

'Unfossilized' Alaskan dinosaur bones?

Recently, I have been barraged with a number of inquiries about the dinosaur bones I collected from the North Slope of Alaska in 1994.¹ The literature reported that the preservation of the bones was 'remarkable'.^{2,3} This led many, including myself, to believe that the bones were 'unfossilized'. Many (but not all) of the bones we collected were very lightweight, which seemed to confirm this hypothesis. It was our hope, because of the 'remarkable' preservation, that these bones might contain some ancient organic molecules. To date, our tests have not been able to confirm the 'unfossilized' hypothesis. Twenty of the bone samples were analyzed in Russia for collagen. Only four showed positive results. We became suspicious of these results when we were not able to confirm them with tests made by other labs. One report from a reputable laboratory in the United States told us the samples they tested were 'extremely degraded'. Some of the bones have also been tested for DNA. The results were inconclusive. From our results thus far, the bones should *not* be referred to as 'unfossilized'.

The Bureau of Land Management reports⁴ that the Alaskan bones are fossilized, but all of their pore spaces have not been filled in with rock, making many of them lightweight. They also report that no DNA had been discovered in the bones, but because of their condition, they might be good candidates for it. Until further testing can prove otherwise, the Alaskan dinosaur bones should be referred to as 'fossilized'.

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Dinosaur eggs and the post-Flood boundary

Andrew Sibley has suggested the possibility that pregnant female dinosaurs could have postponed laying their eggs until days/weeks into the Genesis Flood, by which time the embryos would have been well-developed.¹ He cites the Komodo monitor as an example of a reptile that can breed during the heat of the summer, but can withhold laying its eggs until cooler months, such as September. He also points out that if eggs are withheld for too long they develop a second shell, suffocating the embryo. This may serve as a parallel to dinosaurs, whose eggs on rare occasions have been found with double shells. According to Sibley, dinosaurs would have withheld their eggs until suitable times during the Flood when they could walk out on freshly exposed land and lay their eggs—eggs that would be close to maturity. This they could do repeatedly, accounting for eggs at different stratigraphic levels. More recently, Walter R. Barnhart has likewise hypothesized that 'embryo development may have been already well underway when some dinosaur eggs were deposited'.²

One of the first creationists to suggest that dinosaur eggs may have reached near maturity within the uteruses of females is Leonard Brand, who wrote:

'One hypothesis for interpreting

these [dinosaur nests and eggs, some of which contain embryos] in a catastrophic framework suggests that perhaps female dinosaurs retained their eggs within their bodies until the eggs were almost ready to hatch, as some modern reptiles do (Goin *et al.* 1978). When the season for egg-laying arrived, they would search for a place to build a nest. The land surface during the flood was not all underwater all the time (as evidenced by the numerous animal tracks on mudflat environments), so the dinosaurs built nests on an exposed surface and laid their eggs. The next inflow of sediments catastrophically buried the nests (nests of eggs would be well-preserved only by rapid burial). ... This could happen repeatedly, resulting in several levels of nests in the same geographic area. This story certainly should not be taken as a final answer, but it is a hypothesis to be tested.'³

We have ample means for 'testing' the hypothesis that female dinosaurs may have held their eggs almost to maturity before depositing them on newly-exposed Flood sediments, even though the testing cannot be accomplished with live dinosaurs naturally. The reference to Goin *et al.* in Brand's quotation above is probably to either or both of the following two passages:

'Usually the young of amphibians hatch after the eggs have been laid and the animals are said to be oviparous. Rarely, however, the eggs are retained in the body of the female while they pass through their embryonic development and the young are "born alive." If the developing embryo in the mother's body is nourished entirely by food stored in the yolk of the egg, the animal is ovoviparous.'⁴

'Most reptiles are oviparous. Some lizards and snakes are ovoviparous, with the eggs hatching either in the oviduct or just after they are laid. ... Eggs of some colubrid snakes, examined at



Photo by Sasan <www.sxc.hu>

Most reptiles are oviparous, with their young hatching outside their body after the eggs have been laid.

the time of deposition, contained embryos ranging from 15 to 55 mm in length. Such eggs may not hatch for two or three months. Alligator eggs also seem to go through some development in the oviduct before deposition. This is also true for some of the spiny lizards (*Sceloporus*).⁵

