived as follows:
Let

$$v^2 = k\bar{\rho}\, r^2 \quad \text{so} \quad v = (k\bar{\rho})^{1/2}\, r \quad \text{and}$$

$$H = \sqrt{\tfrac{4}{3}\pi\bar{\rho}G}$$

where v is velocity and r (radius) is understood as galactic distance. This result was first obtained by the British astrophysicists Edward Milne and William McCrea (North, 1965). In 1934, they successfully demonstrated that the dynamics of the universe could be expressed in Newtonian terms. However, by assuming homogeneity, the Milne-McCrea model displayed a number of flaws. Their attempt to describe a universal expansion that was independent of any gravitational influence while upholding the Copernican principle (similar to the negative curvature version of the Standard Model) was shown to be inconsistent with Newtonian mechanics. But by allowing for gravity, as the equations demand, and setting aside the Copernican principle, the problems of the Milne-McCrea model can be avoided.

In the CORE model, the greater the distance of a galaxy from the cosmic center, the greater its velocity when compared to other galaxies that are closer to the cosmic center. This holds true for any given point in time but does not mean that velocity increases as a galaxy travels to ever-greater distances. On the contrary, the value of v here will constantly decrease with time. By using a current estimation for the average density of matter in the universe (1.9×10^{-29} g/cm^3) one arrives at a value for H (approx. 71 km/sec/Mpc) that is consistent with the observations.

When the CMB was discovered in 1964 it was hailed as being supporting evidence for the Standard Model. To some degree this is true. But it is also true is that it is equally supportive of other models as well. Homogeneity based on the copernican principle is the very foundation of the Standard Model, but the CMB offers no support for this principle. All it shows is that the universe is isotropic from our vantage point. Contrary to claims of some "Big Bang" proponents, isotropy and homogeneity are not synonymous.

All serious cosmological models need to account for two fundamental phenomena concerning the CMB: (1) its isotropy and (2) the blackbody nature of its spectrum. The isotropy of the CMB can be explained by the Earth's location in the universe. As for its blackbody spectrum, both my model and the Standard Model agree that in the past the universe was much hotter and denser, to the point of thermal equilibrium. The fundamental disagreement is in the nature of the cosmic expansion. If the universe was once inside its Schwarzschild radius, then as the event horizon collapses and matter is initially ejected out of the singularity the spectrum of the radiation emitted should conform to that of a blackbody i.e. cover a range of wavelengths the peak of which is determined by the temperature of the emitter. Ordinarily this temperature should be great, but photons would be radiated at lower energy levels due to the extreme velocity of their source. In this case they would display a redshift of roughly 1000 and be radiated in the microwave region of the electromagnetic spectrum. This redshifting could theoretically result in an observed temperature of roughly 2.725 Kelvin. Redshift can be defined as the displacement of spectral lines toward the longer wavelength ("red") end of the electromagnetic spectrum due to the Doppler effect. In the case of a blackbody, however, there would be no spectral lines, so redshift would be determined by the peak wavelength of the blackbody curve. Redshift (z) is expressed mathematically as $z = \Delta\lambda/\lambda$ where λ is wavelength. It can be measured as a fraction of the speed of light by:

$$\frac{v}{c} = \frac{(z+1)^2 - 1}{(z+1)^2 + 1} \tag{9}$$

where v is velocity and c is the speed of light.

