SPEED OF LIGHT DECAY

Dear Editor,

I was interested to read the article by Malcolm Bowden in **CEN Tech. J.,** 12(l):48-54 about his views on the debate over the apparent decrease in the speed of light. He is concerned in his article with the question of whether the information available demonstrates clearly that the speed of light has decreased over the past 300 years or so, and he provides a summary of some of the aspects of the arguments which have taken place over this question. However, a much more important question is this:

If it can be shown that the speed of light has decreased over the past 300 years, what implications does this fact have for broader questions of science and its relationship with the Bible?

The significance of Setterfield's and Norman's work has been that they attempted to grapple with this question and to come up with an answer, realising that the fact of c-decay itself was of little importance unless one could relate it to other phenomena. Their theory was not simply that the value of the speed of light had decreased over the last 300 years (as Mr Bowden seems to imply), but that it had decayed in a certain way, that this could explain other observations, and that it had implications for our understanding of the early chapters of Genesis.

Setterfield worked hard to determine the actual mathematical relationship which described the decrease. Since there are probably a great many equations that could fit the data and allow it to be extended into the past beyond 1670, or into the future beyond the present, he was always clear that the actual form chosen must be one that made sense in the context of a broader theoretical framework. In his early work[1] the relationship he found was

$$c = c_o \operatorname{cosec}^2(kt)$$

and at the end of his publication he derived this from theoretical considerations, thus giving it greater credence.

In his later work published with Norman[2] the relationship was described as

$$c = \sqrt{\left[a + e^{kt}(b + dt)\right]}$$

and this was chosen because

> '[A] *universe under the control of A* [the cosmological constant] *essentially exhibits some form of simple harmonic motion, with A varying as the radius of the cosmos. An exponentially damped sinusoid would thus be typical A behaviour. This form is typical of the behaviour of many electrical, mechanical, and other systems. Taking the square root of this exponentially damped sinusoid equation immediately gives us the behaviour of c'.*

Thus in the theory of c-decay there are three components: the phenomenon of c-decay, the explanation of c-decay, and the implications of c-decay. The actual form of the relationship is what allows the phenomenon to be explained and enables implications about the past to be derived. It could make a difference, for example, whether the speed of light has decreased since the beginning of time or whether the present decrease is just the latest part of an oscillating change in this speed.

One of the reasons why the theory of c-decay has fallen into disfavour is probably the difficulty of obtaining agreement about whether the speed of light has actually decreased. But more importantly, another reason is the difficulty of providing an explanation for the phenomenon and correctly drawing out its implications. Norman and Setterfield altered their equation which describes the phenomenon because their explanation of the phenomenon had changed as a result of criticism. The explanation provided in their 1987 publication has also been subject to serious criticism to which, as far as I am aware, they have not responded.

Until an adequate theory which incorporates the phenomenon of c-decay is produced, the phenomenon itself (if it does indeed exist) can have little importance in wider fields of science or Biblical understanding.

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REFERENCES

1. Setterfield, B., 1983. **The Velocity of Light and the Age of the Universe,** Creation Science Association, Adelaide, p. 27.
2. Norman, T. and Setterfield, B., 1987. **The Atomic Constants, Light, and Time, SRI** International, Menlo Park, California, **p. 55.**

Dear Editor,

Malcolm Bowden has dropped a real bombshell with his review article claiming that the death of the c-decay has been greatly exaggerated. But I think he is right.

I was involved with the c-decay hypothesis in the early 1980s, on the supporting side. I was asked to do a mathematical evaluation of the work done by Barry Setterfield, before the **Technical Journal** existed. The first mistake I made (of a long list) was in failing to keep a copy of my report. Soon after that, I ceased from following the controversy because I felt it was getting to be out of my area of expertise when the questions being discussed involved the acceptability of the values for c arrived at by different methods, and esoteric statistical considerations, because I don't claim to be an expert in statistics. But Malcolm Bowden has pointed out that the statistical arguments being used recently leave much to be desired. He is right. I have had a rough look at the papers presented by Evered in **CEN Tech. J., 7(1)** and **CEN Tech. J., 9(1),** and the mathematics is indeed shoddy. I realised in 1982 that there was no point trying to fit a straight line, a polynomial or an exponential; it is obvious that the result in each case will fail to conform to the trends clearly visible before, say, 1960. One must

always fit a curve suited to the data.

To my mind, the critical issues always related to finding a curve that has real applicability to the problem, and ensuring that any hypothesised change in c was offset by coupled changes in other constants. Malcolm Bowden mentions the curve for critical damping which I hadn't seen (or at least hadn't noticed) mentioned in this respect, but it would seem to make good sense. Another possible problem could be that in Einsteinian relativity, c is the one constant, while length and time are relative. If this is true, it would be impossible (by definition) for c to change with respect to an absolute time. I investigated this problem and satisfied myself that the objection does not hold water. I offered my findings in the paper 'Einstein's contribution to relativity'.[1] However, Einsteinian relativity is entrenched in scientific orthodoxy, and I honestly wonder if this issue presents a tacit barrier to real progress in this field.

At this point, it would seem to be imperative that people have another look at c-decay in the light of Malcolm Bowden's review of the current situation. Furthermore, as **The Answers Book** is currently under revision, I think that the possibility of c-decay must remain there as a viable alternative when dealing with the distant starlight problem. There may be a temptation to replace the c-decay hypothesis with Dr Humphreys' time dilation solution, but I think **this would be a serious mistake.** Why not keep both options open? Both theories, in my opinion, have some difficulties but also show considerable promise. It is the c-decay hypothesis, however, which has observational evidence in its favour.