Do the above examples provide modern analogs for the extinct dinosaurs and their reproductive behaviour? The answer is found when one considers the relationship between egg-shell thickness and the degree of development that takes place in the egg prior to egg laying, or oviposition, as illustrated in the following quote:

'The extent of gas exchange may explain the amount of development that occurs prior to oviposition in reptilian eggs (Andrews 2000). Turtles and crocodilians have thick eggshells and oviposit at the gastrula and neurula stages, respectively. On the other hand, most squamates have relatively thin eggshells and oviposit when 25 to 40 percent of development has been completed (Shine 1983a, DeMarco 1993). While shell structure is associated with the amount of development at oviposition, the extent of vascularization of fetal and maternal tissues may also be contributing factors.'⁶

Dinosaur eggs are all thick shelled; hence one would expect that

such as amphibians, turtles, snakes, and lizards. Dinosaurs most likely were *not* ectotherms, and some have suggested they were endotherms, or warm-blooded creatures.⁷ Possibly, though, they were at an intermediate state between ectothermy and endothermy.

Recent evidence from growth lines in tyrannosaur bones offers confirmation that dinosaur metabolism was midway between that of modern birds and reptiles.⁸ This has important implications on whether dinosaur eggs were retained for very long within the living females. The great number of dinosaur tracks and the length of trackways indicate that a large amount of metabolic heat would have been generated within the bodies of these large creatures, which would be detrimental to any embryos within eggs. Jerry Bergman has recently highlighted findings showing that birds could not retain their eggs for a long duration in their bodies because the warmth of the exercising mother would have led either to death or to deformation in the young.⁹ The body temperature of birds ranges between 40° C and 41° C in most cases. In one experiment, if bird eggs were kept at a temperature of 40.5° C. for an extended period of time, then 84% of the young died. Bergman concludes:

'If the embryos were in the mother bird's body for a longer period of time, their survival rate would be drastically lower.'¹⁰

oviposition would take place very early in embryonic development at the latest. One should also keep in mind that all modern analogs cited in creationist literature (Sibley and Brand, for example) refer to ectotherms, or cold-blooded vertebrates,

The warmth of the dinosaur mother's body from heat generated by extensive swimming or track-making during the Flood likewise could mean that their eggs would not have been held for very long in the mother's body. Additionally, as Sibley points out, if eggs are held for very long in a mother Komodo's body, then a second layer is deposited on the eggshell. The extreme rarity of second layers on dinosaur eggs proves that most dinosaur eggs were deposited in a fairly short period after their formation in the female's body.

Moreover, the extreme rarity of dinosaur eggs discovered within fossilized dinosaur skeletons argues against the idea that gravid female dinosaurs were carrying their eggs for weeks or even months during the Flood, otherwise one should find eggs within, or near to, articulated dinosaur skeletons buried suddenly in a watery catastrophe.¹¹ Eggs would have no time to be ejected! The first conclusive discovery of dinosaur eggs within a dinosaur skeleton has now been reported in 2005.¹²

Significantly, only two eggs were found in the cloacal area of an oviraptosaurian dinosaur, suggesting that dinosaurs had two oviducts as in modern crocodiles, but did not retain a whole clutch of eggs in their uterus prior to laying, as do modern reptiles and amphibians. Elsewhere, two clutches of oviraptosaurian dinosaurs have been discovered with an adult atop the clutches, each clutch having at least fifteen eggs. If eggs were laid only two at a time, which is more like all modern birds that lay just one egg until another is produced, then the egg-laying process happened over a period of a few days and not all at once. This would be comparable to ostriches that lay one egg every two days until the proper clutch size is reached.¹³

If these parallels with modern bird egg-laying hold up, then the incubation of dinosaur eggs would be *ex vitro*, not *in vitro*.¹⁴ This holds important implications for Flood geology. Regardless of whether we can piece together the exact details of the dinosaur egg-laying process, we can



The great number of tracks and the length of dinosaur trackways influence our understanding of the Flood/post-Flood boundary.

safely deduce from the latest discovery that female dinosaurs did not retain a whole clutch eggs to near maturity within their bodies because only two eggs were produced at a time.¹⁵

