# Creation Matters

**Volume 16 Number 4** **July / August 2011**

**— A publication of the Creation Research Society —**


## Understanding Uniformitarianism, Part I: Words

**by John K. Reed, Ph.D.**

When *The Genesis Flood* hit the bookstores in 1961, the discipline of geology was very different. Planetary science and plate tectonics were virtually unknown, as were facies modeling and seismic stratigraphy. Technology was just offering glimpses of the sea floor, and climate change was the province of glaciology and of no immediate concern. Drilling in thousands of feet of water for oil and gas was science fiction and computers had yet provided no practical application.

On the theoretical side, any possibility of Noah's Flood as a serious agent of geological change was laughable. Geology was firmly united around Lyellian gradualism, though cracks in the system could be seen in the Spokane Flood evidence (Figure 1). Just a few short years after celebrating Darwin's centennial, secularists were still singing with joy… they had won. Religious opposition had been effectively silenced by the propaganda strategy of pitting "religion vs. science" and the ensuing intimidation and repression of orthodox belief by "science." Though the school of logical positivism was dead, a more amorphous, but no less powerful scientific arrogance prevailed, blurring secular belief with science (Reed, 2009).

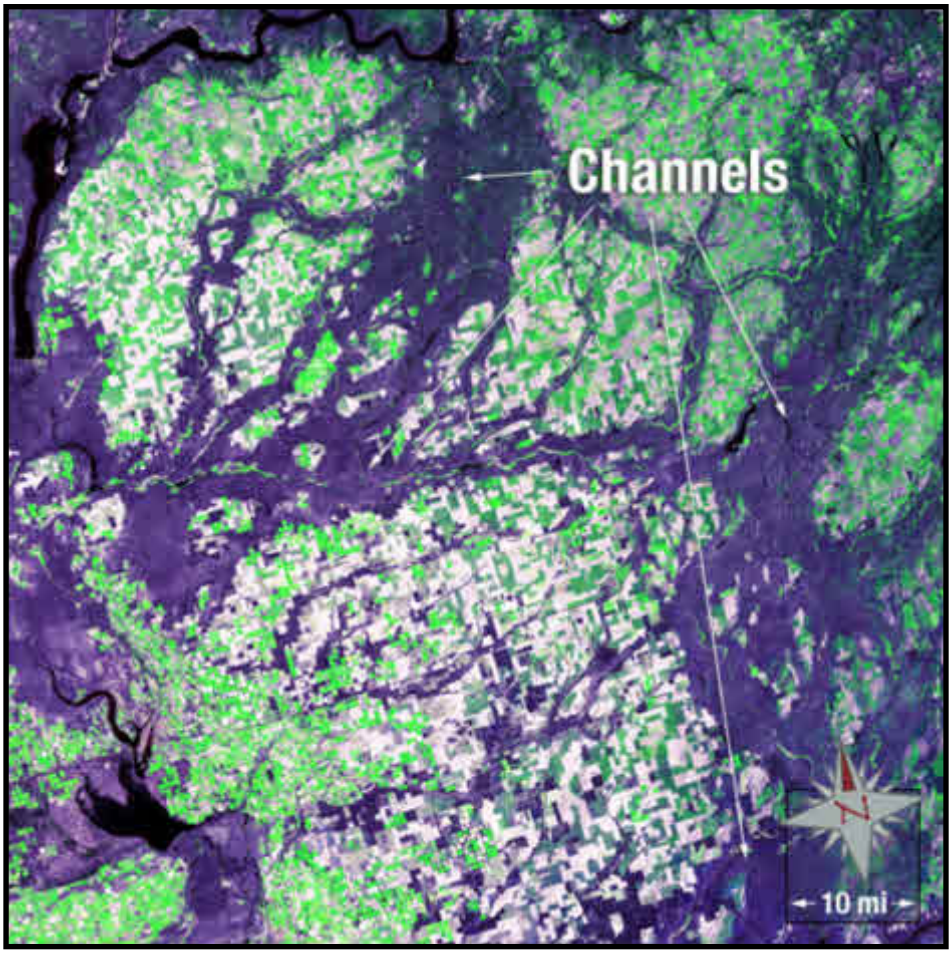



*Figure 1. False-color Landsat image of eastern Washington state showing the extent of the channeled scablands formed by the catastrophic Spokane flood. Prominent geologists resisted the evidence for decades out of fear of catastrophism and the Flood. The channels are shown in purple. The present-day Columbia River and Grand Coulee Dam appear in the upper left corner. Spokane is just out of view near the upper right corner. Image (taken June 1, 2001) courtesy of NASA at http://landsat.gsfc.nasa.gov/images/archive/f0021.html*

### Uniformitarianism vs. catastrophism

Whitcomb and Morris (1961) engaged evolution, positivism, religious compromise, and the secularization of science, but their main target was the geological uniformitarianism which had sealed secular rejection of the Flood in the early 1800s. From today's perspective, we can see that the resurrection of biblical creationism had a profound effect. In one sense, it won — Lyellians no longer have a monopoly in geology. But the victory was tarnished; today's secular neocatastrophists reject biblical history, including the Flood. This demonstrates that the long-running "uniformitarianism vs. catastrophism" debate was a side issue, masking the true worldview conflicts (Reed, 2001; Reed et al., 2004).