Recent observations of type Ia supernovae have begun to show the fundamental flaws of the Standard Model. Type Ia supernovae are very powerful astronomical tools called "standard candles." Because these supernovae have a known intrinsic brightness they can be used by astronomers to calculate cosmic distances. In 1998 two independent teams of astronomers observing type Ia supernovae in distant galaxies obtained the same startling results. They found that the observed supernovae, and therefore their host galaxies, were much further from the Earth than their redshifts would suggest. Their conclusion was that the universe must be expanding at an accelerating rate since given the Hubble relation between distance and redshift an accelerating expansion would result in a universe that was considerably older than one would otherwise think. But what can be causing this acceleration? This is where the Standard Model begins to break down. Cosmologists say that a mysterious unknown force, which they call "dark energy," must permeate the universe. This is just Einstein's *cosmological constant* with a fancy new name. In addressing the cosmological implications of the GTR in 1917 Einstein invented the idea of a cosmological constant, a hypothetical force unknown to science which he used to support his belief in a static universe. In the1920's when Edwin Hubble showed that the universe is expanding, Einstein admitted that the cosmological constant was the greatest blunder of his career. Today secular cosmologists have no way to reconcile the type Ia supernovae data with a homogeneous universe other than to repeat Einstein's blunder. But in a finite, spherical, Pseudo-Euclidean universe (not to be confused with the positive curvature Non-Euclidean version of the Standard Model), the supernovae data shows that Hubble's Law is only valid up to a certain distance from the cosmic center, due to the universe's finite size. An empty sphere of Pseudo-Euclidean space would be defined by the Minkowski metric in spherical coordinates: $ds^2 = dt^2 + dr^2 + r^2(d\theta^2 + \sin^2\theta\, d\phi^2)$. This is just an ordinary three-dimensional space where ϕ and θ represent "longitude" and "latitude" respectively (see Figure 3) with an additional dimension of time.

However, the spacetime surrounding a spherically symmetric mass, or in the case of our universe, a radially expanding sphere of matter, would be defined by the Schwarzschild metric:

$$ds^2 = -\left(1 - \frac{R_{sch}}{r}\right)dt^2 + \frac{dr^2}{1 - \frac{R_{sch}}{r}} + r^2\left(d\theta^2 + \sin^2\theta\, d\phi^2\right) \tag{10}$$

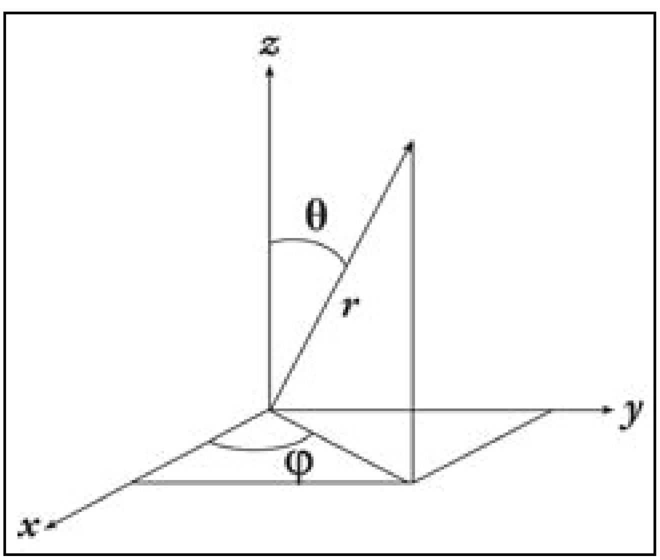

Figure 3. Spherical coordinates r, θ, φ.

where R_{sch} is the Schwarzschild radius described earlier.

Friedmann's equation for the critical density of the universe ($\rho_c = 3H^2/8\pi G$) would yield a ratio of 2 between average density and critical density ($\Omega = \bar{\rho}/\rho_c$) in this case, given the average density of matter ($\bar{\rho}$) in the universe is 1.9×10^{-29} g/cm^3 and the Hubble constant is 71 km/sec/Mpc. In a homogeneous Non-Euclidean model where Ω=2 one would expect these distant supernovae to appear brighter than their redshifts would suggest. However, in an inhomogeneous Pseudo-Euclidean model one would expect that as a galaxy approaches the edge of the universe its redshift would naturally make it appear closer than it actually is. The reason for this is that as the sphere of matter continues to expand and the value of r increases, the Schwarzschild metric will increasingly resemble the Minkowski metric. In an unbounded cosmos this transformation of the spacetime outside the matter sphere would be expected to continue at a constant rate. However, once you impose a physical boundary on the universe, that expectation is no longer valid. As a result those galaxies near the edge of the sphere would be decelerating at a greater rate than one would expect if there were no such cosmic boundary. If you believe in homogeneity therefore the observations are interpreted as evidence of an accelerating universe. But in reality it is deceleration that is causing the phenomenon. As with the horizon problem, the absence of any explanation for a cosmic acceleration reveals the weakness of the copernican principle.