All of this discussion on dinosaur nest-making and egg-laying is healthy in that it has important implications regarding the duration of the ‘Inundatory’ stage of the Flood, whether it lasted 40 days or 150 days, and regarding the question of dinosaurs being post-Flood.¹⁶

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- Paleontologists studying the nests of the theropod dinosaur *Troodon* from the Upper Cretaceous of the US and Canada concluded that eggs were laid in pairs and that no more than two eggs were laid per day. All embryos within a single nest at site MOR 246 show the same amount of bone development, indicating that incubation did not begin until all the eggs were laid. ‘The clutches are oval and contain up to 24 eggs. … Iterative egg-laying at daily or greater intervals produced pairs of eggs within clutches.’ Varrichio, D.J. and Jackson, F.D., Two eggs sunny-side up: reproductive physiology in the dinosaur *Troodonformosus*; in: Currie *et al.*, ref. 11, pp. 219–221.
- Any creatures that are active and agile and that have hard-shelled eggs, such as birds, would not be able to retain a full clutch of eggs in their uterus because of the obvious reason that quick movements would result in jostling and eventual cracking of eggs. That’s one reason why birds lay their eggs very soon after shell formation is completed. Dinosaur eggs, being generally larger than most birds’ eggs, would not be able to have a full clutch retained in their uterus for the same reason, and that is to prevent cracking. Two eggs retained in the two sides of the uterus, as in this latest oviraptosaurian discovery, would thus avoid the problem of cracking.
- Johns, W.H., Did dinosaurs lay eggs and hatch young during the Flood? *TJ* **11**(3):318–323, 1997. This was written in response to Michael Oard’s proposal that all egg-laying and nest-building activities of dinosaurs took place during the ‘Inundatory stage’ of the Flood, that is, while the waters were rising on the earth, some time before the end of the first 150 days. See Oard, M., Polar dinosaurs and the Genesis Flood, *CRSQ* **32**(1):47–56, 1995. My 1997 letter was also written in support of the point made by Paul Garner that the natural reading of Gen 7:17–23 is that all terrestrial creatures died within the first 40 days of the Flood. See Garner, P., Where is the Flood/post-Flood boundary? Implications of dinosaur nests in the Mesozoic, *TJ* **10**(1):104–105, 1996. Let’s suppose that Oard and others are correct in stating that the Inundatory stage of the Flood lasted a full 150 days. Here is how Flood chronology would have to be calculated, based upon the new evidence of dinosaur egg-laying habits:

 - Days 1–40 Forty days of rain—geological deposits of 3,000–12,000 metres in thickness laid.
 - Days 41–50 Ten days for drying of exposed sediments to enable dinosaurs to walk on them.
 - Days 51–57 Seven days for laying of oviraptosaurian eggs, two eggs per day with 15 per clutch.
 - Days 58–107 Fifty days for average incubation time for dinosaur eggs *ex vitro*.
 - Days 108–137 Thirty days for growth of young dinosaurs, according to M. Oard, ref. 16, p. 53–54.
 - Days 138–150 Thirteen days for a second catastrophe to kill off the dinosaurs—stony bolide or an icy comet (resulting perhaps in an ice age, as proposed by some creationists).

The average incubation time of 50 days for dinosaurs is admittedly hypothetical, but nevertheless reasonable based upon analogs with modern birds and reptiles. The larger the

egg, the longer the incubation time, is the rule. See Carpenter, ref. 13, pp. 199–202. Varicchio and Jackson have concluded that the time for egg-laying plus incubation in the dinosaur *Troodon* occupied about 60 days (ref. 14, p. 220).

Below dinosaur egg-laying nesting sites in western North America lie a minimum of 3,000 metres of fossil-bearing sediment, according to Oard (ref. 16), but in the Junggar Basin of China with several locales with dinosaur nests in Cretaceous deposits lie approximately 12,000 metres of pre-Cretaceous fossil-bearing sediment, according to McKnight, C.L., Graham, S.A., Carroll, A.R., Gan, Q., Dilcher, D.L., Zhao, M. and Liang, Y.H., Fluvial sedimentology of an Upper Jurassic petrified forest assemblage, Shishu Formation, Junggar Basin, Xinjiang, China, *Palaeogeography, Palaeoclimatology, Palaeoecology*, 79:4, 1990. The deposition of 12,000 metres of sediment within 40 days calculates to 300 m/day, or 12.5 m/hour, or 0.2 m/minute. It would be highly unlikely for the many Chinese dinosaurs to survive a sedimentation rate of up to 12.5 m/hour for a period of 40 days or more, after which time they laid eggs and in a few cases saw their young hatched, only to be destroyed by another catastrophe!

