The elements of the universe point to creation: introduction to a critique of nucleosynthesis theory

Jonathan Henry

The cosmic H/He ratio and temperature of the cosmic background radiation (CBR) are supposed to match predictions of nucleosynthesis theory (NST). However, model 'predictions' were in fact retrodictions. With the failure of NST to account for elemental origins and abundances, theorists are in the position of a century ago, when physicists such as James Maxwell claimed that the existence of the elements points to creation. Just as naturalistic origins-theory failed to anticipate properties of cosmic elemental-matter prior to modern NST, modern NST continues to exhibit the shortcomings of naturalistic theory as a predictor of cosmic properties. A full critique of modern NST would consider (1) nucleosynthesis in the big bang; (2) nucleosynthesis in the sun; (3) nucleosynthesis in other stars; and (4) anomalous elemental abundances in stars, solar system bodies and the interstellar and intergalactic media. This paper focuses on the claim that big bang NST successfully predicted the cosmic H/He abundance, together with the subsidiary claims (A) that big bang theory successfully predicted the CBR temperature and (B) that the nature of the CBR confirms the big bang.

Since the rise of modern evolution in the 1800s, naturalistic theory has experienced two phases regarding the existence and abundances of elemental matter. In the first phase, the matter of the universe was believed to be exotically different and non-uniform with respect to terrestrial elements. This belief was a holdover from the teachings of antiquity prior to the acceptance of atomic theory. In this context, the discovery that atoms of a given element have identical structure and properties wherever they exist was taken to imply a common design and Designer for the universe. This design argument was widely used in the late 1800s. Most evolutionists readily accommodated to atomic theory, but this design argument illustrates the inability of naturalistic theory to predict cosmic properties before the rise of modern NST.

The second phase was underway by the mid-1900s, when a large body of theory was developed to explain the formation of elements in the big bang and in stars. Theorists embraced not only the uniformity of the atomic plan for all elements in the cosmos, but further proposed that elemental abundances are universally uniform or at least predictable. These expectations continue in modern NST:

> 'The relative abundances of the various isotopes of different elements are repeatedly found in similar ratios in stars, in the interstellar medium, in meteorite fragments and in the earth's crust. The similarity of these ratios cannot be accidental, and the detailed explanation of the hundreds of known abundance ratios provides a severe task for the theory of stellar evolution.'[1]

In a similar vein, Gamow, a prime originator of big bang theory, also claimed:

> 'Relative abundances of elements [throughout the cosmos] have been exhaustively studied. ... The most important result of these studies is the fact that *the chemical composition of the universe is surprisingly uniform* [emphasis in original].'[2]

Each of these writers is expressing what he wants to believe rather than the actual situation.[3] Matter in the universe is uniform in atomic construction, but diverse in elemental abundances. This paper focuses on the success of big bang theory in explaining observed cosmic abundances of H and He.

Naturalistic theory did not expect a uniform atomic nature of matter

Little was known about the elements or their abundances in the early 1800s. Then, it could be said that, 'We do not know of what kind of matter the sun is made.'[4] Though meteorites were recognized as having a source beyond the earth,[5] and it could be said that 'all the materials of which they consist are familiar to us',[6] the origin of meteorites was still a mystery. The solution of this mystery was not helped by the fact that they contained substances unlike 'the known mineral substances on the face of the globe'.[6] Though meteorites clearly had an atomic structure, their unknown origin made it difficult to extrapolate their atomic nature to the cosmos in general, and assumptions that the cosmos was atomic were based on 'the simplicity of the hypothesis'.[7] Humboldt made this assessment despite the fact that the intersecting orbits of Ceres and Pallas pointed to an origin within the solar system,[8] thus indicating the difficulty of extrapolating atomic concepts to the solar system, let alone to the stars beyond. Early indications of asteroidal origin in the solar system were obscured by claims of Laplace's nebular hypothesis, in which the nebula from which the asteroids developed had an unknown source.[9]

Indeed, the ancient belief was that the cosmos was made of exotic matter unlike that found on Earth. Though Galileo's observation of sunspots and lunar craters in the 1600s gave a setback to the belief that cosmic matter was fundamentally different from terrestrial matter,[10–12] this belief persisted for centuries. In the early 1800s—before evolution was widely accepted—this belief may have formed part of the basis for the widespread expectation that extraterrestrial life inhabited the sun and planets.[13] If cosmic matter were truly exotic and could exist in mysterious forms capable of supporting biological systems on even the sun and on the coldest planets, then clearly life must thrive nearly everywhere.