But the uniformitarianism vs. catastrophism debate was common currency, extending back to the roots of modern geology. It came because intellectuals who had already rejected the Bible still debated whether history was a long, slow process or whether it had been punctuated by natural catastrophes. This was true decades before Lyell, and long before the term *uniformitarianism* was coined in 1832. In other words, Lyell was the culmination of a trend, not its originator. His success came from linking his gradualist view of the past with the method of "actual causes" that all scientists accepted (Gould, 1987).

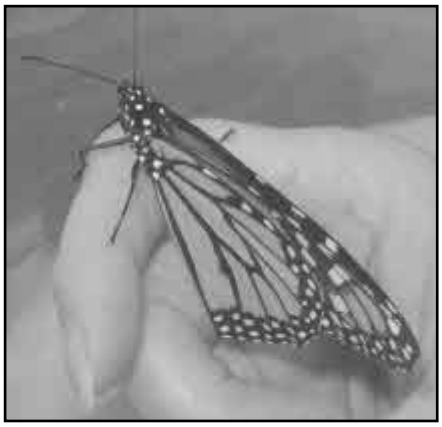
*... continued on p. 6*

# Speaking of Science

*Editor's note: Unless otherwise noted, S.O.S. (Speaking of Science) items in this issue are kindly provided by David Coppedge. Opinions expressed herein are his own. Additional commentaries and reviews of news items by David, complete with hyperlinks to cited references, can be seen at: http://crev.info/. Unless otherwise noted, emphasis is added in all quotes.*

## Butterfly Swarm Buries Darwin

Billions of butterflies, flashing their gossamer wings with brilliant colors, have swarmed over Darwin, leaving him unable to breathe. Figuratively, that is. Illustra Media's new documentary *Metamorphosis*,[1] leaves little room for Darwin's theory, while making a powerful case for intelligent design. The film is already being hailed as a masterpiece.



*A monarch, recently emerged from its chrysalis, letting its wings dry before taking flight. Photo by Glen Wolfrom.*

Featuring some of the most beautiful footage of butterflies and their amazing life cycles, from egg to caterpillar to chrysalis to flying insect, with information and music to match, *Metamorphosis* breaks new ground in butterfly research. Animations based on MRI imaging of a chrysalis show for the first time how organs are broken down and rebuilt inside within ten days. Electron micrographs zoom in on the antennae, compound eyes, legs, and wings of butterflies. Stunning close-ups of egg-laying, caterpillar molts, chrysalis formation, and emergence show phenomena rarely witnessed by non-scientists. The story of the Monarch butterfly migrations to Mexico is told with some of the most wondrous shots ever made of millions of butterflies flying through the air in remote mountain forest colonies only discovered in the 1970s.

