of the excess ^{176}Hf found in the entire universe would have been generated within that short period of time.

The rapidly-accumulated products of the accelerated radioactive decay subsequently became part of every object in the created universe, albeit at differing concentrations. During the remainder of the Creation Week, as God cooled and organized the plasma into solid celestial objects, such as planets, the excess radiogenic isotopes became partitioned into the relevant mineral phases, perhaps according to accelerated geochemical processes. The modern uniformitarian geologist misreads this deployment of the radiogenic isotopes as isochrons indicative of up to billions of years to time. This span of time never happened.

This exciting demonstration that isotopic 'clocks' can be accelerated at least a billion-fold is good news to creationist scholars. It raises fundamental questions about the temporal stability of isotopic 'clocks'. What *else* have we failed to consider in terms of the physics of radioactive decay? The myth of the virtual invincibility of radioactive decay to external forces has been decisively shattered, and the door to further research has now swung wide open.

References

1. Chaffin, E.F., Theoretical mechanism of accelerated radioactive decay; in: Vardiman *et al.*, *Radioisotopes and the Age of the Earth*, Institute for Creation Research, El Cajon, California and Creation Research Society, Missouri, 305–331, 2000.
2. Alpha (α) decay has also been likened to particles bouncing around inside a well (a potential energy well created by a combination of the nucleus's positive charge and the 'strong' nuclear force) until some of them acquire sufficient kinetic energy to jump through one of its walls: Humphreys, D.R., Accelerated nuclear decay: a viable hypothesis? in: Vardiman *et al*., Ref. 1, pp. 333–379. This is the standard Gamow theory, and is often referred to as *quantum mechanical tunneling*. In α-decay, the electrons are largely irrelevant. Humphreys suggests, based on an application of the standard theory, that a small diminishing of the nuclear potential, however, has allowed α-decay to be accelerated a billion-fold or more.
3. Takahashi, K. *et al.,* Bound-state beta decay of highly ionized atoms, *Physical Review* **C36**(4):1522–1527, 1987.
4. Jung, M. *et al.,* First observation of bound-state β^- decay, *Physical Review Letters* **69**(15):2164–2167, 1992.
5. Woodmorappe, J., *The Mythology of Modern Dating Methods*, Institute for Creation Research, El Cajon, California, 1999. See pages 25, 49, 67–68 for the many fallacies of the Re-Os dating method.
6. Bosch, F. *et al.*, Observation of bound-state β^- decay of fully ionized ^{187}Re, *Physical Review Letters* **77**(26):5190–5193, 1996. For further discussion of this experiment, see: Kienle, P., Beta-decay experiments and astrophysical implications; in: Prantzos, N. and Harissopulus, S., *Proceedings, Nuclei in the Cosmos*, pp. 181–186, 1999.
7. Note that bound-state β_b decay accelerates the Re-Os 'clock' by 9 orders of magnitude. However, in order to compress 4.5 Ga worth of 'normal' radioactive decay into the several hours of the First Day of Creation Week, the Re-Os 'clock' would need to be accelerated by another 5 orders of magnitude.
   There has been some concern expressed that radioactive decay would be inconsistent with God creating the universe 'very good'. There is always the danger of reading too much into the 'very good' statement, and the context indicates that 'very good' refers to the absence of suffering and death for man and other sentient creatures prior to the Fall. Radioactive decay does not, of course, have anything in common with the death and decay of sentient beings. Moreover, radioactive decay involves the transformation of one nuclide into another, and does not have any connotation of imperfection in the Creation.
8. Humphreys, Ref. 2, p. 362.
9. For a discussion of some of the flaws already evident in the new Lu-Hf dating method, see Woodmorappe, Ref. 5, p. 68.
10. Kappeler, F., Beer, H. and Wisshak, K., S-process nucleosynthesis—nuclear physics and the classical model, *Reports on Progress in Physics* **52**:1006–1008, 1989.
11. Klay, N., *et al.*, Nuclear structure of ^{176}Lu and its astrophysical consequences, *Physical Review* **C44**(6):2847–2848, 1991.

End-Mesozoic extinction of dinosaurs partly based on circular reasoning

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Creationists are well aware that rocks are often dated by the fossils they contain. The evolutionists also tell us it is a hard 'fact' that dinosaurs became extinct at the end of the Mesozoic. This has given vent to many dinosaur extinction hypotheses, including catastrophic events such as the popular meteorite extinction hypothesis.[1] After the dinosaurs disappeared from the scene with a blast, the large mammals took advantage and evolved into the unoccupied niche. So goes the story.

A recent article reveals how evolutionists arrive at their nice clean scenario using circular reasoning.[2] In China and Peru, tracks were found that were assumed to be made by dinosaurs. The date assigned to the strata was, of course, Mesozoic, namely Cretaceous. The tracks in Peru looked like they belonged to tiny hadrosaurs. However, a reanalysis of the tracks has strongly suggested that the tracks were made by mammals, but not the tiny mammals assumed to have lived in the Cretaceous. This was based on comparing similar mammal tracks from the United States and Europe that are 'well dated' as early Tertiary, namely Eocene. Guess the new age assigned to the Chinese and Peruvian track strata? It is *early Tertiary*, since the tracks are considered the most reliable age indicator in the strata. Of course, we now are told that the previous age assignments were poorly constrained.