The belief in exotic extraterrestrial matter did not diminish until the discovery of spectroscopy. Spectroscopy is based on the fact that all matter gives off some light or radiation. This energy can be analyzed to find which elements are causing it. Each element produces a unique spectrum, a 'fingerprint'. Light from stars can be gathered by a telescope, passed through a prism to produce a spectrum and then the spectrum can be analyzed to determine the elements originating it. Spectroscopy was first applied to the light from stars in 1859:

> 'Kirchoff and Bunsen immediately saw their discovery's celestial possibilities. Bunsen wrote to a fellow chemist in England: "Kirchoff has made a wonderful, entirely unexpected discovery in finding the cause of the dark lines in the solar spectrum. **…** A means has been found to determine the composition of the Sun and fixed stars".'[14]

With the discovery of stellar spectroscopy, the elements present in the universe could be detected anywhere telescopes could penetrate. It was soon found that all stars—or at least their surfaces—are mostly hydrogen, which led one wag to pen the ditty:

> 'Twinkle, twinkle little star
> I don't wonder what you are,
> For by spectroscopic ken,
> I know that you are hydrogen.'[15]

The same basic kinds of atoms exist throughout the cosmos. This was a well recognized fact a century ago (though the lack of uniform element abundances was not so well recognized then), but modern theorists continue to comment on its significance:

> 'The Ancients believed in a sort of unity between the heavens and the Earth. **…** But there is a real unity **…** That real unity is in the basic structure of matter everywhere in the universe **…** We have learned that all matter is made of the same stuff—the matter of the Earth **…** of the stars and even the remotest galaxies (from studying their spectra). This stuff is **…** approximately a hundred different kinds of atoms that make up the hundred or so naturally occurring elements and, in various combinations, the molecules of the billions [*sic*] of kinds of chemical compounds.'[16]

Further, this is not a trivial state of affairs, but is 'significant', 'The deeply significant point is that everything, everywhere, is basically the same. **…** [It is] made up of the same things: mainly protons, electrons and neutrons.'[17] There is 'a marvelous unity' implied by this observation, 'Science has revealed a marvelous unity in the universe; **…** everywhere **…** we find the same kind of stuff: atoms, electrons, and so on.'[18] Since this observation is viewed as being a 'significant' condition of 'marvelous unity', we might suspect that this is not the observation which naturalistic origins theory would have led one to expect. Indeed, it was the failure of naturalistic thought to anticipate this observation that conferred an anti-evolutionary status upon it.

This uniformity is especially remarkable considering the diversity of celestial bodies constructed from these elements. Moons and planets, for example, exhibit a diversity of properties and elemental abundances which naturalistic theory cannot explain,[19,20] and the sun is sufficiently different from most other stars to be considered special, if not unique.[21,22] The interstellar medium and the intergalactic medium have D/H abundance ratios that do not fit into conventional NST.[23,24] Indeed, God has named each star (Psalm 147:4); a fact suggesting that perhaps each one is truly unique in some way. Yet among all celestial bodies, there is a uniform plan evident in the elements employed in their creation. This universal plan was taken to point to the action of a creator, who spoke the cosmos into existence instantly rather than to a process of gradual evolution.

The anti-evolutionary implications of cosmic elemental unity were emphasized by the great physicist James Clerk Maxwell. In a 'Discourse on Molecules' written in 1873, Maxwell recognized the creationary implications of the fact that over the universe, molecules and atoms of a given kind are identical:

> 'A molecule of hydrogen **…** whether in Sirius or in Arcturus, executes its vibrations in precisely the same time. Each molecule therefore throughout the universe bears impressed upon it the stamp of a metric system as distinctly as does the meter of the Archives at Paris.
>
> 'No theory of evolution can be formed to account for the similarity of molecules, for evolution necessarily implies continuous change. **…** the exact equality of each molecule to all others of the same kind gives it, as Sir John Herschel has well said, the essential character of a manufactured article, and precludes the idea of its being **…** self-existent.'[25]

Shortly before his death in 1879, Maxwell also wrote:

> '... there are immense numbers of other atoms of the same kind [throughout the universe]. **…** Each is physically independent of all the others. **…** We are then forced to look beyond them to some common cause or common origin [i.e. supernatural creation] to explain why this singular relation of quality exists **…** .'[26]