Michael Oard responds:

I agree with Warren Johns that the discussion of dinosaur eggs and possible analogs is healthy, and that it has important implications for the Flood. Johns raises a number of good points that advance the discussion of whether dinosaur remains, eggs, and tracks are Flood or post-Flood, as well as the duration of the Inundatory Stage (40 versus 150 days). It is well known that Johns believes that the Inundatory Stage was 40 days and that dinosaurs could not have made tracks and laid eggs early in the Flood, so they must be post-Flood.¹

Biological arguments

Johns believes we can test whether dinosaurs held onto their eggs until close to embryo maturity by examining the shell thickness. The thicker the shell the more immature the embryo, and since dinosaur shells are thick, the embryo must have been immature after egg laying. This observation is likely

due to the embryo taking calcium out of the shell as the embryo grows. It is difficult to know the exact meaning of such relatively thick dinosaur eggshells, since dinosaurs are unlike any animal alive today and very few eggs contain embryos.² Apparently, there are more dinosaur eggs that have thick shells because of a pathological second layer, as revealed by scanning electron micrographs, than previously thought.²

Those who suggest the possibility of embryo development within the dinosaur have used modern analogs also, although Johns points out that these analogs are only for modern cold-blooded creatures. It seems that modern amphibians and reptiles possess a variety of habits when it comes to egg laying and incubation. Since dinosaurs may have had intermediate metabolism between warm- and cold-blooded does not in itself negate the views of Brand and Sibley.

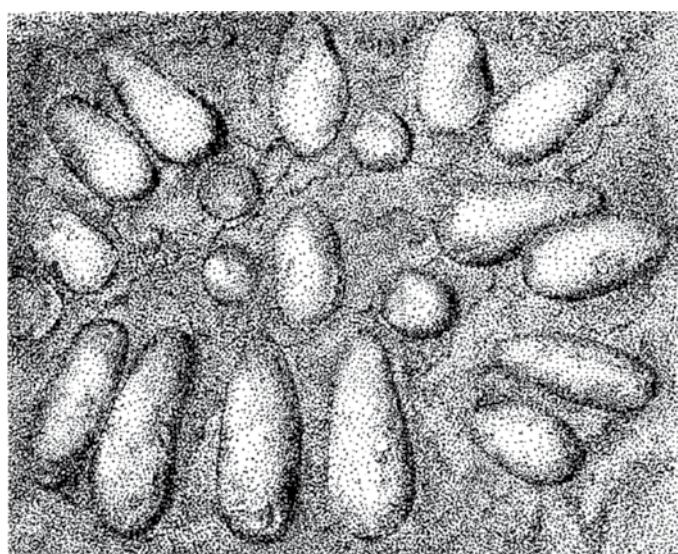
Johns also assumes that eggs had to be held within the dinosaur from before the Flood. This is possible based on imperfect modern analogs. It is certainly possible that some dinosaurs mated during the Flood, especially since the Flood was not a gigantic catastrophe everywhere on the earth for the first 150 days—a simplistic concept.³ Dinosaur mating could have occurred

on emergent Flood sediments or land not yet inundated by the Flood that continued in this condition for many days.⁴ Freshly laid Flood sediments could remain exposed for many weeks based on the dynamics of strong Flood currents on ‘shallowly submerged continents.’⁵

Johns points

out that there is now one case of eggs associated with a dinosaur skeleton. However, this observation is also a problem for the uniformitarian and post-Flood models. In the post-Flood scenario, all these dinosaurs would have had to die in local and/or regional catastrophes. Then why weren’t the eggs preserved? The lack of preservation of eggs could be due to unique factors in the Flood. Some possibilities are a lack of preservation, the expulsion of eggs while the dinosaurs floated, or that the female dinosaurs had already laid their eggs.

