energy if it had already been in prior eternal existence. It would not have been in the assumed original state of the primeval atom.

It is interesting to note what A. C. B. Lovell has to say about the dilemma associated with the primaeval atom theory of the origin of the universe:

> It would, of course, be wrong of me to suggest that this view of the origin of the universe demands necessarily the possibility of creation of matter by a divine act. On the contrary, those who reject God adopt a strictly materialistic attitude to the problem of the creation of the primeval atom. They would argue that the creation of the primeval material had no explanation within the framework of contemporary scientific knowledge, but would escape from the dilemma by reserving the possibility that science would, if given the opportunity of studying these initial conditions, find a satisfactory solution. Or they would evade the problem of a beginning altogether by following a further line of thought due to Gamow, that the primeval atom was not the beginning but merely a state of maximum contraction of a universe which had previously existed for an eternity of time.[5]

One cannot help but note that there is more rhetoric than true scientific thought in this attempt to escape the dilemma thrust upon anyone who attempts to use the laws of science to explain the origin of the universe.

Some have attempted to evade the constraints imposed by the first and second laws of thermodynamics by assuming that the universe is an open system. The essence of that argument is that energy may be supplied to our universe from some outside source. The questions remain as to how that "extra-universal" source could have originated, or why it has not run down if it had been in existence forever. Thus the logic leads back to the same basic interminancy.

Hence the solution to the origin of the universe is clearly beyond the scope of science. However, if one accepts the creation point of view, the problem of origin and development (or degeneration) of the universe to its present state is not paradoxical.

According to the creation point of view, the universe began by divine act as a fully wound up system, and the time of creation is not so remote but that the present state of the universe still has great potential.

References

[1]Lindsay, Robert Bruce. 1968. The nature of physics. Brown University Press, Providence, R.I., p. 34.

[2]*Ibid.,* pp. 33 and 34.

[3]Encyclopaedia Britannica. 1947. Vol. 8, p. 439.

[4]Gamow, George. 1963. The private life of the stars (in) Exploring the universe. McGraw-Hill Book Co., New York, p. 317.

[5]Lovell, A. B. C. 1963. Two theories of the origin of the universe (in) Exploring the universe. McGraw-Hill Book Co., New York, p. 281.

CARBON-14 AND THE "AGE" OF THE ATMOSPHERE

MELVIN A. COOK*

Formation of Carbon-14 (C^{14}) in the earth's atmosphere exceeds the known rate of decay for C^{14} by a significant amount. The author of the radiocarbon method, Dr. Willard Libby, has attempted to explain this discrepancy by assuming that some of the C^{14} is continually and irretrievably deposited in sediments.

The present paper shows that Libby's explanation leads to preposterous conclusions and is no "explanation" at all. The discrepancy continues to exist, it is real, and it is evidence that may be used to defend the Biblical, not the geologic time scale.

Comments on Creation

The popular position of some scientists on the origin of the earth places its beginning about 4.5 billion years ago. But *historically* Adam and Eve left the Garden of Eden, as the first of mortality—man or beast—only about six thousand years ago. "Earth," i.e., the dry land which the Lord called "earth," appeared at the beginning of the third *day* of creation.

Though most geologists generally assume a rigidly authoritative stance concerning the antiquity of the earth, as a matter of fact, no sound scientific evidence exists to support a 4.5 billion year old earth. Instead, the best evidence still supports an age only about a millionth as great, an age that is in accord with Bible history. After extensive studies of the available information on this matter, it is my opinion that *actually nothing* exists in the way of sound scientific evidence even to permit scientists to go back in history

*Melvin A. Cook, Ph.D., is President of IRECO Chemicals and Professor of Metallurgy, University of Utah, Salt Lake City, Utah. He was the 1968 E. V. Murphee Award Winner of the American Chemical Society and the 1968 Nitro-Nobel Gold Medal Winner, Nobel foundation, Stockholm.

from the Noachian Flood, a real and tremendous catastrophe which effectively erased all earlier prehistory. The only history available for the antediluvian period is that found in the Bible itself, and this history denies uniformitarian geologic prehistory!

In reaching this conclusion, due account has been taken of the various radioactive dating methods.[1] Only the radiocarbon method appears to have real and sound usefulness in geologic dating and then only if due regard is taken of the *nonequilibrium* of Carbon-14 (C^{14}) in the earth as a whole. The evidence of nonequilibrium of radiocarbon in the carbon cycle leads to a radiocarbon age of less than 10^4 years (10,000 years) for the atmosphere itself! In fact, the "beginning" of radiocarbon in the atmosphere seems not to be the beginning of the earth, but rather in the flood, perhaps only about 4,500 years ago.

