MINISYMPOSIUM ON VARIABLE CONSTANTS—V

WORLD-VIEWS AND THE METAMORPHIC MODEL: THEIR RELATION TO THE CONCEPT OF VARIABLE CONSTANTS

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Abstract

In this paper, the D-world model is used to discuss four scientific method presuppositions, involving linguistic concepts, that should be radically altered prior to the selection of any theory that incorporates variations in assumed universal constants. The metamorphic-anamorphosis model is re-introduced as an appropriate theoretical construct that is consistent with the four altered presuppositions.

Introduction

Prior to the formation of the Creation Research Society, some researchers developed models for the effects of a gravitational field that were simple modifications of Newton's theory. Indeed, modifications of this type can be traced to the late 1800's. In the first part of this paper, i discuss such a model—the Bastin-Prokhovnik model. This model should be, at least, of historical interest and possibly attractive to members of the CRS since, as judged by recent articles in the Quarterly, many of this model's conclusions are in accordance with a rejection of certain aspects of an Einsteinian philosophy of science.

With respect to this model, I introduce a hypothetical scientist named Thor. Thor's underlying world-view is discussed and a description is given of four presuppositions that many scientists appear to embrace. It is shown that if the velocity of electromagnetic radiation is not an invariant, then Thor, in order to retain his world-view and presuppositions, would need to alter extensively his speculative theories.

Following our investigation of Thor's predicament, certain linguistic concepts associated with the *D-world model* are re-introduced. It is pointed out that this mathematical model contradicts Thor's four presuppositions and rationally implies that a new set of four more realistic assumptions is more appropriate. The *metamorphic-anamorphosis* model is re-introduced as a general scheme that satisfies these four altered presuppositions. Moreover, even though it is not necessary, this model would be partially verifying if any change in the so-called universal constants could be detected.

As an added feature to this article, a short "glossary" has been included as an appendix so that the reader need not consult some obscure or not widely distributed reference. If a term within the main body of this article is italicized the first few times it appears, then it also appears in this glossary. On the other hand, if I have defined a term within one of my Quarterly articles it will probably not be included within this glossary.

The Bastin-Prokhovnik Model

In order to eradicate many philosophic ramifications encountered within the original derivations of the Special Theory of Relativity, A. J. Bastin (1960) has assumed, as a fundamental postulate that is not derived from some other theory, that gravitational effects are propagated as a form of communication between material bodies with the same velocity, c, as that of electromagnetic communication in a vacuum. He then lets m_0' be a gravitational point mass at rest with respect to some fundamental observer and m_o be a gravitational point mass in relative motion v towards the mass m_0'. Bastin's law of gravitational force F is:

$$F = \frac{Gm'_0 m_0}{d^2}\left(\frac{c + v}{c - v}\right)^{1/2} \qquad (1)$$

where G is the gravitational constant and d is the linear distance between the point masses. In section 8 of the Bastin paper, the postulated equation (1) is more rigorously justified. Further, in this model $G \propto 1/(Rc^2)$, where R is an assumed *substratum* radius of the universe. S. J. Prokhovnik (1967, p. 68) incorporates Bastin's modified Newtonian expression (1) into a *substratum theory* using the cosmic (i.e. *substratum)* time notion T and a uniform Hubble type substratum expansion law that requires $R(T) = \omega T$, were ω is a universal constant. Thus for two constant and fundamental gravitational point masses m_0' and m_0 the gravitation "constant" does not have such a nonvarying character but rather

$$G \propto 1/(Tc^2) \qquad (2)$$

Under this Bastin-Prokhovnik theory T is, at present, 10^{10} yrs.

When v << c, then the Bastin expression (1) is closely approximated by Newton's. Thus, in the case where our Sun has mass M and the Earth has mass m, the Newton theory of gravity yields the period of rotation of the Earth about the center of mass as $t = (2\pi a^{3/2})/\sqrt{G(M + m)}$. Even though it is generally agreed that the number $(M + m)$, 5000 years ago, was slightly larger than it is today, for comparison sake, assume it is constant.