The new discovery of two eggs within a dinosaur skeleton is quite informative and suggests that dinosaurs held only two eggs at time. Based on modern analogs, Johns suggests the dinosaurs generally laid two eggs each day. So it could take a dinosaur up to 10 days to lay a clutch of eggs. This is one possibility. However, the second possibility of near continuous egg laying is still a viable option,⁶ since some clutches come in nice geometrical shapes, such as spirals, two parallel rows, circles and arcs.⁷ If a dinosaur laid two eggs a day, how could a dumb animal lay such nice geometrical shapes over a period of a week? Another argument for this second option is that if a mother dinosaur laid only two



After drawing by W. Barnhart, CRSQ 41:91, 2004

Some clutches of dinosaur eggs have nice geometrical shapes, such as spirals, parallel rows, circles and arcs. This clutch of protoceratopsid eggs was found in Mongolia.

eggs a day, the embryos would have different development, if the ambient temperatures were cool and she did not wait to incubate the eggs until all were laid. Apparently, one dinosaur clutch, MOR 246, contains multiple embryos of the same development. In a Flood model, I would expect fairly warm atmospheric temperatures, so that the development of the embryos would be different if laid two a day. Whether the dinosaur mothers laid two eggs a day or all at once may or may not be a problem for a Flood model, because very early Flood sediments may become exposed above sea level for weeks.

One question in all this, assumed by both uniformitarians and post-Flood advocates, is: ‘Did dinosaur eggs hatch and were babies reared by the mothers for awhile?’ Uniformitarian scientists simply believe that if the top of an egg is broken off, the baby hatched. However, there are several other explanations for explaining the rather rare ‘hatching window’, such as scavengers, erosion of the tops since the bottoms were commonly laid half-down in soft sediments, and sediment crushing.^{8,9} Furthermore, shell fragments with the concave surface upward are often found at the bottom of these broken eggs.¹⁰ If an embryo hatched, the shell should be outside the egg.

Apparently, there are only *one or two* claims of babies hatching and being reared in the nest by ‘good mothering lizards’.¹¹ One of these is near ‘Egg Mountain’, northwest of Great Falls, Montana. One ‘nest’ with babies 45 cm long was later attributed to embryos. A second ‘nest’ that contained babies 90 cm long is considered to have been reared by their *Maiasaur* mothers. However, there are a number of questions related to this observation. First, some researchers question whether the dinosaur remains are in a nest, since true nests are actually very rare.¹² Second, some believe that the dinosaur remains could be precocial, that is independent after hatching and did not need a ‘good mothering lizard’.¹³ Horner now concedes that these dinosaur remains



Shell fragments, with their concave surface upward, are often found at the bottom of broken dinosaur eggs.

were ‘semi-altricial’,¹¹ or helpless at birth. This could mean that the very small dinosaurs could also be embryos, which a few researchers believe.¹⁴ Third, embryos of some hadrosaurs can be as long as one metre, such as the lambeosaurine hadrosaur *Hypacrosaurus stebingeri*.¹⁵ When one considers that it is difficult to identify the type of dinosaur from embryos or babies,¹⁶ and that there are no adult dinosaur remains associated with the group of babies, then it is possible that the remains are embryos. Regardless, if the remains do represent actual hatched babies, these dinosaurs grow very fast and would represent a time of only one to two months.¹⁷ This could happen early in the Flood, considering that this situation is apparently unique over the earth, and that relatively low sea levels can be maintained by the dynamics of Flood currents for a month or more.¹⁸ Clearly, more research is required.

I also think that the heat problem based on tracks and possible swimming in floodwaters is not that clear cut. We don’t know whether they are the same dinosaurs that made tracks and then laid eggs. The tracks could easily have been made by slow-walking dinosaurs that would generate less heat.