Apologists in the following years used Maxwell's arguments as a case for creation. Iverach criticized the nebular hypothesis, harking back to Maxwell's design argument from atomic uniformity:

> 'The nebular theory does not explain even the mechanics of the [solar] system **…** The unity [of the elements] we have to start with is not simple, but complex. It is again a unity of related elements,

also rational.'[27]

Then, speaking of the evolution of the universe in general, Iverach stated, 'What has to be accounted for is the unity of all these elements in one [chemical] system [throughout the universe]',[28] and he clearly identified these arguments as originating with Maxwell.[29] For Maxwell and for others after him, part of their pro-creation offensive was the fact that the atomic makeup of elements throughout the cosmos shows a common creation, not a random nuclear/chemical development in a naturalistic process.

In contrast, physicist Ernst Mach opposed the atomic theory as it developed in the 1800s and early 1900s.[30] The anti-evolutionary implications of atoms constructed on a common plan throughout the cosmos may have been responsible indirectly for Mach's view. Mach was an evolutionist and also shared some of the beliefs of George Berkeley, a freethinker of the 1700s and one of the originators of the philosophy called 'positivism'.

Positivism asserted that only directly observable information should be considered as a legitimate part of science.[31,32] Mach attempted to dissociate himself from Berkeley's metaphysics,[33] which postulated a type of impersonal 'New Age' force animating the universe. Nevertheless, some of Mach's scientific ideas follow from Berkelian thought.[34,35] Thus positivism sought to divorce from science any philosophical considerations, such as the creationary implications of the cosmos to which Romans 1:20 alludes. Given the philosophical (creationary) implications of atomic matter existing on a cosmic scale, together with the fact that atoms cannot be sensed directly, the logical conclusion of positivism was that atoms are not a valid scientific concept. As a positivist, Mach was forced to assert that atoms do not exist. However, with the widespread acceptance of atomic theory, investigators from the early 1900s onward sought naturalistic mechanisms by which the elements might have been produced. Modern nucleosynthesis theory was the eventual result.

Naturalistic theory has not explained the H/He abundance ratio

In 1896, the French scientist Henri Becquerel discovered radioactivity. Meanwhile, Marie and Pierre Curie had been making a steady series of findings about the previously unsuspected phenomenon of atomic transformations.[36] A few years later, George Darwin, son of Charles Darwin, made the first proposal of solar nuclear fission reactions.[37] Fission was dropped as a possible solar energy source because it could not supply the sun with energy long enough to match the geologic age of the earth.[38,39] In the 1930s following the discovery of the neutron, research into fusion reactions intensified,[40] and in 1939, Hans Bethe proposed that fusion reactions power the sun and synthesize heavier elements.[41,42]

The concept of fusion nucleosynthesis was refined until by the late 1940s a theoretical framework existed to explain nucleosynthesis in the big bang more than 10 G ago. Big bang theorists once believed that virtually all isotopes were synthesized in the sequence of conditions following the primordial explosion.[43–48] Today, the big bang is considered the source of only a few isotopes, including H, D, ^{3}He, ^{4}He and ^{7}Li,[49–51] with stellar nucleosynthesis supposedly forming the rest.[52]

It has long been claimed that big bang theory correctly predicted the 3:1 abundance of H to He in the universe.[53–57] This is not true. The H/He ratio was known before big bang NST was conceived. The theory has been modified to fit the facts and did not make a prediction:

> 'The study of historical data shows that over the years predictions of the ratio of helium to hydrogen in a BB [big bang] universe have been repeatedly adjusted to agree with the latest available estimates of that ratio as observed in the real universe. The estimated ratio is dependent on a ratio of baryons to photons (the baryon number), which has also been arbitrarily adjusted to agree with the currently established helium-to-hydrogen ratio. These appear to have not been predictions, but merely adjustments of theory ('retrodictions') to accommodate current data.'[58]

Other acknowledgments of such 'retrodictions' are generally more subtly expressed than the source just quoted. Hawking wrote:

> 'At the time that Alpher, Bethe, and Gamow[59] wrote their paper [proposing big bang theory], not much was known about the nuclear reactions of protons and neutrons. Predictions made for the proportions of various elements in the early universe were therefore rather inaccurate, but these calculations have been repeated in the light of better knowledge [i.e. the model parameters have been retrodicted to fit reality] and now agree very well with what we observe.'[60]