*Metamorphosis* presents 46 minutes of fascinating science about butterflies before asking how such natural wonders could come about. By then, the photos and information have laid such a strong foundation of intelligent design, the arguments against Darwinian evolution are almost academic. But they are well stated: neo-Darwinism cannot account for the origin of two body plans (caterpillar and insect) in the same genome, in a process that destroys one and rebuilds it into another. It would be like a car encasing itself in a garage, recycling its parts, and emerging as a helicopter.

That whimsical analogy is actually an understatement, explains philosopher of biology Dr. Paul Nelson, because the butterfly is even more complex. A caterpillar entering a chrysalis is entering a casket unless it has a plan and a coordinated process to emerge out the other side. Most of the caterpillar's tissues are consumed and reconstituted into organs that have no analogue in the caterpillar. Developmental biologist Dr. Ann Gauger adds that unguided processes like evolution, with no ability to foresee a goal, cannot account for one body plan, let alone two.

The message of *Metamorphosis*, though, does not end on a negative note — the bankruptcy of Darwinian theory. Nelson and Gauger show that butterflies present a positive case for intelligent design. The only cause capable of reaching an end goal is intelligence, they say. That the end result is an object of great beauty, an aesthetically pleasing butterfly, its wings painted like works of art, is icing on the cake.

*Metamorphosis* includes the expertise of lepidopterist Ronald Boender, entomology department head Thomas Emmel, and biology professor Richard P. Stringer, along with Nelson and Gauger. In the Bonus Features, Dr. Emmel, who has visited the Monarch colonies in Mexico every year for over 20 years, answers many additional questions about butterflies, and viewers can take tours of three American butterfly houses. The original orchestral score by Mark Lewis includes voices of world-class African-American

## Contents




*Creation Matters*

ISSN 1094-6632
Volume 16, Number 4
July / August 2011





**General Editor:** Glen W. Wolfrom
**Assistant Editor:** Jean K. Lightner

**For membership / subscription information, advertising rates, and information for authors:**

Glen W. Wolfrom, Editor
P.O. Box 8263
St. Joseph, MO 64508-8263

Email: CMeditor@creationresearch.org
Phone/fax: 816.279.2312

**Creation Research Society Website:**
www.creationresearch.org

singers; the pieces can be enjoyed separately in the Bonus Features as concert pieces. The film is available on DVD and Blu-Ray at the "Metamorphosis the Film" website,[1] where visitors can watch a 4-minute preview.

1. Harned, J. (editor). 2011. *Metamorphosis: The Beauty and Design of Butterflies*. Illustra Media, La Mirada, CA. www.metamorphosisthefilm.com/

## Dinosaur Protein Is Primordial

Scientists from 10 universities and institutions have verified that the collagen protein in dinosaur bone is primordial — i.e., from the dinosaur, not from later contamination. By first studying the molecular packing of collagen in living animals, and using X-ray diffraction modeling, they matched the surviving collagen molecules to those that would most likely survive degradation. They feel this establishes the authenticity of the protein fragments against claims of contamination, and simultaneously offers a mechanism for its resistance to degradation.

The claim of original dinosaur protein was met with skepticism, as an article on *PhysOrg*[1] began:

> Although the team had previously presented **multiple lines of evidence supporting the veracity** of the find, the fact that the **age of the peptides far exceeds any previous predictions of how long a protein could resist degradation has generated controversy.**

The team set out to test for contamination, but also to try to understand how any protein could last for 65 million years or more. The research was published last month in *PLoS One.*[2]

Like every protein, collagen is made up of amino acid sequences (polypeptides). For collagen, these arrange into a triple-helix structure like a rope that is further wrapped in higher-level fibrils that give it its high tensile strength. About 25% of the human body is collagen; it "literally holds the body together," the article said.