The Bastin-Prokhovnik model is a Newtonian substratum model and such a Newtonian substratum has also been used by Surdin (1962) to obtain relativistic expressions for perihelion procession and gravitational EMR (i.e. electromagnetic radiation) deflection; but, nevertheless such models have the usual drawback of whether or not the substratum should be assumed to exist in reality. After examining the basic simplistic structure one might conclude that this model's particular substratum behavior should not be deemed as

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objectively real in character. This modeling technique cannot be differentiated from that advocated by Lorentz. In 1906, Lorentz altered the notion of the mathematical model by stating that such models should be viewed as only partially realistic. Lorentz (1952, p. 31) states his type of Copenhagen interpretation relative to his ether notion:

> I should add that, while thus denying the real existence of ether stresses, we can still avail ourselves of all of the mathematical transformations . . . We need not refrain from reducing the force to a surface-integral, and for convenience's sake we may continue to apply to the quantities occurring in this integral the name stresses. Only, we must be aware that they are only imaginary ones, nothing else than auxiliary quantities.

I also point out that the objects termed as photons as originally stated in the Einstein's photo-electric theory were only to be assumed imaginary entities. Since the Bastin-Prokhovnik model is intended as a prototype, it's useful to invoke for this model the most conservative substratum approach and assume that the numbers R, T and the substratum expression $R(T) = \omega T$ do not correspond to objective reality.

Scientist Thor

Scientist Thor considers himself a world authority on the applications and conclusions associated with the Bastin-Prokhovnik cosmology. He attributes the vacuum velocity c_g for the propagation of gravitational effects as being always equal to the in vacuo velocity c of EMR as necessary since he has developed an EMR theory similar to that of R. A. Waldron (1989) that corresponds to the propagation of gravitational effects with the effects of EMR. Further, he has developed a technique for measuring c for EMR using some type of laboratory instrumentation independent from his theories. He discovers that over a period of 300 measurements made at the starting time of 12 noon on 12 July 1989 and ending at 12 midnight (local time), as measured by a mechanical clock, that the velocity of EMR had decreased slightly.

Why does Thor appreciate Bastin-Prokhovnik type models? His appreciation comes from the fact that all of the dynamic properties of the Special Theory of Relativity and almost all of the verified consequences of the General Theory can be deduced from such models without invoking the incomprehensible, to him, concept of absolute time dilation or length contraction. There is, however, one critical aspect of Thor's philosophy of science that he has not expressed formally. His writings are carefully edited so as to contain no indication that he subscribes to a particular world-view exterior to his scientific discipline. In Herrmann (1985b), it is argued that belief-systems and their deduced world-views are the hidden motivating factors that govern theory selection. The assumption is that a theory conjoined with a world-view must not yield a logical contradiction. To achieve this, Thor must couple his theories with four immutable, and often considered as minor, presuppositions.

(i) Human beings have the ability to comprehend and will eventually describe in human languages all of the true laws that govern the cosmos. This includes the laws that govern the development of individual natural systems.

(ii) A uniformity of nature; which is equivalent to stating that there are theories (possible yet unknown) expressible in a human language, that embrace human logical processes and that are correct in their predictions of natural system behavior for all of cosmic time.

(iii) A natural order or harmony concept; which is equivalent to stating that many, but not all, developing natural systems display a describable uniformity or order that is acceptable and comprehensible to his scientific colleagues.

(iv) In the absence of a theory that predicts why a quantity might vary, then scientists are allowed free speculation.