In his classic work *The Realm of the Nebulae*, Edwin Hubble states that if galactic redshifts are actual velocity shifts then one would have to conclude that we are at the center of a finite spherical universe (Hubble, 1936). As a scientist Hubble correctly acknowledges that the data allows for this possibility. It should be noted that in astronomy all spectral shifts are generally interpreted as representing radial velocity, except, of course, for galactic redshifts. Secular cosmology had to come up with another explanation for galactic redshifts in order to avoid the unpleasant conclusion that the Earth occupies a unique position in the cosmos. Hubble (1936) goes on to say "…if the interpretation as velocity shifts is abandoned, we find in the redshifts a hitherto unrecognized principle" (p. 185). Unrecognized principles and mysterious forces are the only way the "Big Bang" theory can sustain itself. This illustrates beyond doubt that it is ideology, not science, that drives the Standard Model.

Two striking characteristics of a center oriented relativistic expansion (CORE) is (1) how well it fits both the Biblical account of creation and the scientific data and (2) its theological symbolism. To illustrate these points it will be useful to look at the chronology of creation.

Genesis 1:1–2
God creates a sphere of space-time with a finite amount of matter and energy within it. As a result of gravitation the mass-energy of the universe begins to localize and fall towards a central point. As matter continues to fall inward the entire universe will eventually be inside its Schwarzschild radius forming a black-hole. All is dark. In the absence of any further intervention, the universe will fall into a singularity and be crushed out of existence.

Genesis 1:3–8
God turns the black-hole into a white-hole. Matter begins to ascend away from the singularity. The event horizon collapses. Light is introduced into the darkness.

Thus creation itself can be seen as being analogous to man's fall followed by his redemption in Christ.

Summary

The CORE theory presented here is just that: a theory. It is a possible explanation for the astronomical phenomena that have been observed. However, unlike the Standard Cosmological Model it does not rely on mysterious forces and unrecognized principles to account for those phenomena. Rather, it is based on fundamental natural laws like gravitation and the Doppler effect. Also, the value of the Hubble Constant determined theoretically may be shown to be in agreement with the observed value.

It is clear that the Standard Model is the product of an ideology. Its underlying principles have no basis in science and as it grows increasingly untenable attempts to keep it viable are increasingly artificial and fantastic. Though some will say that belief in an all-powerful intelligent Creator is also an ideology one need only observe the natural world that surrounds us to see that this is more of a conclusion than an ideology.

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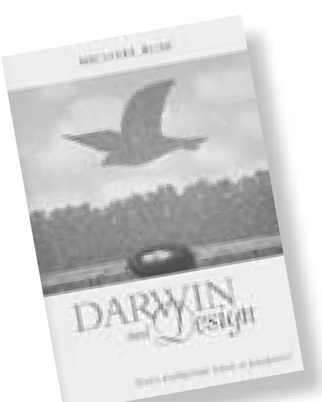

Book Review

Darwin and Design: Does Evolution Have Purpose?
by Michael Ruse
Harvard University Press, Cambridge, MA. 2003, 371 pages, $30.00.

Prolific writer and speaker Michael Ruse, an evolutionist and Professor of Philosophy at Florida State University, announces that he is a committed naturalist, no gods or supernatural powers, thank you (p. ix). Evolution is "Progress rather than Providence" (p. 134). "The Darwinian revolution is over and Darwin won" (p. 330). The message of the book is clear and persistent: "Evolution has been proven true, and is widely accepted as such. God did not intervene miraculously to make each species separately" (p. 333). Ruse believes "that selective forces can generate genuine complexity" (p. 326). Evolution works through natural selection (p. 8) which in a sense becomes for him a god. Evolution is "the only game in town" (p. 280), an ideology, or secular religion, replacing Christianity (p. 134).

Ruse surveys authors and issues dating back 2,000 years and then in Chapter 5 reaches the 19th century and publication of the "world-shattering" 1859 evolution book by his hero, Charles Darwin. Darwin's spiritual journey was from theism (Christianity) to deism to agnosticism. "Darwin became an evolutionist as much because of his religious beliefs as despite them" (p. 124). Then follow chapters dealing with important personages and positions pertinent in the penetration of evolutionary thinking into the scientific community. Ruse summarizes his position which is the same as that held today by a majority of the scientific community, "There is no reason to think that biology calls for special life forces over and above the usual processes of physics and chemistry" (p. 268).