The innermost amino acids in the bundle are the most protected from attack by degrading agents. Among those, the hydrophobic would be the least likely to degrade in water or other solutions. In addition, these sequences appeared to be located in stable regions away from the damaging effects of breakdown enzymes. These are the peptide sequences the team found in the dinosaur samples.

> Sequencing and mapping of 11 dinosaur peptides that represented 8 sequences revealed that the dinosaur sequences were from regions of the protein that were partly protected by molecular packing. This localization **could be responsible** for **protecting** the peptides over the millenia [sic].

Of course the problem evolutionists face is not mere millennia, but their alleged tens of millions of years. As for how any protein, protected or not, could survive such extensive epochs of time, the team said: "These features provide **hard biochemical evidence** for why these particular peptides **endured** for **such a long time**."

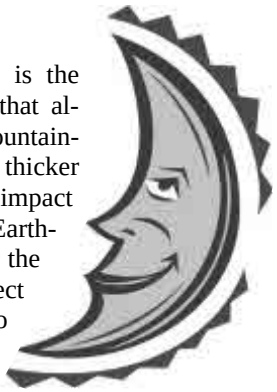
Actually, though, they only established that these particular peptides were the most likely to be protected. They did not provide hard evidence that they would be protected for tens of millions of years; they only assumed the millions of years, and reasoned that the proteins must have survived that long. But the team knows the controversy will continue:

> **Does this work satisfy the skeptics? Not yet,** but having a **new mechanism** for **how ancient proteins might be preserved** is a dinosaur-sized step in the right direction.

1. Field, S. (2011, July 26). How dinosaurs put proteins into long-term storage. *PhysOrg*. Retrieved August 9, 2011, from www.physorg.com/news/2011-07-dinosaurs-proteins-long-term-storage.html

2. San Antonio, J.D., M.H. Schweitzer, S.T. Jensen, R. Kalluri, M. Buckley, and J.P.R.O. Orgel. 2011. Dinosaur Peptides Suggest Mechanisms of Protein Survival. *PLoS One* 6(6):e20381. doi:10.1371/journal.pone.0020381

## Another Crash in Lunar Tunes



Our moon has two faces. One is the familiar man-in-the-moon side that always faces Earth. The other side is mountainous and heavily cratered, possessing a thicker crust, and with almost none of the large impact basins we see as dark maria on the Earth-facing side. The giant-impact theory for the origin of the moon — that a Mars-size object hit the Earth and the debris coalesced into our planetary companion — has been controversial since it was first proposed. Will adding another impact help? It all depends on what one means by "scientific progress."

In *Nature*,[1] Jutzi and Asphaug presented a new model for the origin of the lunar highlands on the far side of the moon. They first proposed that the impact against Earth formed two moons, not one. The bigger piece formed the moon; the other piece, caught in a stable orbital position called a Trojan point, hung around for a few tens of millions of years. Being smaller, it crystallized faster. After a while, something nudged it toward the bigger piece, and with a gentle collision less than the speed of sound in rock, it merged into the moon. Their computer models show it moving most of the magma to the near side of the moon and depositing material on the far side, forming the lunar highlands.

Maria Zuber considered this theory in the same issue of *Nature.*[2] She said that since several alternatives can produce the lunar profile, "the current study **demonstrates plausibility rather than proof.**" The *BBC News*[3] and *LiveScience*[4] each summarized the theory with one frame from the computer simulation.

Being tied to the giant-impact theory, the two-moon theory will suffer from the same defects. But it seems to offer some explanatory value at the price of complicating the picture with another body which, like the initial impactor, must be finely tuned to reside at the Trojan point for a period of time, and then impact the larger body at the right speed. Future missions might be able to support the theory with better gravity maps and sample returns. For now, it is little more than a conjecture.

1. Jutzi, M. and E. Asphaug. 2011. Forming the lunar farside highlands by accretion of a companion moon. *Nature* 476:69–72.