The whole atmosphere seems to have been fluxed such as to be cleansed of radiocarbon during the flood. Most of the carbon in the antediluvian carbon cycle (hydrosphere, atmosphere, lithosphere, and biosphere) was apparently *Locked out* of the cycle by sudden deposition along with all but the representatives of the species taken into the Ark as needed to regenerate the biosphere.

Attention to Recent Proposals

By way of a brief updating of my criticism of the *equilibrium model* of radiocarbon,[2] let us consider a statement by Dr. Willard Libby given in the *Sixth International Conference of Radiocarbon Dating.* (CONF 650652, "Proceedings of the Sixth International Conference on Radiocarbon and Tritium Dating," Washington State University, page 750, June 7-11, 1965. Atomic Energy Commission, Clearing House for Scientific Information, National Bureau of Standards, U.S. Dept. of Commerce, Springfield, Va. 22151.) Libby there reiterated the value of 2.5 C^{14} atoms per square centimeter, per second*, for the rate of formation of C^{14} in the atmosphere, as compared with the value 1.9 for the rate of decay of radiocarbon. Included in his comments was the following interesting new attempt to answer my nonequilibrium challenge:

> (The difference between 2.5 and 1.9 C^{14} atoms/cm^2sec) appears to be nicely explained by radiocarbon taken down irreplaceably and irretrievably by deposition of calcium carbonate in the sediments. From a sedimentation rate of 2.5 cm per millennium with a calcium carbonate content of 35 percent and assuming shells to have the C-14 composition of living matter, about 0.5 [why not 0.6?] radiocarbon atoms appear to be removed each second/cm^2 on the average. Thus we seem to have a state of equilibrium at the present time . . .

Such tugging and pulling on observed data is bound to get one into serious trouble at some time or other; Libby seems here to have trapped himself by his new explanation of the apparent radiocarbon unbalance.

The total carbon of the biosphere-atmosphere-hydrosphere is given by Libby as 8.3 grams/cm^2, but he regards this as an apparent value only, as far as the radiocarbon reservoir is concerned.[3] This is because he has assumed that radiocarbon is in equilibrium. Now one actually observes 13.56 counts of radiocarbon decay each minute for each gram of ordinary carbon of the biosphere. From this value and the value 8.3 grams carbon/cm^2 one obtains 1.9 C^{14} atoms/cm^2/sec. (Note: 13.56 counts per minute is 0.236 counts per second and 0.236 x 8.3 = 1.9 C^{14} atoms/cm^2/sec.) In order to identify an equilibrium, Libby must account for 2.5 C^{14} atoms/cm^2/sec as the rate of decay because this is the rate of formation. In other words, in equilibrium the rate of decay must equal the rate of formation. But in order for this to be so, the total effective carbon in the atmosphere-hydrosphere-biosphere cycle would have to be 8.3 X 2.5/1.9 or 11 g/cm^2. Thus, Libby must account for 2.7 g/cm^2 more total carbon in the biosphere-hydrosphere-atmosphere cycle than was originally estimated by him (i.e. 8.3 grams/cm^2).

Calculation Difficulties Itemized

But even this figure of 8.3 grams/cm^2 is too high by the amount effectively locked out of this inventory by ocean circulation lag, namely, about 0.6 grams/cm^2 based on Libby's estimated 1000 year circulation lag. Therefore, Libby's new explanation for the discrepancy requires a loss by *irreversible and irretrievable* deposition of $CaCO_3$ of 3.4 grams/cm^2 every 8300 years (the mean life of C^{14}).

The value 3.4 grams/cm^2 is the part of the total carbon that must be lost by sedimentation every 8300 years in order to make the decay rate equal the formation rate (the requirement for equilibrium) in Libby's new explanation for the discrepancy between the observed rate of formation and the observed count of radiocarbon in biospheric carbon samples. This is simply 11-x = 3.4 where x is the effective total carbon/cm^2 in the biosphere-atmosphere-hydrosphere cycle. That is, Libby's new model of sedimentation of carbonates to remove the excess radiocarbon requires 3.4 grams/cm^2 of total carbon to be removed every average life of radiocarbon,

*The abbreviation atoms/cm^2/sec will be used hereafter.

namely, 8300 years. This value of 3.4 is arrived at as follows:

(a) Of the 8.3 grams/cm^2 in the total hydrosphere, biosphere and atmosphere one must discount part of it by the fact that part of the hydrospheric carbon is effectively locked out of the cycle by an ocean circulation lag. (The average turnover time of the oceans is about 1000 years.)