Even though it is not possible to extrapolate beyond Thor's experimental time interval with any certainty; Thor, in order to sustain his belief-system, does so by exponentially extrapolating his data to 5,000 present day years into the past. He assumes that the length of the major axis, a, of the approximately elliptical orbit of the Earth is approximately a constant, due to a requirement of his theories that the heat falling on Earth be approximately the same 5,000 years ago as it is today. Using the above model, and his complete trust in his uniformity of nature concept, it follows that the period of rotation of the Earth about the center of mass is $t = K(cT^{½})$, in general, where K is a constant. Let c_1 denote the velocity of EMR 5,000 of our present day years ago and c the velocity as measured at 12 midnight on 12 July 1989 by Thor in his laboratory. Thor claims that $c_1 = 5c$. Then letting t_1 denote the period of rotation 5,000 present day years ago and t_N a present day year in time as Thor conceives of it, it follows that t_1 is very nearly $5t_N$. Using this result, Thor concludes that his selection of the Bastin-Prokhovnik model is inappropriate, not because it may be incorrect, but rather this result contradicts a hidden conclusion unmentioned by Thor—a speculative conclusion that scientist Thor desperately wants to establish logically from an assumed extrapolated behavior. In particular, he needs a theory that does not contradict his belief that over the past 5,000 present-day years the unit a "year" has remained approximately constant.

Unless there is a bona fided revelation, individuals seem to find it difficult to alter even the most innocuous portions of a belief-system, then to accommodate (i)-(iv) above Thor needs to alter his theory or find a different one that includes a continuous time varying EMR velocity, a description for a cause of such velocity changes that will predict the variations he has measured within his laboratory, an approximation for Newton's theory of gravity and does not, when extrapolated, contradict other conclusions he wants to establish theoretically. Indeed, there are literally hundreds of different speculative cosmology theories that cannot be differentiated one from another within a laboratory setting and I am sure that Thor could fill many journal pages with his arguments for the acceptance of one of these as it relates to his speculation on the behavior of c.

I point out that considering such speculation as somehow significant or objectively real in character has only occurred within the scientific research com-

munity within the past 137 years. Faraday (1852) apologizes to his audience for his speculations on the possible physical reality of his lines of force and informs them, due to the fact that he speculates, that he will only publish his remarks in a "nonscientific" journal rather than in the ***Philosophical Transactions.*** The view as to whether or not to categorize as objectively real what was once called metaphysics, but is now simply termed as "theory," has vacillated since Faraday's pronouncements; but, as I have argued, it is mostly dependent upon a world-view that one is attempting to force upon a populace that is not aware of the fact that such speculation cannot be scientifically verified.

A World-View Model

It is not often that one finds in a research publication a statement in the very first paragraph relative to the researcher's philosophic world-view. However, I did find in the paper by Tipler the statement that he would, first of all, reject a cosmology pilot wave interpretation of quantum mechanics since any such approach would require a clear division of systems into observer and observed and that: "Such a split is quite impossible in cosmology, for there is nothing outside the universe." (Tipler 1984, p. 188).

I have recently published (Herrmann 1984; 1985a,b; 1986b,c) some findings based upon the ***D-world*** (i.e. deductive-world) model, a model that is now called the NSP-world model (Herrmann, 1987). I emphasize that this model is a mathematical model that employs only the most accepted modeling methods. Further, I note that certain terminology that appeared in the original published papers has been altered to make the model as unbiased as possible. As I discuss the relation of the ***D-world model*** to the possible variation of the assumed universal constants, the newer terminology will be introduced and specifically correlated to the older expressions. Notice that this model is slowly being successfully applied to interesting scientific questions (Herrman, 1989). It even yields a more fundamental cause for the Barnes instantaneous feedback axiom (Barnes, 1983, p. 86). But what has not been fully appreciated is exactly what this model establishes relative to Thor's world-view and that in Herrmann (1986b, p. 196) the ***metamorphic*** portion of this model would be partially verified if one could establish that even one of the universal constants had altered.