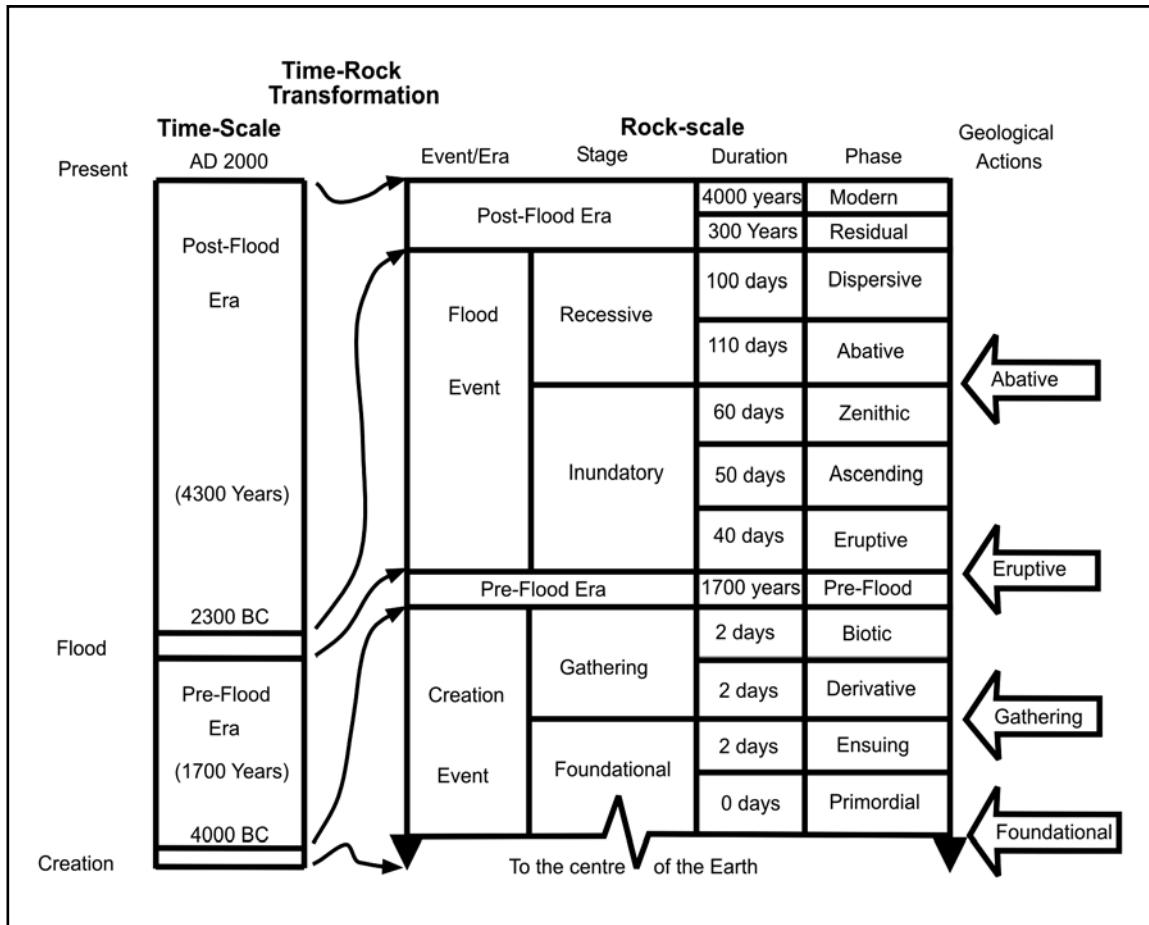
Dinosaurs could simply have floated in the floodwaters and also not generate that much heat. Furthermore, are birds a good analog for a possible dinosaur heat problem?

Evidence of unusual egg-laying activity

As evidence for an early-Flood explanation for dinosaur eggs, as well as tracks and bonebeds, there are many indications of unusual activity that one would not expect in the uniformitarian or post-Flood catastrophe models.¹⁹ Some of these indications are:

1. the rarity of embryos in the eggs,¹⁶
2. the complete absence of any indication of vegetation with the nests,²⁰
3. the rarity of true nest structures,¹²
4. the lack of association between adult to late juvenile skeletons with younger dinosaurs,
5. most asymmetrical eggs have the pointed end down and buried half way in soft sediment,²¹ and
6. evidence that sedimentation was occurring while eggs were being laid.¹⁰

The fifth indication is a problem because the pointed end down



The first part of the Flood year, when the floodwaters were rising on the earth, has been called the Inundatory Stage.

is an unstable orientation and the egg should have been knocked over by the embryo or the mother.