(b) After taking the ocean circulation lag into account, we find that the effective total carbon in the biosphere-hydrosphere-atmosphere cycle is only about 7.6 grams/cm^2 instead of 8.3 grams/cm^2.

(c) Therefore, in order that the total *effective carbon* in the actual postulated whole cycle (which includes some carbon in the lithosphere as well, namely, that lost by sedimentation of carbonates) will amount to 11 grams/cm^2, one must assume that an effective 3.4 grams/cm^2 of the carbon in the sediments is actually involved in the radiocarbon cycle.

(d) To involve it, Libby is simply assuming that this amount of carbon is being lost by sedimentation at the rate needed to account for the difference 2.5 - 1.9 = 0.6 C^{14} atoms/sec., namely, 3.4 g/cm^2 every average life (8300 years) of radiocarbon.

The actual loss requirement is probably nearer 5.0 g/cm^2 every 8300 years considering the fact that considerable *tugging and pulling* has been practiced already in arriving at the value 2.5 C^{14} atoms/cm^2sec, the value 2.9 C^{14} atoms/cm^2/sec being the one found in Lingenfelter's original work on this matter.[4] Now to be strictly "*irreplaceably and irretrievably" lost* could mean that the 3.4 (to 5.0 or more) grams/cm^2 of the total carbon (carrying its required C^{14} contingent) is not replaced in the (atmosphere-hydrosphere-biosphere) carbon cycle by radiocarbon-free carbon. This implication is drastic to uniformitarians, but so also is any conceivable alternate interpretation of Libby's glib statement.

At the minimum required loss rate of 3.4 (to 5.0) grams/cm^2 every 8300 years, the present total inventory of 8.3 grams/cm^2 would be depleted in only 18 (to 14) thousand years, and the estimated 1800 grams of carbon/cm^2 now in the entire sedimentary column would have accumulated in only 530 (to 360) mean life periods of C^{14}, i.e., 4.4 (to 3.0) million years. (Note: The value 1800 grams of carbon per square centimeter comes from G. P. Kuiper. 1954. *The Atmosphere of the Earth and the Planets.* University of Chicago Press, Chicago, Ill. See Chapter 6 by Mason.) What does this do to prehistory which requires that the sediments since the Precambrian have accumulated in about 600 million years? Libby's rate of accumulation is 135 to 200 times greater than a uniformitarian view of the sediments would allow!

An Alternative Interpretation

A generous alternate interpretation of Libby's "explanation" is that even the *locked out* carbon in the sediments *is not actually locked out*, but rather re-circulating (slowly) in an atmosphere-hydrosphere-biosphere-lithosphere distribution cycle with the lithosphere part of it, like the hydrosphere component, involving a "circulation lag": the former distribution cycle an approximately 4.4 million year lag, and the latter "circulation lag" about a thousand year lag.

Even this alternative interpretation of Libby's "irreplaceably and irretrievably" lost C^{14} carries serious implications for historical geology and uniformitarianism:

1. According to accepted estimates there are about 2.5 x 10^5 grams of sediments/cm^2 of the entire earths surface. Assuming with Libby that they contain an average of 35% carbonates (or 4% C) there would be 10,000 grams carbon/cm^2, not the estimated 1,800.* Hence Libby apparently over-estimated the carbon content of sediments more than five-fold.

2. According to conventional prehistory, the 2.5 x 10^5 grams/cm^2 of sediments were supposed to have been deposited in about 600 million years at a (uniform) rate of deposition of 2.5 x $10^5/6 \times 10^8 = 4 \times 10^{-4}$ grams/year of sediments,** and the carbon deposition component should thus amount to $1800/6 \times 10^8 = 3 \times 10^{-6}$ grams/year. Libby's "explanation" would require more than $3.4/8300 = 4.1 \times 10^{-4}$ grams/year, which, as already noted, is a deposition rate more than 130 times greater than that allowed by historical geologists. (Thus, both alternate interpretations of Libby's "explanation" over-estimate the deposition rate if conventional historical geology is considered valid. I, of course, do not consider that rate valid.)