2. Zuber, M.T. 2011. Planetary science: Making mountains out of a moon. *Nature* 476:36–37.

3. McGrath, M. (2011, August 3). Earth may once have had two moons. *BBC News*. Retrieved August 9, 2011, from www.bbc.co.uk/news/science-environment-14391929

4. Choi, C. (2011, August 4). Earth had two moons that crashed to form one, study suggests. *LiveScience*. Retrieved August 9, 2011, from www.livescience.com/15389-earth-moons-crashed.html

*... continued on p. 9*

## Call for Papers

## Seventh International Conference on Creationism 2013

High quality papers for the Seventh International Conference on Creationism (ICC), Summer 2013, Pittsburgh, PA are now invited for submission. In continuation of the Sixth ICC, the theme of the Seventh ICC is again Developing and Systematizing the Creation Model of Origins, making the Seventh ICC also a "working" conference.

The interested author should submit a 1000-2000 word Summary no later than 31 January 2012. For detailed instructions, see

**www.creationicc.org**

## Coming Soon

CREATION...in a flash

**Look for it November 1 at the CRS store**
***www.CRSbooks.org***

**If you have not renewed your CRS membership, this will be your final issue of** *Creation Matters.*

# Math Matters

**by**
**Don DeYoung, Ph.D.**

## Leonhard Euler

Leonhard Euler (pronounced "oiler," 1707–1783) was born in Switzerland, the son of a Calvinist pastor. One of the greatest mathematicians of all time, Euler always remained close to his biblical family heritage. Augustus De Morgan (1806–1871) later wrote that "Euler was a believer in God, downright and straightforward" (Newman, 1956, p. 2377). Euler and his wife Katharina had 13 children, and he stated that their home was his joy.

Although nearly blind in his later years, Euler still managed to author original papers and books totaling 70 volumes, making him one of the most prolific mathematical writers of all time. He advanced our understanding of the technical language of creation, including calculus, optics, and fluid dynamics.

Euler's contemporaries included the French atheists Voltaire and Denis Diderot. Confident in his faith, Euler also enjoyed humor. The story (perhaps an urban legend of the day) is told that Euler and Diderot once carried on a theological debate in the presence of Russia's Catherine the Great. At one point, Euler remarked, "Sir, $(a + b^n)/n = x$, and God therefore exists. What is your reply?" Philosopher Diderot, not realizing that the formula was meaningless as stated, did not know how to reply and sat in embarrassed silence. The Russian Court soon erupted in laughter and a humiliated Diderot quickly retreated to his home in France (Newman, 1956, p. 2378). Whether entirely true or not, the story gives a glimpse of Leonhard Euler's dynamic life and testimony.

### References

Newman, James R., Editor, 1956. The World of Mathematics. Volume 4. Simon and Schuster, New York.

*Figure description: Portrait of Leonhard Euler by Emanuel Handmann, 1753. (public domain)*

◁ CM ▷

Matters of Fact...

# A New Icon of Evolution?

**by Jean K. Lightner, DVM, MS**

*Editor's note: You may submit your question to Dr. Jean Lightner at jean@creationresearch.org. It will not be possible to provide an answer for each question, but she will choose those which have a broad appeal and lend themselves to relatively short answers.*

**Q** According to an online news source, a certain mouse is set to become the next evolutionary icon (Walker, 2009). How should creationists respond to this?

**A** With a big smile and warm feelings. Seriously, this is an example of a change within a created kind. With these deer mice, just as with peppered moths, the only thing that has changed is coloration. The deer mice are still the same species of deer mice; the moths are still the same species of moth. There is no evidence of the type of change that turns one kind of creature into a different kind of creature. However, a close look at this example does point to a loving and wise Creator that cares for His creation.

## What the researchers found

Deer mice (*Peromyscus maniculatus*) come in several colors. Most are dark and blend in well with the soil in the areas where they live. However, deer mice that live in the Sand Hills of Nebraska are much lighter in color, which helps them blend in with the lighter background of the Sand Hills.