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REFERENCE

1. Malcolm, D., 1991. Einstein's contribution to relativity. CEN Tech. J., 5(l):58-69.

Dear Editor,

As a regular reader of the **CEN Technical Journal,** I was delighted to see Malcolm Bowden's article in the *Viewpoint* section of the CEN **Tech.** J., 12(1). Along with many other readers, I have followed with great interest anything published in the creationist literature which dealt with Barry Setterfield's contention that the speed of light has decayed since creation. Seeing the well-known graph of c against time, again, prompted me to give some thought to a possible new approach to the problem.

The new approach involves checking the accuracy of historical apparatuses against the most accurate modern methods. In a nutshell, if the historical sets of apparatus can be shown to measure c accurately today, this implies that the measurements made by these sets of apparatus were also very close to their respective historical values of c.

The c against time graph, as it appears on page 52 of the journal, can be divided into three broad areas. These might give the casual reader the following impressions:

(1) The pre-1850 time period, with values of c relatively distant from current c.
(2) The 1850-1920 time period, during which slightly more sophisticated methods were used, but the values obtained apparently still a significant way off from current c.
(3) The post-1920 time period. These values, on their own, would appear to support constant c.

Imagine that the experiments in areas (1) and (2) were repeated many times, today, using the original equipment and historical values for constants in the calculations. If the results clustered around the current value for c rather than the values obtained by the original experiments, this would surely be strong evidence in favour of c-decay. However, special care would need to be taken to maximise the validity of the results. For example, for each historical experiment, one might need:

(1) A number (say three) of separate sets of apparatus, independently developed as facsimiles of the original.
(2) A number (say three) of independent observers for each apparatus, taking separate sets of observations.
(3) Observations taken at several (say three) times of the year, by each observer, thus 27 sets of observations in all.

The above might be varied with consideration to the details of each original experiment, but the approach should be capable of demonstrating beyond reasonable doubt whether c has shifted. For example, suppose all 27 data set mean values clustered around current c, and the furthest was still closer than the historical value. You would not need to be a statistician to conclude that c has most probably shifted in the meantime. If such results, or close to it, were obtained for a number of totally different types of experiments, that fact would be most compelling in favour of c-decay.

If an experiment is proved valid by coming up with the current value of c (within associated error limits), and x years ago an almost identical experiment came up with a value for c that is statistically different, what can fully account for the difference other than a change in c itself? The methodology described above is an attempt to remove the 'fluke' factor and strengthen the evidence, if it exists.

It seems to me the most intriguing part would be the replication of the earliest experiments. Seeing a cluster of results form, far from the original observed value (in terms of the expected error), would be real food for thought.

This whole scenario would of course be a very large undertaking, involving much expense, time and dedication from the personnel involved. In practical terms, it would be difficult to convince enough people to simultaneously make such an undertaking, let along fund it. But

perhaps, if encouraging results were obtained for just one historical experiment, and shared about on the internet among the creationist scientific community, momentum would grow and other re-creations of historical experiments would commence.

A very useful body of data would then result, providing statistical ammunition for one side or the other. If c really has decayed, this fact should emerge clearly, with all the associated ramifications for cosmology, etc.

The possibility of a c-decay website springs to mind, with some interested party co-ordinating the effort as well as gathering and presenting the results. This would no doubt be a popular link destination from other creationist sites on the internet.

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QUOTABLE QUOTE:
The Effect of Naturalistic Thinking on Christians

'The greater problem is that modernist science protects its grand-theory of evolution by starting with the basic assumption that God is out of the picture and by sticking to that assumption through every discouragement. When people are taught for years on end that good thinking is naturalistic thinking, and that bringing God into the picture only leads to confusion and error, they have to be pretty dense not to get the point that God must be an illusion. This doesn't necessarily mean that they become atheists, but they are likely to think about God in a naturalistic way, as an idea in the human mind rather than as reality that nobody can afford to ignore.'

Johnson, Phillip E., 1997. **Defeating Darwinism by Opening Minds,** InterVarsity Press, Downers Grove, Illinois, pp. 88-89.

QUOTABLE QUOTE:
Fossils and Evolution

'. . . it is evident that there is a manifest progress in the succession of beings on the surface of the earth. This progress consists in an increasing similarity to the living fauna, and among the vertebrates, especially, in their increasing resemblance to man.

But this connection is not the consequence of a direct lineage between the faunas of different ages. There is nothing like parental descent connecting them. The fishes of the Paleozoic Age are in no respect the ancestors of the Reptiles of the Secondary Age, nor does Man descend from the mammals which preceded him in the Tertiary Age. The link by which they are connected is of a higher and immaterial nature; and their connection is to be sought in the view of the Creator himself whose aim . . . was to introduce Man upon the surface of our globe.'

Written about Darwin's theory of evolution in the early 1860s by Louis Agassiz (1807-1873), Swiss-born American geologist and professor of geology and zoology at Harvard University, Cambridge, Massachusetts.
Cited by: Johnson, Phillip E., 1993. **Darwin on Trial,** Regnery Gateway, Washington, D.C., p. 71.