

Radiocarbon Dates for Dinosaur Bones?¹

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Prophesy upon these bones, and say unto them, O ye dry bones, hear the word of the Lord.

—Ezekiel

We have knocked 100 million years off the age of the dinosaurs.

—Hugh Miller

The Creation Research, Science Education Foundation (CRSEF) of Columbus, Ohio announced recently that several radiocarbon dates had been obtained on dinosaur bones which proved that “dinosaurs lived with man ... as recently as 10,000 years ago” ([Lafferty 1991:2A](#)). The claim that dinosaurs co-existed with humans is a popular creationist notion supported by alleged human footprints found in rocks alongside fossilized dinosaur footprints (see [Cole and Godfrey 1985](#) and [Kuban 1989a](#) and [1989b](#) for an extensive discussion of this topic), prehistoric petroglyphs which creationists interpret as depictions of dinosaurs ([Dahmer et al. 1990:372](#); [Fields et al. 1990](#)), and a few surprisingly recent radiocarbon dates obtained for apparent charcoal or carbonized wood supposedly associated with dinosaur bones ([Bierle and Fields 1979](#); [Morris 1984](#)).

The special significance of the new dates reported by CRSEF, and presumably the justification for an article in the *Columbus Dispatch*, is that the objects which were dated are actual dinosaur fossils including specimens Obtained from the paleontological collections of the Carnegie Museum of Natural History. Moreover, a “laser mass spectromitrist” [sic] from Russia’s Moscow State University reportedly confirmed the relatively recent age of the specimens ([Dahmer et al. 1990:372](#)). These factors would appear to provide strong scientific support for creationist claims: authentic dinosaur fossils provided by a credible, even prestigious, institution are subjected to independent scientific tests which indicate an age 150 million years out of step with the accepted dinosaur chronology. This paper examines the evidence to see if the creationists’ extraordinary claims are warranted.

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CRSEF Dinosaur Research

The Creation Research, Science Education Foundation (CRSEF) is a non-profit, tax exempt corporation founded in Millersburg, Ohio in 1972 “to advance knowledge of the scientific evidences against evolution in schools and among the general public” (CRSEF n.d.). In addition to their search for traces of people and dinosaurs in the Cretaceous limestone of the Paluxy River area of Texas CRSEF researchers also are looking for Noah’s Ark on Mt. Ararat in Turkey (CRSEF n.d.).

CRSEF obtained several fragments of fossilized dinosaur bone from the paleontological collections of the Carnegie Museum of Natural History “by disguising the nature of the creationist science group” (Lafferty 1991:2B) and by misrepresenting the nature of their proposed research. James King, Director of the Carnegie Museum, says Hugh Miller and his party identified themselves as chemists who wanted to do some analyses of the chemical composition of the fossils. King says that small “bits and pieces” which had spalled off the surfaces of various specimens were offered to Miller with the explicit warning that the fossil bones had been “covered heavily in shellac” and other “unknown preservatives.” Miller accepted the fragments and indicated that the coatings posed no problems for the analyses they were considering. Subsequently, several of the bone fragments were submitted to the University of Arizona’s Laboratory of Isotope Geochemistry for radiocarbon dating. CRSEF “also arranged the Arizona testing by not revealing its origins” (Lafferty 1991:2B). Austin Long, professor of geochemistry at the University of Arizona, informed Miller that there was no collagen (a protein which is the source of most of the carbon in bones) in the samples and that large amounts of shellac and other contaminants were present. Miller indicated that he wanted the samples dated regardless.

CRSEF’s misrepresentation of their intentions, although ethically questionable, may have been necessary in order for them to obtain the specimens they required. No responsible curator would have approved of sacrificing valuable dinosaur fossils for unsuitable tests. Radiocarbon dating techniques cannot date samples which are older than about 50,000 years. There simply is not enough carbon 14 remaining in the sample to measure reliably. It is a firmly established geological fact that dinosaurs lived between 248 and 65 million years ago. Indeed, the age of the rock layers which contained the fossil specimens CRSEF obtained from the Carnegie Museum has been established by numerous independent dating methods. These age determinations range from 130 to 150 million years before the present (Kowallis et al. 1991). Therefore, these fossils are outside the range of radiocarbon dating methods.

Creationists dispute the great age attributed to dinosaurs and, if they are correct, it might be possible to radiocarbon date dinosaur bones. But for the results to be credible the samples would have to be well-preserved organic matter from the dinosaur and free of any recent contamination:

At a horizon of 40,000 years the amount of carbon 14 in a bone or a piece of charcoal can be truly minute: such a specimen may contain only a few thousand ¹⁴C atoms.