Both varieties of deer mice produce the same pigments; a darker brown to black pigment known as eumelanin, and a lighter yellow to red pigment called pheomelanin. As with many mammals, most of the hair shaft is black with a band of yellow just below the hair tip. This gives an overall brownish appearance to the animal, a color pattern often called agouti. The reason the deer mice of the Sand Hills are lighter is that the yellow band is much wider in their fur.

In the research article that the online news source referenced, the researchers indicated that they had sought to uncover the basis for this difference (Linnen, *et al*., 2009). They knew that the *Agouti* gene was responsible for the yellow band in mice, which is a result of a pulse of gene expression in early neonatal life. They found that the *Agouti* gene was being used (expressed or transcribed) for a longer period of time and at a higher rate during the first week of life in wide-band deer mice compared to the same period of time in darker members of the species. They were also able to eliminate other color genes as the source of this color variation.

What was less clear in the article was the exact reason for this increased gene expression. There were some differences in the coding region, one of which was associated with a significant amino acid change (deletion of serine). However, changes in this region would be expected to affect the function of the protein, not its expression. Normally, changes affecting expression would be more likely in the promoter regions, which come right before the rest of the gene. The researchers were unable to identify any differences in this region that corresponded to the wide-band color pattern.

There was very little variability in the region before the deletion mutation which eliminates serine, in contrast to the mice that didn't have this mutation. This suggests that it is a recent mutation. Additionally, it could easily be associated with another unidentified mutation that, with or without the identified deletion, contributes to the wide-band color pattern. Despite this ambiguity about the exact cause(s) of the increased *Agouti* expression, the color pattern appears to be an advantage on the Sand Hills by providing camouflage for the deer mice.

## The underlying design that allowed for these changes

While evolutionists imagine everything as the result of random mutations and natural selection, creationists should notice the evidence of design. There are hundreds of genes that affect coat color in mammals. These genes are from multiple pathways, most affecting far more than just coat color. The incredible design that is evident, which allows the right molecules to show up at the right time and place to enable life to exist, is seen in greater detail as we continue to learn more about the genetics of coat color.

One thing is evident in this design: not all characteristics of creatures are static. A similar change in the *Agouti* gene was identified in oldfield (beach) mice (*Peromyscus polionotus*). The lighter coloration provides camouflage for the oldfield mice inhabiting the beaches of Florida's barrier islands (Steiner *et al*., 2007). *Agouti* is one of several genes where mutation can lead to an interesting and/or adaptive color change (Lightner, 2009 and 2010). This is unlikely to be an accident, since mutations in many places can be disastrous. Instead, these genes were likely designed to be able to undergo useful mutations. It has been suggested that at least one color gene may undergo changes by designed mechanisms (Lightner, 2008).

## Recognizing the awesome Designer

All this is consistent with the God of the Bible as the Designer of life. He created life according to their kinds, and blessed them so they could reproduce and fill the earth (Genesis 1:20-22; 24-28; 8:17-19). Many mutations show evidence of the Curse as they result in disease and/or death. Others, such as those in these species of mice, show God's provision for his creation even in a fallen world. The ability to adapt is consistent with God's intent that the earth be inhabited (Isaiah 45:18). These changes are not the type necessary to turn one kind of creature into another; instead, they do remind us we have a caring Creator.

## References:


Lightner, J.K. 2008. Genetics of coat color I: the melanocortin 1 receptor (MC1R). *Answers Research Journal* 1:109-116.

Lightner, J.K. 2009. Genetics of coat color II: the agouti signaling protein (*ASIP*) gene. *Answers Research Journal* 2:79-84.

Lightner, J.K. 2010. Post-Flood mutation of the *KIT* gene and the rise of white coloration patterns. *Journal of Creation* 24(3):67-72.