On the other hand, Barrow and Tipler claim:

> '… calculations predicted that the present Universe should contain about 75% of its mass in the form of hydrogen and 25% as helium-4 with about one part in a million ending up in the form of all the other elements … These predictions have been strikingly confirmed by observations.'[61]

Such claims are misleading and go back to a paper that made this 'prediction' about twenty years after the big bang theorizing of Gamow and colleagues.[62] By 1967, theoretical H and He abundances had been refined to agree with observations. As mentioned above, this was done by adjusting the baryon-to-photon ratio, a parameter whose actual value is unknown.[43,63,64] In other words:

> 'It is commonly supposed that the so-called primordial abundances of D, ^{3}He, ^{4}He and ^{7}Li provide strong evidence for Big Bang cosmology. However, a particular value for the baryon-to-photon ratio needs to be assumed *ad hoc* to obtain the required abundances.'[65]

A significant consequence of sizing the baryon-to-photon ratio by recourse to big bang theory is that the density of the universe works out to be about two orders of magnitude less than that required for closure, i.e. long-term 'stability'. This putative density deficiency has led to the claim that dark matter must exist to provide the closure which visible matter does not.[43] Thus the belief in dark matter is at least partly due to retro-fitting big bang theory to the observed H/He cosmic abundance ratio.

Along with the faulty claim that big bang NST correctly predicted the H/He abundance ratio, theorists have focused on other alleged confirmations of big bang theory, namely (1) the temperature of the CBR, and (2) the non-isotropy of the CBR.

The big bang did not predict the temperature of the CBR

Space is filled with microwave radiation popularly believed to be a vestige of the big bang 'fireball' over 10 Ga ago. This cosmic background radiation (CBR) is thus the 'glimmer' of the big bang.[66] Indeed, big bang theory is supposed to have correctly predicted the temperature of the CBR.[67–69] This is not true. The first predictions of the theory were of the order of 10 times too high. Gamow claimed that according to big bang theory, the temperature of the CBR was as high as 50 K.[70] The theory was later modified to fit the observed CBR temperature. Big bang theory in 1948 predicted the CBR's existence, but the CBR temperature was not known then. Indeed, as will be seen below, the first inference of microwave CBR was not from big bang theory. Big bang theoretical prediction of CBR existence has been conflated with discovery of the CBR temperature:

> 'The Big Bang theory received remarkable confirmation with the discovery of the microwave background radiation in 1965 by Penzias and Wilson. It had been predicted by Alpher and Herman in 1948 that the hot fireball of the Big Bang should leave an 'echo', a glimmer of its former self, in the present-day Universe. They calculated that the adiabatic expansion of the Universe should have cooled the heat radiation from the hot initial state down to a level ~ 5 K or thereabouts by the present … .'[71]

Following up on earlier calculations of Gamow,[66,72] Alpher and Herman had predicted a CBR temperature of 5 K,[73] but this was revised to 50 K before the discovery of Penzias and Wilson that the CBR temperature was about 3 K.[74] Indeed, published alongside the paper announcing the 3 K CBR discovery was the last minute prediction of a 40 K CBR temperature.[75] Thus, at the time of Penzias' and Wilson's discovery, the theoretical CBR temperature was of the order of ten times too high, so it cannot be said that big bang theory made an accurate prediction. Nevertheless, Trefil claims that 'theoretical physicists' predicted 3 K for the CBR temperature in 1948.[76] In the context of 1948, Trefil should have referred only to the prediction of the CBR's existence,[77] but he also mentioned the observed CBR temperature known only since 1965, a misleading conflation.

Did Eddington correctly predict the CBR temperature without recourse to big bang theory?[78] Eddington wrote:

> 'It is quite true that far away from the sun, at an average point in our galaxy, the temperature of any solid or liquid body would fall to -270°C, or 3° above absolute zero.'[79]

Elsewhere, Eddington predicted a background radiation temperature of 3.18 K.[80] However, Eddington did not know of the microwave CBR, and the 3.18 K temperature was actually Eddington's estimate of the temperature of optical emissions.[81] In sum, neither big bang theory nor Eddington anticipated the microwave CBR temperature observed in 1965 (figure 1). However, in 1940–41, Canadian astrophysicist Andrew McKeller did in fact deduce the microwave CBR to be 2.3 K based on the behaviour of cyanide (CN) molecules in space.[82] Gamow's big bang theory was still in the future. Thus the observed CBR temperature is no confirmation of the big bang, and the CBR should not be described as the 'glimmer' of the big bang.