What the D-world model has to say about theories, logic and other linguistic concepts is not scientific speculation. The D-world properties are established rationally by mathematical reasoning—the same reasoning processes used to arrive at the most basic of scientific conclusions. But the D-world is a special type of substratum theory and you cannot eliminate this substratum mathematically. If you utilize mathematical models in any manner to describe natural system behavior, then this substratum world exists, at least, in uninterpreted symbolic form. From the speculative point of view, all atomic theory is also a substratum theory in that there appears to be no direct evidence—evidence that impinges upon one of the five senses—for the existence of the assumed elementary particles. One can totally reject the quantum physical model for subatomic behavior by rejecting portions of the mathematical structure itself or consider other interpretations and, thereby, develop alternate theories that predict the same verified consequences (Simhony, 1987; Barnes, 1983). If the basic necessity for science is communication through application of any symbolic language, then the D-world exists as an abstract entity. Moreover, for me, I have considerable personal and sensory evidence that the ***pure D-world model*** does correlate to an objective reality. However, I acknowledge that some scientists still have retained an actual free will. Hence, as done by Lorentz, Bohr, and many present-day individuals, you can, of course, freely reject the objective reality of the pure D-world as its implications are discussed by deeming it as extraneous or simply parametric in character.

As to the basic structural assumptions, the mathematical modeling technique uses only the most accepted axioms of modem ***Zermelo-Fraenkel set theory.*** The fundamental linguistic rules that scientists employ to communicate findings and the most simplistic axioms for logical deduction are embedded into a mathematical structure. In Hermann (1986b), the propositions generated by this model are interpreted in two different ways. One interpretation discusses hidden D-world processes and entities that sustain, guide and are the possible building blocks for universes, in general. The second interpretation, which I consider more significant, is often ignored. This second interpretation specifically implies that Thor's statements (i), (ii), (iii) and (iv) are false within the D-world. Using the mathematical methods in Herrman (1986a), it is established (Herrman 1986b, c; 1987) that Thor's world-view needs to be radically altered and replaced by the following:

(i)' Human beings do not have the ability to comprehend and will not eventually describe in human languages all of the true laws that govern the cosmos. This includes the laws that govern the development of individual natural systems.

(ii)' Nature is actually ultra-uniform (i.e. superuniform) in character. There does exist a complete set of rules and processes that would give a correct prediction of all natural system behavior with respect to cosmic time assuming that such behavior is not interfered with by human intervention. However, the rules can never be written in any human language and their application requires the use of an ultralogic (i.e. a supermind process) that cannot be duplicated by any creature within the universe. Further, no form of human intervention can alter certain D-world properties—properties that will continue to govern system development.

(iii)' There is an ultra-natural harmony and order within the universe. Every natural system, even those that relative to human comprehension are classified as chaotic or random in behavior, is endowed with a harmony and order to their development that is far superior to anything that can be achieved by human endeavors (Herrmann, 1989).

(iv)' Speculation must be constrained. Scientists should admit that many of their speculative theories and the so-called methods of indirect verification exist for the sole purpose of fostering hidden aspects of personal world-views and that other speculative theories associated with competing world-views are just

as meaningful scientifically. Furthermore, when we employ the D-world model to investigate the linguistic aspects of human comprehension and knowledge, then it strongly suggests that science as a discipline should be restricted to small cosmic time periods that embrace the NOW. That speculation as Faraday (1852) wrote: ***Should ever be held as doubtful and liable to error and change . . .***

The D-world model also implies that the true nature of the cosmos can be greatly appreciated and marveled at by mankind-intuitively-even if we are only able to describe system behavior in but general terminology rather than in minuscule detail. We can appreciate a theological interpretation which specifies that there are no chaotic natural processes from the Creator's viewpoint, but that every natural system changes under the guidance of ultra-harmonious laws that display, magnificently, an intelligence of immeasurable magnitude when compared to that of the created.

The Metamorphic-Anamorphosis Model

In Herrmann (1986b), the concept of the ***metamorphic model*** was restricted to long term developmental processes and is fully discussed there, in section 5. The conclusions reached in that section are associated and consistent with statements (i)' -(iv)'. Moreover, they are applicable to any discussion of a present day variation in what was thought to be a universal constant. Indeed, the possibility of universal constant as well as first-principle alterations, in the far past, is specifically cited (Herrmann, 1986b, p. 196) and used to develop the implications of the metamorphic model—a model for sudden changes that can appear to occur instantaneously throughout a natural system. As seen in Herrmann (1989), such variations need only be considered as "sudden" from the human point of view. They can actually be described as ultra-continuous (i.e. supercontinuous) and ultra-smooth variations from the D-world viewpoint. If such variations can be verified within the laboratory to have actually taken place, then this gives strong indirect evidence that such variations have occurred previously. Observe that such variations can be accompanied by subtle changes in first-principles.