Linnen, C.R., E.P. Kingsley, J.D. Jensen, and H.E. Hoekstra. 2009. On the Origin and Spread of an Adaptive Allele in Deer Mice. *Science* 325:1095-1098.

Steiner, C.C., J.N. Weber, and H.E. Hoekstra. 2007. Adaptive variation in beach mice produced by two interacting pigmentation genes. *PLoS Biology* 5(9):e219. doi:10.1371/journal.pbio.0050219

Walker, M. (2009, August 27). Mouse set to be "evolutionary icon." *BBC Earth News*. Retrieved July 29, 2011, from http://news.bbc.co.uk/earth/hi/earth_news/newsid_8225000/8225219.stm


◁ CM ▷

Words

*...continued from page 1*

In other words, Lyell deceived his fellow scientists, and was able to tar his (secular) opponents as "non-actualistic," which was then virtually synonymous with "unscientific." Modern geology was built on that lie. As late as the 1960s, geologists were calling uniformitarianism "the fundamental principle of geology." They threw it in the teeth of the early creationists, confident that the mere invocation of their motto, "the present is the key to the past," settled the argument.

But *The Genesis Flood* revealed a number of inconsistencies between theory and reality. Had its authors taken a secular path instead of asserting biblical fidelity, the book would undoubtedly be a classic of modern geology and would likely have preempted the work of Ager (1973). But Whitcomb and Morris chose the Bible, forcing geologists (who saw the errors of uniformitarianism, but were unwilling to consider the Flood) towards modern neocatastrophism, emphasizing catastrophic impacts in particular (Alvarez et al., 1980; see also Figure 2).

While neocatastrophists and creationists focused on the empirical shortcomings of uniformitarianism, another group of secular geologists, historians, and philosophers of science began assessing the theoretical shortcomings of uniformitarianism. Gould (1965) suggested a way out of Lyell's trap by unveiling multiple definitions of the term, some of which could be retained and others, discarded. This strategy was developed and implemented, providing an avenue for rejecting geology's "fundamental principle" and the Flood while retaining secular geohistory and deep time.

*Figure 2. The Barringer crater in northern Arizona is a blunt reminder of catastrophic events in earth history. The growth of impact studies has spurred the transition from Lyell's uniformitarianism to modern neocatastrophism.*

This outcome is little short of incredible. For over 150 years, uniformitarianism was revered as the bedrock of geology. The catchphrase, "the present is the key to the past," echoed through the halls of academia, although no one seemed able to explain what it meant (Shea, 1982). Today, many geologists scoff at Lyell and describe themselves as neocatastrophists.

It is important to understand what has changed and what has not. Contemporary geology has been changed in three ways: (1) the *narrative* of earth history now includes catastrophism; (2) the *method* of earth history is now called *actualism*; and (3) many distortions of the history of the development of geology have been recognized and corrected. As Gould (1987) noted, the "cardboard" "empiricist myth" has been discarded (Reed, 2008).

But some things have not changed. Biblical history is still considered irrelevant to geology. Deep time and its time scale are inviolate. "Science" still disproves "religion," at least in terms of orthodox Christianity. And creationists are still despised by the secular establishment. Discussions of the downfall of uniformitarianism pointedly omit the early creationists. This reaction shows us that the secular belief system, or worldview of Naturalism, is the real bedrock of modern geology. Despite this, all acknowledge that a revolution has occurred in the earth sciences. Creationists need to understand what has happened and what issues remain.

If uniformitarianism is no longer the fundamental principle of geology, then what is? Since part of the confusion has always been associated with an imprecise vocabulary, then that is the first place to start bringing clarity to the debate.

## Tangled terms

Semantic confusion precedes even Charles Lyell, though he used it to promote his ideas. Science in the18th century was Newtonian. Newton's method of "true causes" was a foundation of science in general, and Lyell

# 2011 CRS Board of Directors and Staff

The CRS Board of Directors met for their annual meeting in Jacksonville, FL on June 15–18. From left to right are: Gary Locklair, Don DeYoung, Ron Samec, Mike Oard, Diane Anderson, Mark Armitage, Kevin Anderson, Jean Lightner, Gene Chaffin, Danny Faulkner, Ted Aufdemberge, and Robert Hill.