CBR properties do not confirm the big bang

Big bang theory originally predicted that the CBR temperature must be smooth and uniform, i.e. isotropic, and that all galaxies and all matter in the universe must be evenly distributed, i.e. homogeneous:

> '[The big bang model] gives a picture that very closely resembles the observed universe. … it assumes at the outset that the universe is spatially homogeneous. The astronomical evidence confirms that this is an extremely good approximation to reality. … The observations imply that the universe can be considered homogeneous. … Roughly speaking, the level of inhomogeneity in the observable universe is small and the matter distribution becomes increasingly homogeneous in [large] sample volumes …'[83]

This belief followed from the picture of cosmic matter and energy expanding uniformly and smoothly in the eons since the big bang. By the 1980s, however, disillusionment with this prediction was setting in because

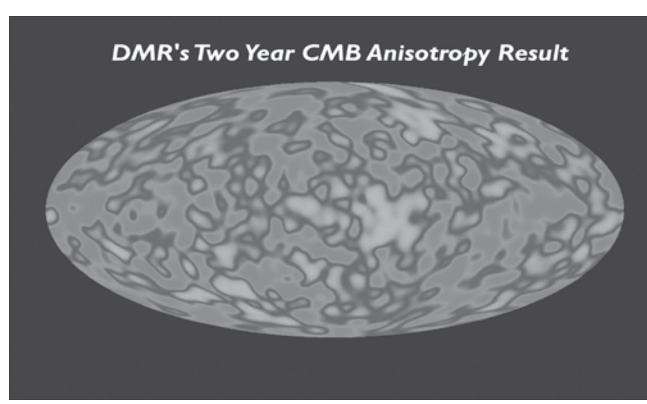

Image by NASA-GSFC

Light and dark patches representing the variation of the temperature in the microwave CBR after all foreground sources have been subtracted. The different regions represent temperature differences of the order of 0.01% above or below the average sky temperature of 2.73 K (see Hartnett[112]).

observations showed that galaxies are distributed unevenly in huge clusters. Further, theorists began to realize that the 'standard big bang' with an isotropic CBR could not explain, '... where did [cosmic] structure originate?'[84] To resolve this dilemma, the 'inflation hypothesis' was proposed:

> 'The inflationary model for the early universe proposes that … the rate of [cosmic] expansion began to increase rapidly with time. … Inflation explains the origin of the structure that later became galaxies and clusters. … Before inflation, the part of the universe that we can observe was so small that density fluctuations appeared and disappeared in a random manner that can only be described by probabilities. At the instant inflation began, the existing fluctuations were inflated to great sizes and became the fluctuations in the CBR and the seed of large-scale structure in the universe.'[85,86]

Inflation theory has two fatal flaws. The first is that the CBR has not been demonstrated to possess significant fluctuations, as we will see below, despite the insistence that such fluctuations have been detected.[87] The second is that cosmic inflation is 'untestable'.[88] After claiming that 'inflation can provide natural answers to the problems of the standard model of the Big Bang', Fix acknowledges that cosmic inflation actually has no observable cause, 'But what caused the epoch of inflation? The explanation that has the widest acceptance today depends on a *phase change* in the universe when the temperature was 10^{27} K.'[89]

Aside from the fact that the 'phase change' is only a consensus (i.e. 'the most widely accepted explanation'), this reasoning seems plausible. However, Fix confesses,

> '... this explanation for the period of inflation may sound like a fairy tale … It seems unlikely … that people will ever be able to confirm the validity of these theories by means of experiments …'[89]

In short, the inflation and phase change theories constructed to explain cosmic structure via the big bang are themselves unverifiable speculation. Indeed, inflation resulted in 'increasingly complicated' models,[90] which '[came] nowhere close to providing us with an understanding of the large-scale homogeneity of the universe'.[91]

The isotropy of the CBR eventually caused the big bang itself to be questioned. Ferris complained, 'The Big Bang theory … fails to tell us how galaxies, stars and planets formed: If the universe began as a homogeneous soup, why did it not stay so forever?'[92] Finally, there were 'widespread reports of the death of the Big Bang [but] Big Bang proponents responded with new ad hoc hypotheses' to save the theory.[93]