The ***anamorphosis effect*** transpires after each such variation. As an analogue model, we need simply consider any natural system as a time dependent system interior to an ***anamorphoscope.*** This anamorphoscope takes all natural-world informational transmissions that are "distorted" by the first-principles or unaltered universal constants prior to a metamorphosis and conforms them, in a ultra-uniform manner, to what would afterward be considered as "normal" transmissions patterns. This particular interpretation is not the only D-world possibility. However, if accepted, it shows on the one hand that extrapolating a set of data beyond an immediate time interval is scientifically inappropriate, no matter how successfully the data fits some hypothesis. On the other hand, this interpretation supports the concept of the ultra-uniform and ultra-natural harmony and order within our universe described in (ii)' and (iii)'. The mathematical model actually describes, in general terms only, remarkable and marvelous processes that conjoin the seeming discordant time dependent system developments. These processes are simplistic notions within the D-world, but beyond all natural-world attempts to either replicate or comprehend in detail.

Now Thor could have accepted his original variation of the Bastin-Prokhovnik model by simply accepting, without any further analysis, that c had decreased, in say discrete steps, to c_i. For, if he had but bothered to do so, he would have discovered that all of the verified conclusions of his original theory with the c_i substituted for c still hold true. Further, if it were not for the fact that it would contradict his world-view, than he could include the metamorphic model with the anamorphosis effect as a cause for the variation of c. Unfortunately, Thor has never considered such a possibility.

Conclusions

Even though the first lectures that used the D-world model to interpret and analyze both scientific and theological questions were given in 1981 and the first theological publication appeared in March 1982 (Herrmann, 1982), and even though at that time criticism was extremely favorable and the processes were considered by some as revolutionary, in actuality, few scientists have investigated the mathematical methods nor have they carefully considered how this model affects their pronouncements. Since its introduction many individuals have discovered that its ramifications contradict their long held world-views and they often attempt to escape from its conclusions by ignoring the model's existence. Some even reject its foundings, without analysis and thereby display their own ignorance, when they claim that such analytical results cannot possibly be obtained rigorously, but must come from some mental aberration. Recall that the D-world model has distinct scientific and theological interpretations. And, indeed, this proposed substratum world need not carry any theological interpretation.

If it is not verified that some universal constants have altered, then this does not eliminate world-view statements (i)' -(iv)'. You can I eject them only by assuming that they do not refer to objective reality, but the possibility that such a substratum world exists can no longer be denied on the grounds that no such scientifically acceptable model exists. If it is not verified that some universal constants have altered, then the speculative metamorphic model may have no laboratory verification and some, who do not have personal evidence available, may reject its reality. The rejection of the metamorphic model and the corresponding anamorphosis effect or, indeed, other similar portions of the D-world model will have no effect upon statements (i)' -(iv)' as long as science communicates by means of any form of symbolization.

It is unfortunate that within creation science literature there is a tendency to embrace Thor's world-view without concern as to its obvious theological implications. In light of the world-view model as partially described by statements (i)' -(iv)', when any creation model, from the so-called "Big Bang" to the metamorphic model, is discussed and analyzed, it is increasingly important that theoreticians consider openly how their hypotheses and conclusions reinforce a world-view that is exterior to the canons of their scientific discipline; in particular, a world-view that entails a grandiose view of human intelligence. It

is hoped that if variations of universal constants are detected, due consideration be given to models, such as the metamorphic, that sustain a more realistic view of the proper relationship between mankind's cognitive nature and that of the Creator.