Nature is conceived as having selected the living forms best adapted as they stagger toward complexity. Ruse employs the following analogy to illustrate the process of evolution:

> However random the process, on average organisms seem to be able to evolve only in the direction of more complexity, not less. It is like the drunkard on a sidewalk bounded by a wall on one side and the gutter on the other. The drunkard can never go through the wall but eventually his random stagger will land him in the gutter. Perhaps that is all one sees in the course of history—a random stagger towards complexity (pp. 207–208).

In considering this illustrative example, I expect that critics (including myself) of Ruse's philosophy, very readily would be inclined to ask if a staggering drunkard is on a path to a better life.

For Ruse, observed *design* in nature is as it was for Darwin, *apparent* or design-like (pp. 268–269). Design should be thought of as a metaphor (pp. 274–278, 287, 289). The "designer" is a selection which therefore becomes a substitute for God. Ruse argues for a "theology of nature" (p. 335), a religion without God. However if what Ruse says is true and God does not exist, we well might ask why recognition of the supernatural is a universal characteristic found in all human cultures. In fact, along with behavior patterns including prayer to influence to the supernatural, recognition of the "divine" could be the only cultural attribute consistently found within all cultures of people. According to evolutionists, belief in the supernatural would be a feature resulting from some "blind variation" chosen by natural selection for its survival value. If evolution were assumed to be true, then hunger and thirst also would have been selected during the long evolutionary process. Since there are means to satisfy human needs such as food for hunger, water for thirst, marriage for the sex drive, etc., also a supernatural (God) must exist to satisfy the basic human need for God. Ruse has some strong opinions, but to his credit he also tries to be conciliatory, for example, pulling passionate atheist-evolutionist Richard Dawkins and the Christian design theorist Michael Behe together by saying that they both enjoy nature (p. 334).

Darwin and Design, published in 2003 has no references for that year, four for 2002, 11 for 2001, and the rest are older. Ruse's entire book lacks references to pertinent strictly scientific anti-evolutionary books by a spectrum of authors including L. S. Berg (1922), A.H. Clark (1930), H. Nilsson (1953), G.I. Kerkut (1960), M. Denton (1986), and J. Wells (2000). Also ignored is other quite pertinent scholarly creation literature, for instance material from the Victoria Institute in England and the Evolution Protest Movement (now the Creation Science Movement), both of which published anti-evolutionary scientific information and conclusions during the first half of the 20th century. Nothing is mentioned from any of the latter 20th century creation scientific societies or the presence of more than 100 more popular creation groups.

Ruse refers to the Scopes creation-evolution trial of 1925 and then jumps to some of the post-1990 writings of anti-evolutionist Phillip Johnson and of design theorists Michael Behe and William Dembski, all of whom he considers people involved in "turning back the clock." Also, among the late 20th century influential North American creation scientists, Henry Morris is mentioned briefly, but F.L. Marsh, J.W. Klotz, D. Gish, and dozens of others all are ignored.

The only origins question should not be, "How *could* evolution happen?" Bur rather we should ask, "Did it happen?" Certainly we can conceive that it did, and we can "design" computer programs to show how it possibly could have happened. But today most scientists are carrying out their studies based on the *assumption* of evolution. Modern creationists, however, prefer a scientific model involving multiple origins rather than a single one consistent with Darwinian thinking.

Ruse's book has 19 pages of "Sources and Suggested Reading" and an 11-page index. Some scientific material is outdated. For example "horse evolution" (pp. 204, 300) now is believed, as Stephen J. Gould and others have said, to be more bush-like than it was thought to be several decades ago. This also is true in physical anthropology. Regarding nucleic acids, ideas about "junk" (pp. 200–201) rapidly are being discarded as useful functions are discovered. The main value of *Darwin and Design* may be for the reader to comprehend the mindset of a convinced Darwinist and his integration and evaluation of the various resources that have supported his position.

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