Consequently equally small quantities of modern carbon can severely skew the measurements. Contamination of this kind amounting to 1 percent of the carbon in a sample 25,000 years old would make it appear to be about 1,500 years younger than its actual age. Such contamination would, however, reduce the apparent age of a 60,000-year-old object by almost 50 percent. Clearly proper sample-decontamination procedures are of particular importance in the dating of very old artifacts ([Hedges and Gowlett 1986:107](#)).

It is clear that the samples obtained from the Carnegie Museum were not free from recent contamination and this fact alone should have precluded their use for dating purposes. But even if contamination wasn't a problem, is there well-preserved dinosaur organic matter in the fossils?

Dahmer and the other authors of the principal CRSEF research report claim that an "Analysis of the bones for 30 elements revealed no differences from modern bones with the exception of uranium and fluoride ..." ([1990:371-372](#)). In other words, they claim that the bones are not permineralized and are in nearly pristine condition. It is not clear from the text exactly what dinosaur bones are being referred to here, but they cannot be the fossils obtained from the Carnegie Museum. At another point in the article Dahmer et al. ([1990:371](#)) state that "surface scrapings" from the fossils studied by CRSEF "contained from 1.9% to 7.4% carbon" ([1990:371](#)). Since bones generally contain about 12% carbon it is quite evident that these fossils are rather different from modern bones.

Dahmer and his co-authors do not present the results of their analyses in their article. However, Hugh Miller generously provided me with a copy of the elemental analysis of one of their dinosaur fossils. Daniel Fisher of the University of Michigan's Museum of Paleontology examined these results and concludes that there is nothing whatsoever extraordinary about them. The predominant suite of elements present and their relative percentages (including the 3.4% carbon!) are about what one would expect to find in hydroxyapatite and calcite, two of the commonest minerals present in ordinary dinosaur fossils. There is absolutely nothing unusual about these fossils and no reason to think the carbon contained in them is organic carbon derived from the original dinosaur bone.

Robert Kalin senior research specialist at the University of Arizona's radiocarbon dating laboratory, performed a standard independent analysis of the specimens submitted by Hugh Miller and concluded that the samples identified as "bones" did not contain any collagen. They were, in fact, not bone.

Kahn's results and the results obtained (but not reported) by CRSEF's own researchers confirm a simple paleontological fact: fossil dinosaur bones preserve the form but not the substance of dinosaur bone. The organic parts of the bone have been broken down and leached away by ground water percolating through the rock for thousands of millennia. At the same time, minerals from the water gradually replaced the organic molecules until all that remained was a casting of

the original bone. So even if radiocarbon dating could be applied to the fossils and even if the specimens were not contaminated the resulting date would not tell you when the dinosaur died. It might tell you when the bone became fossilized, but since the process of fossilization involves the almost total replacement of organic matter by inorganic minerals the carbon-14 dating technique would be totally inappropriate.

But if fossil dinosaur bones can't be radiocarbon dated, how could reputable radiocarbon laboratories produce the dates listed in Table 1? First, it must be emphasized that the numbers which come out of the radiocarbon dating machine are no better than the samples which go in. Computer programmers have a delightfully simple phrase which captures the essence of this point: garbage in, garbage out. For the purposes of radiocarbon dating CRSEF submitted garbage to the University of Arizona. The scientists from the Carnegie Museum who provided the samples and the scientists from the University of Arizona who analyzed and dated the specimens all now agree that the radiocarbon dates on the Carnegie's dinosaur fossils are garbage. The so-called "dates" are meaningless numbers which give the age of a mixture of organic detritus and preservatives which contaminated the fossils. They have nothing whatsoever to do with the age of any dinosaurs.

Blackened Bones

Many of the fossil dinosaur bones considered in the CRSEF research reports are described as having blackened surfaces. Black coatings on fossils are not rare and usually are deposits of manganese dioxide or iron minerals. Indeed, the amounts of manganese and iron documented in CRSEF's unpublished elemental analysis are more than enough to account for the black coloration. However, this most likely interpretation is not even mentioned by the CRSEF researchers. Instead, Dahmer and his co-authors speculate that the "blackened dinosaur bones may be the result of absorption by the bones of decaying flesh of the dinosaur itself" (1990:371). Fields et al. (1990:166) more confidently assert that "the staining of the bones ... was due to the decomposition of dinosaur flesh."