The 'smoothness' of the CBR was detected by monitoring CBR temperature, known since 1965 to be about 3 K. Ironically, this temperature, once seen as a confirmation of the big bang, had become a liability because its uniformity denied that 'lumpy' galaxy clusters could have evolved. Even with inflation and phase change, the isotropic 3 K background left the early universe with no heterogeneities to explain present cosmic structure. This crisis was resolved by processing CBR temperature data to extract minuscule variations:

> 'Much to the embarrassment of big bang boosters, increasingly sensitive studies of the microwave background continued to show a uniform glow of radiation. Theorists obligingly adjusted their models to accommodate ever smaller initial density fluctuations. … COBE's [Cosmic Background Explorer satellite] precision instruments seem to have come to the rescue. The detected fluctuations [are] near the limit of COBE's sensitivity.'[94]

The COBE team leader claimed that the fluctuations are 'real', but Powell noted that:

> 'In this case, "real" is a somewhat blurry term. COBE's map of the microwave sky is dominated by instrument noise; roughly two-thirds of the data … originated in COBE or in unaccounted-for nearby sources and not in the infant universe. … The reason for the ambiguity lies in the Herculean task of accounting for every source of microwave emission other than the cosmic background.'[95]

Even after this extensive data processing, the CBR fluctuations were so small as to disallow formation of galaxies in the required time:

> 'The temperature fluctuations are minuscule, only about one part in 100,000. … Such slight variations could not easily have produced dense, highly organized galaxies within a billion years or two after the big bang.'[96]

Riordan and Schramm similarly noted that:

> 'These ripples are far smaller than those necessary to trigger gravitational collapse … But the compact structures we witness in all directions tell us that such collapses occurred almost everywhere. What is wrong here?'[97]

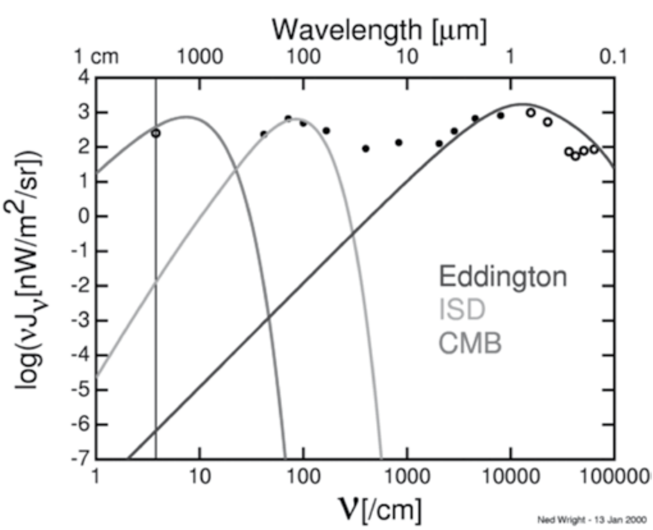

Figure 1. Eddington's estimate of the temperature of the interstellar radiation field of 3.18 K from optical emissions does not account for the data from interstellar dust (ISD) and the CBR. Therefore, Eddington did not anticipate the CBR. (After Ned Wright in Wright[81]).

Before COBE, theory had led investigators to expect a maximum non-isotropy of 1 in 10,000,[95] but 'no significant variations' were found at this level.[98] However, even if galactic structure could develop from a 1-in-10,000 non-isotropy, 'From such a smooth state, there is simply not time for gravity to have assembled the galaxies and clusters we see today.'[99] In other words, 'Gravity can't, over the age of the universe, amplify these irregularities enough to form galaxy clusters.'[100]

Theorists responded that a 1 in 10,000 non-isotropy might trigger galaxy formation if as much as 99% of the universe were 'dark matter'.[101] This dark matter is supposed to emit no light or other electromagnetic radiation, so would be invisible,[102] but this means that 'its existence must remain an article of faith for the true believer in the standard model'.[101] Even indirect evidence for the existence of dark matter has been questioned,[103] but big bang models with no dark matter have difficulties, such as the requirement of a super-heavy neutrino.[104] (Neutrinos have been thought to be virtually massless.)