Duration of the Inundatory Stage

In his note 16, Johns alludes to his hypothesis that the writer of Genesis 6–9 employed a literary device of reverse-order parallelism for the early Flood and the late Flood, so that the Inundatory Stage could not have lasted 150 days.¹ Furthermore, he states that a natural reading of Genesis 7:17–23 is that all terrestrial creatures died by Day 40. I have addressed these issues elsewhere.^{22,23} The reverse-order parallelism, a chiastic structure, is seen a little differently by various authors.^{1,24} This literary device seems to be general, and Johns leaves out specific events. Besides there is a reverse-order parallelism in that the floodwaters

rose and then they retreated with the common use of the sacred numbers 40 and 7. Shea admits that his chiastic structure could be only approximately correct.²⁵ Besides, it is difficult for me to believe that a possible literary structure forces the Inundatory Stage to be 40 days.

As far as the order of Genesis 7, it is a general chronological sequence and sometimes jumps back in time. It does not specifically state that all air-breathing animals expired by Day 40. I have maintained that Day 150 is a maximum time and that a case can be made for the Inundatory Stage being 40 or 150 days. It is also possible that the floodwaters peaked before Day 150 and were falling when the Ark grounded on the Mountains of Ararat. I don't believe Johns and others can be so dogmatic. In fact, a good case can be made that the Ark did not start floating

until Day 40,²⁶ as I have suggested as a possibility: 'Furthermore, verse 17 could mean that the Flood came upon the earth for 40 days before the Ark floated'.²⁷

The bottom of note 16 provides what Johns believes is a logical deduction of my position. This sequence is a straw man and presumes a lot. Since, there is about 1.6 km average depth of sedimentary rocks on the continents, thick sedimentary rocks would have mainly filled in local or regional basins early in the Flood,²⁸ such as the Junggar 'Basin' in China. As these basins fill up, the top of the sediments is raised toward sea level, making the area vulnerable to a local drop in sea level that can be caused by at least four mechanisms. In note 16, Johns presumes that dinosaurs were incubated and hatched over a few months, but I think these assumptions need research.²⁹

Further problems for post-Flood dinosaurs

Except for those limited number of dinosaurs that left the Ark and lived for awhile after the Flood, John Woodmorappe and I have published many geological and paleontological reasons why the vast majority of dinosaurs were buried in the Flood.^{30–32} We also have provided logical reasons why dinosaur eggs and tracks were made early in the Flood, the Inundatory Stage. Except for minor quibbling, I have not seen a refutation of these ideas.

I live among these dinosaur features. The strata that contain dinosaur fossils, tracks, eggs, etc. has been deposited in an area about 5,000 km long from northern Canada to the New Mexico/Texas area. It is around 1,500 km east-west with thicknesses exceeding 1,000 m. Furthermore, based on igneous and sedimentary remnants, hundreds of metres of sedimentary rocks have been eroded from the area, down to the level where we observe dinosaur remains.³³

Just think of what this means for those who believe these dinosaurs are post-Flood.²² The dinosaurs must propagate rapidly from two of each kind (probably around 50 kinds) leaving the Ark after the Flood. They must spread all over the earth and multiply to many millions during the Ice Age.^{34,35} How long will it take for millions of dinosaurs to spread into North America? Let us say it is on the order of 200 years. Then all these ‘Mesozoic’ dinosaurs must be killed in post-Flood catastrophes, all the time carefully avoiding being entombed with large ‘Cenozoic’ mammals. An enormous amount of sediment was deposited on the high plains and Rocky Mountain region during these catastrophes, as indicated above. Hundreds of metres more strata were deposited on top and then somehow eroded down to the present level—all in the post-Flood period! This is not to mention all the tectonics over the world and that practically all mountains have risen in the late ‘Cenozoic’ after

worldwide planation surfaces were carved in the mid ‘Cenozoic’.³⁶ I haven’t seen even a suggestion from the post-Flood catastrophists of how such events could possibly transpire after the Flood, except that very heavy post-Flood rain carved planation surfaces.³⁷

It is much more logical that the dinosaurs died early in the Flood, since all air-breathing animals that lived on land had to die by Day 150. I suggest that advocates of post-Flood catastrophism need to re-examine their assumptions.

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