3. The average *contamination* of all samples by radiocarbon-free carbon would, in this second alternative interpretation of Libby's explanation, currently amount to (3.4 x 100/8.3) = 40%! Thus, retrievable carbon (containing no C^{14}) in this proportion to the total carbon inventory would make all specimens appear older than they really are even in the steady state model. There may be something to this as a *living* mollusk is sometimes found deficient in C^{14} to such an extent *as to appear* to have been dead as long as 3000 years!

---

*Note: 2.5 x 10^5 = 250,000 grams of sediments per square centimeter. 4% of 250,000 = 10,000 grams of carbon per square centimeter.

**Note: $2.5 \times 10^5/6.0 \times 10^8$ = 250,000 ÷ 600,000,000 = 0.0004 (or 4 x 10^{-4}) grams of sediment per year.

Conclusion

There is thus no solution at present in the uniformitarian viewpoint to the discrepancy between the rate of C^{14} formation (2.5 atoms/cm^2/sec.) and the rate of its decay (1.9 atoms/cm^2/sec.). This discrepancy vanishes if one assumes (as the Bible indicates) that the earth and its atmosphere have both been created quite recently.

According to a recent creation view, one would expect formation of C^{14} to exceed its decay, as the earth's atmosphere would as yet be in the "build-up" phase for C^{14}. Further details regarding C^{14} and recent creation are given in my book, *Prehistory and Earth Models* (Max Parrish and Co., Ltd., 1966).

References

[1]Cook, M. A. 1966. Prehistory and earth models. Max Parrish & Co., Ltd., London.

[2]Cook, M. A. 1968. *Creation Research Society Quarterly,* 5:69-77.

[3]Karlan, J., I. U. Olssen, P. Kalberg, and S. Kilicci. 1964. *Arkiv Geophysik,* 4:465. (This is the reference quoted by Libby in the latest edition of his book, *Radiocarbon Dating.)*

[4]Lingenfelter, R. E. 1963. *Rev. Geophysics,* 1:35.

TIME, LIFE AND HISTORY IN THE LIGHT OF 15,000 RADIOCARBON DATES

ROBERT L. WHITELAW*

In the twenty years since introduction of radiocarbon dating by Libby, some 91 universities and laboratories in 25 different countries have dated over 15,000 independent specimens of once-living matter. Almost every imaginable form of life both recent and ancient is represented, gathered from every corner of the globe, including "prehistoric" man, a wide range of fossil flora and fauna, and even coal, petroleum and natural gas. All such matter is found datable within 50,000 years as published.

When the published dates are corrected for a basic scientific error in the method, they not only point to a recent creation, but they show an unmistakable world-wide disappearance of man and animals for a long period about 5,000 years ago. On the hypothesis that this drop-off corresponds to the Genesis Flood, it is then possible to derive a Carbon-14 production rate variation with time, which in turn leads to a better correction from published to true dates.

When the true dates of 9,671 independent specimens of animals, trees and human culture are then separated into three categories, and their distribution studied from creation to present in 500-year intervals, a most remarkable confirmation of the details of Biblical Creation and Noachian Flood can be seen on fourteen separate counts. This is shown graphically in Figure 3.

The hypothesis employed is thus confirmed! The evolutionary concept of time, life and history stands thoroughly discredited, and the Biblical record of creation and flood just as thoroughly vindicated.

Introduction

A hundred years after Darwin, the theory of total evolution appears to have swept the field of all challengers. The idea that multiform life, order and complexity all arrived on the scene by mere chance from lifeless, lawless chaos is now accepted almost without question. Such an idea pervades the public press; it colors the teaching of history, philosophy and science; and in the life and earth sciences it is the general premise upon which new evidence is analyzed and new research performed.

Without adducing a shred of supporting evidence, a leading scientist[1] can boldly state: "There is no need of explaining the origin of life in terms of the miraculous or the supernatural. Life occurs whenever the conditions are right. It will not only emerge but persist and evolve." Such statements are generally hailed as twentieth century wisdom, while the Biblical record is relegated to folklore.

Perhaps the best expression of the modern rationale for *total* evolution comes from the pen of George Wald:

> The important point is that since the origin of life belongs in the category of at-least-once phenomena, time is on its side. However improbable we regard this event, . . . given enough time it will almost certainly happen at least once . . . Time is in fact the hero of the plot. The time with which we have to deal is of the order of two billion years. What we regard as impossible on the basis of human experience is meaningless here. Given so much time, the "impossible" becomes possible, the

*Robert L. Whitelaw is Professor of Nuclear and Mechanical Engineering, Virginia Polytechnic Institute, Blacksburg, Virginia 24060.