Glossary

D-world model: Originally, the deductive-world model was applied to questions relative to the discipline termed as logic. A special mathematical structure—a nonstandard structure—is constructed using the modern ideas of nonstandard analysis. Rules are stated that correspond certain abstract mathematical entities to the natural world of human linguistics, while a host of other entities correspond to new linguistic terms. This yields a mathematical model for a new theory of linguistics and logic that incorporates the standard and customary concepts. From the technical viewpoint, the "model" is usually considered to be what is obtained when these rules of correspondence are applied. From the popular viewpoint, the term "model" is often thought to include the entire theory deduced from the mathematical structure where the abstract entities are interpreted in terms of the old or new linguistic terms. After the original rules of correspondence were described, it was realized that a second interpretation was possible. This interpretation corresponds certain linguistic concepts directly to old and to new physical terms. The expression D-world model used in this article is the popular concept of a model—the entire theory generated by the rules of correspondence—coupled with both the old and new linguistic and physical terms.

Anamorphoscope: Originally, an optical device that restored an image that was distorted by an anamorphosis device. For this article an anamorphoscope takes all natural-world informational transmissions that are "distorted" by the first-principles or unaltered universal constants prior to a metamorphosis and conforms them, in a ultra-uniform manner, to what would afterward be considered as "normal" transmission patterns. This concept is further explained under the idea of an anamorphosis effect.

Anamorphosis effect: Originally, an anamorphosis was an image produced by an optical system that rendered the image unrecognizable unless viewed by a proper restoring device. For this article, this effect can be very subtle. It refers to the following scenario. At a particular moment of cosmic time, certain universal constants or even natural laws are altered throughout a natural system. Any information transmitted prior to this cosmic moment but perceived within the natural system after the alteration occurs, will be "distorted" to conform to the altered universal constants or natural laws. Thus, depending upon human awareness prior to the alterations, it might not be possible to determine whether such alterations have occurred by means of any laboratory experimentation carried out within the influenced natural system and after such a cosmic moment.

Anamorphosis model: This is a model that incorporates the possibility that an anamorphosis effect could occur.

Metamorphic model: This is a model for a sudden alteration or change in any aspect of a natural system that occurs at a particular moment of cosmic time throughout the system. But, the sudden change need not be considered as sudden from the viewpoint of a substratum theory that incorporates a different time scale. Moreover, the change can vary from catastrophic to minute in character. It need not incorporate any change in any universal constants or natural laws, but could simply result in what might be perceived in the natural world as a missing portion of system development. This portion would, however, not be missing within the substratum world.

NSP-world model: This is the D-world model with concentration upon the physical interpretation.

Pure D-world model: This is the portion of the D-world model that does not correspond to the ordinary human linguistic concepts nor to the standard physical theory. Rather, this is the portion that corresponds entirely to the new linguistic and new physical terms.

Substratum: When a model is constructed a portion may be declared to be a substratum. On the other hand, such a declaration need not be made. When a substratum is declared, it is considered to be an underlying structure or foundation for a natural system and from which a natural system derives its special character. Generally, for a particular theory, no consideration is given to considering a substratum of a substratum. Often a substratum is not analyzed in any great detail and it can be considered as either objectively real, as an auxiliary construct, or partially real and partially auxiliary in character. For EMR, the ether is often declared to be a substratum. For the Prokhovnik cosmological model for special relativity, the unrealistic substratum is an imaginary construct for our universe where it appears to be isotropic and "smoothed-out" to a family of "fundamental observers" all of whom also obey the Hubble Law for uniform expansion. These fundamental observers may be considered as locations within an appropriate geometry. For the D-world model, the substratum is the pure D-world portion.

Substratum theory: This is any theory that has been declared as having a portion of the theory generated by a substratum.

Zermelo-Fraenkel set theory: This is the formal name given to the most well-known theory of sets. Almost any standard book on set theory is an exposition of Zermelo-Fraenkel set theory.

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GOOD NEWS FROM NEPTUNE: THE VOYAGER 2 MAGNETIC MEASUREMENTS

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Abstract

The Voyager 2 magnetic measurements at Uranus and Neptune have confirmed the predictions of a creationist theory on the origins of planetary magnetic fields. The unusual tilt and offset of the fields found at each planet can be explained by a simple extension of creationist ideas. In contrast, Voyager's magnetic data makes great problems for evolutionary theories.