Carbonization of ancient organisms is a rare but well-documented form of fossilization. Nevertheless, it is difficult to imagine how the carbonized soft tissues of dinosaurs could be preserved while the underlying bone became mineralized.

Actually, with regard to the specimens obtained from the Carnegie Museum, there is no need to speculate about the nature of the blackened surfaces of the fossils. Leonard Krishtalka, a Curator in Vertebrate Paleontology and Assistant Director of the Carnegie Museum, states that the museum archives include a 1922 film of curators applying a black resinous preservative to the dinosaur fossils excavated from Dinosaur National Monument. No one today knows exactly what this black resin consists of, but it is completely impervious to the solvents used by modern curators who have tried to remove it.

Dahmer et al. (1990:371) noted that “surface cracks and pores of the bone fragments contained dark material which could have contributed to the carbon already in the bone,” but they appear never to have considered the possibility that this material represented recent contamination. In spite of the fact that surface scrapings from the fossils, which must have included a relatively high percentage of this “dark material,” yielded a date which was nearly 2,000 years younger than the “crushed bone” sample (see [Table 1](#)), it apparently never occurred to Dahmer and his colleagues to question their interpretation of the dark material as carbonized dinosaur tissue. Instead, they attribute the discrepancy between the two dates to contamination of the “bones” by “older carbon” ([Dahmer et al. 1990:372](#)). But this explanation is implausible. Younger carbon would be present in ground water percolating downward through the rock strata and it naturally might tend to concentrate on the surface of the fossils: what could be the source of the older carbon and how could it contaminate the mineralized interior of the fossil without also contaminating the exterior surface? Dahmer et al. (1990) do not provide answers to these important questions.

Laser Mass Spectrometry Dating

CRSEF makes a big deal of a “rough estimate” for the age of the bones provided by laser mass spectrometry which they claim independently corroborates the radiocarbon age determinations ([Dahmer et al. 1990:312](#); [Lafferty 1991](#)). They estimate the age as “between 30,000 and 100,000 years” before the present ([Dahmer et al. 1990:372](#)).

Laser mass spectrometry dating is a very new and experimental technique. Its methods, assumptions, and limitations are not well understood. In fact several geochemists I consulted had never even heard of laser mass spectrometry being used as a dating technique. One of the Russian researchers involved in the work is quoted in the Columbus Dispatch as admitting “This method is far from ideal. We’re not sure of the absolute age.” Dahmer et al. (1990) do not make this clear. Instead, they claim the laser mass spectrometry dates provide important verification of the radiocarbon dates:

In any science, when a team of scientists is able to confirm one set of data by an entirely different technique, the chance of being correct is better ([Dahmer et al. 1990:372](#)).

Until it is demonstrated to be a reliable and accurate dating technique laser mass spectrometry dating is of little value as a corroboration of the controversial ¹⁴C dates. It is far more significant that the dubious laser mass spectrometry dates and the problematic radiocarbon dates are wildly inconsistent with the latest Rb-Sr, K-Ar, ⁴⁰Ar/³⁹Ar and fission track dates for the strata which contain these dinosaurs ([Kowallis et al. 1991](#)).

Table 1: Radiocarbon Dates Attributed to Dinosaur Fossils and Associated Materials³

Date	Lab #	Specimen	Source
12,800	?	charcoal or tree limb	Bierle & Fields 1979 Fields et al. 1990
37,400 +2950/-2140	?	carbonized wood	Fields et al. 1990
38,000	?	carbonized wood	Morris 1984
39,000	?	carbonized wood	Morris 1984
39,500	?	dinosaur coprolite	Fields et al. 1990
45,920 +5550/- 3250	?	“coalified wood”	Fields et al. 1990
23,760 ± 270	AA-5786	<i>Acrocanthosaurus</i> bone scrapings	Dahmer et al. 1990:373
25,750 ± 250	?	<i>Acrocanthosaurus</i> crushed bone	Dahmer et al. 1990:373
32,400 +	?	<i>Acrocanthosaurus</i> bone fragments	Fields et al 1990
9,890 ± 60	A-5809	unidentified	Fields et al. 1990
16,120 ± 220	A-5810	<i>Allosaurus</i>	Fields et al.1990
36,500+	?	dinosaur bone	Fields et al. 1990

³ Table compiled from Dahmer et al. (1990) and Fields et al. (1990). It is revealing that a complete list of all the radiocarbon dates does not occur in either source. The likely reason for this is that the three dates listed for the single *Acrocanthosaurus* specimen are not terribly close. The two closest are reported together in Dahmer et al (1990), but even these dates are more than two standard deviations apart. The other strikingly divergent date is reported in Fields et al. (1990) without mentioning the other two dates.