The rise of the dark matter concept 'saved' the big bang despite the virtually total isotropy of the CBR. With a virtually isotropic CBR, theorists once again expect a universe that is 'quite uniform on the very largest scales, [though] it has complicated structure and is highly non-uniform on smaller scales, such as the sizes of clusters of galaxies'.[84] Yet features of size on the order of galaxy clusters are the largest observable scales in the universe: the cosmos appears incorrigibly 'lumpy'. Further, dark matter does not really explain how this 'lumpiness' developed. Models of dwarf galaxy evolution indicate that dark matter hinders development of observed galactic properties, and dwarf galaxies are supposed to be the precursors to larger galaxies.[102] On the other hand, dark matter is required to prevent the dissipation of galactic structure over the presumed age of the cosmos.[105]

In sum, to reconcile the near-isotropy of the CBR with the lumpiness of galactic structures, big bang theory has invoked (1) unobservable inflation, an unobservable phase change epoch and unobservable dark matter; and (2) unobserved uniform galactic structures. A theory that reconciles inconsistencies by multiplying unobserved and unobservable phenomena can hardly be said to have been confirmed by any one of them:

NASA/WMAP Science Team

Artist's impression of the COBE satellite.

> 'Theorists … invented the concepts of inflation and cold dark matter to augment the big bang paradigm and keep it viable, but they, too, have come into increasing conflict with observations. In the light of all these problems, it is astounding that the big bang hypothesis is the only cosmological model that physicists have taken seriously.'[106]

If the big bang did not occur, neither did nucleosynthesis in the big bang. This means that existence of the isotopes commonly credited to big bang nucleosynthesis (e.g. H, D, ^{3}He, ^{4}He and ^{7}Li) cannot be explained by the big bang.

What is the creation alternative to NST?

Without a big bang, the isotopes now postulated to have been synthesized in the big bang were not produced. On the other hand, Scripture read straightforwardly teaches that God relatively recently created a finished cosmos. It is possible to conclude that the 'finished' state of creation included to a large degree the present suite of stable isotopes, without the need for nucleosynthesis to account for them. With respect to origins, this is the creation alternative to NST.

A mistaken alternative is to assume that naturalistic processes can be reconciled with fiat creation by shortening the timescale to fit within a literal Creation Week. A naturalistic process impossible over eons is less likely over days, and to say that God accomplished the naturalistic process quickly is to verge on a kind of 'theistic naturalism'. Naturalistic origins theory, NST or otherwise, should be seen for what it is—an attempt to rob God of the glory of creating His universe by mechanisms not subject to natural law and which natural law will never explain.

Conclusion

The uniformity of atomic structure throughout the cosmos is not what naturalistic origins theory once expected. After the general acceptance of atomic theory, naturalistic NST was again surprised by the diversity of elemental abundances throughout the cosmos. Big bang 'predictions' of the cosmic H/He abundance ratio and the CBR temperature were actually retrodictions, so offer no confirmation of big bang NST. CBR isotropy, though once expected by big bang theory, is now understood to render nucleosynthesis and cosmic development impossible without invoking unobservable phenomena such as dark matter. Since the CBR has generated difficulties for big bang theory, its properties cannot be cited as confirmation of the big bang. Ross claims that the CBR 'magnificently confirms biblical cosmology' in the sense of confirming the big bang.[107] The truth is that, by exposing the big bang fallacy, the CBR affirms a non-big bang biblical cosmology.

The present paper is only an introduction to the problems of modern NST. Other long-standing difficulties are the deuterium synthesis problem,[23,108] and the overage of Population I stars.[109] Neither has stellar NST actually explained the origin of the elements. The elements in their existence and abundances continue to point to creation. Indeed, in his Nobel lecture, William Fowler acknowledged:

> 'In spite of the past and current research in experimental and theoretical nuclear astrophysics … Hoyle's grand concept of element synthesis in the stars [is not] truly established. … It is not just a matter of filling in the details. There are puzzles and problems in each part of the cycle that challenge the basic ideas underlying nucleosynthesis in stars.'[110]

The words of Seneca appended by Alexander Humboldt near the end of the astronomical section of his epochal five-volume *Cosmos* series remain applicable, 'We believe we are initiated; whereas we halt at the very threshold.'[111]

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Jonathan Henry earned his doctorate from the University of Kentucky in Chemical Engineering. He is now Chairman of the Science Division and Professor of Natural Science at Clearwater Christian College in Florida. In 1987 he began speaking and writing in defence of 'recent creation' when his teaching schedule permitted. He has authored *The Astronomy Book* published by Master Books.