The use of tracks to correlate strata across the world is not foolproof. The article claims that some mammal tracks, some dinosaur tracks, and certain bird tracks are similar, which is due to the obscure mechanism of *convergence*, whereby similar environments produce similar biological structures. Convergence or parallel evolution has never made any sense

Many mainstream geologists use tracks as a way to correlate strata across the world. In most cases, if the tracks are reinterpreted differently, so is the 'age' of the strata.

to me. It seems impossible that all the multitudinous variables that make up any one environment could be repeated elsewhere over millions of years. The authors of the article do state that the Chinese and Peruvian tracks are not identical to those in the USA and Europe—the morphology is similar but the track maker different. If this is the case, one wonders why dinosaurs could not have made the tracks in Peru and China, similar to mammal tracks? Furthermore, if the Chinese and Peruvian tracks were really made by mammals, why couldn't the mammals have lived in the Cretaceous in China and Peru, and in the Eocene in far away USA and Europe? In other words, why couldn't the 'mammal tracks' be diachronous, a common excuse given for a particular strata that could be given two different dates (probably because of different index fossils)? It is clear that the track dating in China and Peru is an example of circular reasoning.

This is not an isolated example in regard to dinosaurs, mammals and the K/T boundary. Dinosaur eggs were discovered in an Eocene formation in France, which led to a 'reassessment' of the stratigraphy. The eggs, of course, ended up as a continental deposit of Upper Cretaceous age![3] Dinosaur egg shells and other remains were discovered within interbeds of the Deccan flood basalts. These interbeds had been previously fossil dated as early Tertiary, but they are now believed to be End Cretaceous.[4] Keith Rigby and colleagues strenuously claim that they have found Early Tertiary dinosaur fossils in eastern Montana.[5,6] Most paleontologists vehemently oppose this claim of Paleocene dinosaurs, suggesting instead reworking from the Cretacous into the Paleocene.[7] During this controversy, it was revealed that there are quite a number of other areas where dinosaurs are said to have survived into the early Tertiary.[6]

How extensive is such circular reasoning elsewhere in the uniformitarian geological column? I commonly run into such examples, which makes me sceptical of the geological column as a compressed chronological sequence for the Flood. Observing the rocks in my part of the world, I find examples that would line up with part or even most of the geological column, but other examples that are out of order. These out-of-order areas are usually attributed to overthrusting, of which there is rarely evidence for much movement while abundant evidence for rock shearing is seen on other types of faults. (I recognize that overthrusts are likely real in other parts of the world where the evidence for rock sliding over rock is abundant.) Other creationists seem to simply accept the geological column as *the Flood sequence of events*, or even for post-Flood chronology. Within the creationist paradigm, I believe such acceptance requires justification, very little of which has been published in creationist journals and books.

I see four problems with uncritically accepting the geological column within Flood geology. First, there is the philosophical problem of simply incorporating a principle that is mainly based on uniformitarianism and evolution.[8,9] (I am aware that the pioneers of the geological column were often professing Christians and that evolution was not in vogue. However, the ruling paradigm of the day, *fossil succession and multiple catastrophes* of which the Genesis Flood was the last, was clearly contrary to the Bible.) Secondly, it needs to be shown that the local geological column is a real vertical sequence. Third, many local columns need to be correlated, and not just by fossils. Fourth, it needs to be demonstrated that the geological column is a *worldwide* sequence. It is the third and fourth aspects where I see serious problems in simply incorporating the geological column into our Flood models.

References

1. Oard, M.J., The extinction of the dinosaurs, *CEN Tech. J.* **11**(2):137–154, 1997.
2. Lockley, M.G., Ritts, B.D. and Leonardi, G., Mammal track assemblages from the Early Tertiary of China, Peru, Europe and North America, *Palaios* **14**:398–404, 1999.
3. Cousin, R., Breton, G., Fournier, R. and Watté, J.-P., Dinosaur egglaying and nesting in France; in: Carpenter, K., Hirsch, K.F. and Horner, J.P. (Eds), *Dinosaur Eggs and Babies,* Cambridge University Press, London, p. 57, 1994.
4. Sahni, A., Tandon, S.K., Jolly, A., Bajpai, S., Sood, A. and Srinivasan, S., Upper Cretaceous dinosaur eggs and nesting sites from the Deccan volcano-sedimentary province of peninsular India; in: Carpenter, K., Hirsch, K.F. and Horner, J.P. (Eds), *Dinosaur Eggs and Babies,* Cambridge University Press, London, p. 208, 1994.
5. Rigby Jr, J.K., Newman, K.R., Smit, J., Van Der Kaars, S., Sloan, R.E. and Rigby, J.K., Dinosaurs from the Paleocene part of the Hell Creek Formation, McCone County, Montana, *Palaios* **2**:296–302, 1987.
6. Oard, Ref. 1, p. 148.
7. Fastovsky, D.E. and Dott Jr, R.H., Sedimentology, stratigraphy, and extinctions during the Cretaceous-Paleogene transition at Bug Creek, Montana, *Geology* **14**:279–282, 1986.
8. Reed, J.K., A Biblical Christian framework for earth history research: Part I—Critique of the naturalist-uniformitarian system, *Creation Research Society Quarterly* **33**:6–12, 1996.
9. Reed, J.K., *Plain Talk about Genesis—A Fresh Look at the PCA Earth History Debate,* Word Ministries and Deo Volente Publishing, Sardinia, South Carolina and Los Alamos, New Mexico, 2000.