Voyager's Findings

On August 25, 1989, the Voyager 2 spacecraft passed Neptune and made the first measurements of that planet's magnetic field. The Neptunian field is tilted 50° with respect to the rotation axis and offset by 0.4 R (R = Neptune's radius = 22,700 km) towards the south pole (Tsurutani, 1989). This is the second oddly tilted and offset field Voyager has found, the first being that of Uranus in 1986 (Ness, 1986.).

Neptune's magnetic dipole moment (a measure of the strength of the source) turns out to be 0.13 gauss R^3, or 1.5×10^{24} Ampere-meter^2 (1 Am^2 = 1000 gauss-cm^3). Again this is similar to the dipole moment of Uranus. The two planets seem to be fraternal twins; both have nearly the same radius, mass, and magnetic features. Like their gigantic brethren, Jupiter and Saturn, Uranus and Neptune each appear to have an exterior ocean of gas and fluid surrounding a solid core. A major difference between the twin planets is that the rotation axis of Uranus is tilted nearly into its orbital plane, whereas the direction of Neptune's rotation axis is more nearly normal. Figure 1 and Table I show the similarities and differences.

Review of the Creationist Theory

The Voyager measurements confirm a prediction I made six years ago (Humphreys, 1984) that Neptune's magnetic dipole moment would be "of the order of 10^{24} J/T" (1 J/T = 1 Am^2). Also in 1984 I made a similar prediction for Uranus, which was similarly confirmed (Humphreys, 1986b). I made these predictions on the basis of my hypothesis on the origins of planetary fields, which was that (1) the raw material of creation was water (based on 2 Peter 3:5, "the earth was formed out of water and by water"), and (2) at the instant God created the water molecules, the spins of the hydrogen nuclei were all pointing in a particular direction. The tiny magnetic fields of so many nuclei would add up to a large magnetic field of the right magnitude. By the ordinary laws of physics, the nuclear spins would lose their alignment within seconds, but the magnetic field would preserve itself by starting an electric current circulating in the core of each planet. By the same laws, the currents and fields would preserve themselves with only minor losses as God rapidly transformed the water into other materials. After that, the currents and fields would gradually decay over thousands of years (Barnes, 1971, 1973).

To calculate the original fields by this theory, we only need to know the masses of the planets, which have been accurately measured. To calculate the present-day fields, we need to know the size and conductivity of the planetary cores, and the age of the solar system. Using existing models of the cores (Smoluchowski, 1983) and the tight-chronology Masoretic text age of 6000 years (Niessen, 1982), I estimated present magnetic moments of (2 to 6) x 10^{24} Am^2 for Uranus, and similarly for Neptune. However, because Smoluchowski did not have much data on which to base his core models for Uranus and Neptune, I widened my prediction to "of the order of 10^{24} Am^2," by which I meant that the magnetic moments would be between 10^{23} and 10^{25} Am^2. Both planets came within these bounds. If the present field of either planet had exceeded the maximum original magnetic moment according to my hypothesis (8.2×10^{25} Am^2 for Uranus and 9.7×10^{25} Am^2 for Neptune), my theory would have been definitely falsified.

Performance of the Creationist Theory

The Sun, Moon, and all eight of the measured planets (Voyager will not visit Pluto) have present magnetic moments under the maximum values my

Table I. Physical Features of Uranus and Neptune
(Allen, 1973; Ness, 1986; Tsurutani, 1989)

Feature	Uranus	Neptune
Magnetic Dipole Moment (10^{24} Am^2)	3.0	1.5
Angle Between Spin and Dipole Axes (Degrees)	60	50
Offset of Magnetic Dipole (Radii)	0.3	0.4
Inclination of Equator to Orbit (Degrees)	98	29
Inclination of Orbit to Ecliptic Plane (Degrees)	0.8	1.8
Mass (10^{26} kg)	0.868	1.027
Radius (km)	2.3470	22716
Average Density (g/cm^3)	1.58	2.30

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