A noteworthy omission in both papers is the laboratory reference number which should be associated with each radiocarbon date. Laboratory numbers traditionally are considered standard information to be included with any publication of the relevant date. Neither Dahmer et al. (1990) nor Fields et al. (1990) indicate the laboratory numbers of any of their dates. Dahmer et. al. (1990:373) suggest that this information was withheld in order to protect their sources, but representatives of several prominent radiocarbon laboratories (including the University of Arizona who provided two of the laboratory numbers listed above) considered such protection unnecessary under any imaginable circumstances and universally decried the practice of publishing radiocarbon dates without their associated laboratory numbers. The laboratory number for the first *Acrocanthosaurus* specimen listed in Table 1 was provided by Hugh Miller. Miller claims that the identity of the other radiocarbon laboratory (or laboratories) is being kept secret because it is feared the lab will not continue to date additional samples if they find out the material is dinosaur fossils

Conclusions

In the past creationists have attempted to discredit dating techniques based on radioactive decay, especially radiocarbon dating (e.g., [Morris 1974:161-167](#)). For an extensive review of creationist attacks on carbon-14 dating and answers to their arguments, see Weber ([1982](#)) as well as Strahler ([1987:155-158](#)). Although creationists generally have been willing to accept the validity of radiocarbon dates which do not exceed 3,000 years before the present, it is quite extraordinary for them to accept dates as early as those reported by CRSEF (see [Table 1](#)). Are some creationists now willing to concede that the earth may be as much as 46,000 years old? Referring to another dinosaur-associated sequence, one of the CRSEF research reports hints at an answer to this question:

... because radiocarbon dating is more difficult to interpret beyond 5,000 years, we truly cannot say exactly when the Glen Rose strata was [*sic*] deposited ([Fields et al 1990:166](#)).

In other words, they don't really believe dinosaurs could have lived as long ago as their dates indicate, but the dates are so much more recent than what evolutionists have chimed they should be they can be used to discredit the evolutionary position.

The papers by Dahmer et al. ([1990](#)) and Fields et al. ([1990](#)) work very hard at mimicking scientific reports, but they are pseudoscientific misapplications of technical expertise and equipment. The radiocarbon dates which they report are meaningless. The dinosaur fossils which CRSEF obtained (under false pretenses) are not bone and, even if they were, the specimens were thoroughly contaminated by chemical preservatives. CRSEF researchers were informed of this fact by Carnegie Museum curators. The extensive contamination was independently confirmed by University of Arizona geochemists. CRSEF had the samples dated anyway.

Such deliberate disregard of the warnings from both the Carnegie and Arizona suggests not mere ignorance of the limitations of radiocarbon dating nor even simple incompetence, but a premeditated intent to deceive. CRSEF researchers must have known the radiocarbon dates on the Carnegie specimens would be hopelessly compromised by contaminants. They knew the "dates" would be meaningless, but they also knew they would appear recent. And an apparently recent radiocarbon age for a dinosaur fossil could be used to support the creationist myth that "dinosaurs lived with man."

In addition to the specimens obtained from the Carnegie Museum, CRSEF also collected their own specimens and acquired others from different sources ([Dahmer et al. 1990:373](#)). Hastings ([1985:13](#)) reports that small "blackened fossilized bone fragments" were collected by Carl Baugh and that "No treatment of the fossil bones was made before removal" ([1985:13](#)). Therefore, some of the dated fossils may be free of contamination from chemical preservatives. This does not mean that these specimens are uncontaminated by recent carbon or that they might be suitable for radiocarbon dating. They might be more interesting

objects of study, but the manner in which CRSEF handled the Carnegie Museum fossils casts a dark shadow of doubt across all of their research.

Acknowledgments

I thank Hugh Miller and his associates for sharing their unpublished data. James King and Leonard Krishtalka of the Carnegie Museum of Natural History and Austin Long and Robert Kalin of the University of Arizona patiently answered all of my inquiries regarding this material. Daniel Fisher of the University of Michigan spent several hours helping me sort out the elemental analysis of CRESF's dinosaur fossil. Leonard Krishtalka provided many helpful suggestions on an early draft of this paper. Jeff Gill, Karen Lepper, and Joyce Meredith also read the manuscript and did what they could to tone down the histrionics.

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