Not available for the photo were board members Russ Humphreys, John Reed, and Glen Wolfrom. Kevin (Director) and Diane (Administrative Assistant) are professional staff located at the Van Andel Creation Research Center.

appropriated it to cement the new geology as a respectable science. Trained as a barrister (lawyer) before devoting his career to geology, Lyell's legal background gave him an appreciation for the power of words.

Contrary to the mythology of the later 19th and early 20th century, Lyell was not fighting an entrenched academic "theocracy" of orthodox dons. He was fighting elite secular naturalists, including pioneers such as Cuvier, Buckland, and the German geognosts (Rudwick, 2005). Rejection of biblical history for an extended prehuman prehistory had occurred decades earlier, as shown by the near universal contempt for the British scriptural geologists. Lyell's battles with "catastrophists" had little to do with Christianity. Instead, it was a battle between *secular* gradualists and *secular* catastrophists.

Lyell used courtroom tactics to win that fight. He tarred his *secular* opponents with the brush of *scriptural geology* by equating "catastrophism" with Flood geology. That lie served double duty as it also fed the "religion vs. science" propaganda used effectively by Enlightenment secularists against the church. He also made his controversial gradualism difficult to dispute by folding it into the widely-accepted and respected method of actual causes — popularized by Newton and affirmed by gradualists and catastrophists alike.

*Uniformitarianism*, introduced in 1832 by William Whewell, a philosopher of science, became an equivocal, catch-all term. As long as most geologists held shared assumptions, it made perfect sense; when they did not, it became a source of confusion. Only in the last fifty years has the term been untangled. Most now agree that four distinct concepts were combined into the one word, allowing its proponents a remarkable flexibility.

So although creationism and secular neocatastrophism have succeeded in dethroning uniformitarianism, it has proven a hollow victory. Biblical history remains anathema to secular scientists. If creationists are going to effectively defend the Flood, then we must understand the layers of deception built into uniformitarianism. The first step in such an effort must be to assign clear meanings to important terms and to rid ourselves of imprecise language. Only then can the underlying concepts be addressed without more equivocation.

*Table 1. Various meanings of uniformitarianism proposed by authors in late 20th century. See Reed (2010) for more detail.*

| | Gould (1965) | Gould (1975, 1984) | Rudwick (1971) | Austin (1979) |
|---|---|---|---|---|
| methodological | | *uniformity of law* | theological status | methodological uniformitarianism |
| | | *uniformity of process* | methodological status | causal uniformitarianism |
| substantive | | *uniformity of rate* | rate | actional uniformitarianism |
| | | *uniformity of conditions* | "pattern" of past geological cause | configurational uniformitarianism |

## Solving the semantic problems

Secular thinkers have only addressed half of the problem. Between the 1960s and the 1980s, geologists reached a consensus that *uniformitarianism* had four distinct meanings (Table 1). For simplicity, I use Gould's (1984) terminology, defined as:

- **uniformity of law**. The a priori claim of science that laws are constant across time and space.
- **uniformity of process**. Synonym of *actualism*; method that uses the reservoir of observed geological causes to explain effects seen in rock record.
- **uniformity of rate**. Lyell's gradualism; rates and scales of geological processes are constant.
- **uniformity of conditions**. No directional pattern to past; earth maintains a steady-state condition.

This scheme, while valid as far as it goes, has been misused by critics of creationism in two ways. First, secular thinkers assert that the mere explication of the various terms magically makes all the problems of Lyell's deceit go away. Semantics becomes a cover for massive conceptual errors in the outmoded theories of Lyell and Hutton. By splitting the meanings, they can salvage the fundamental concept, which is defined as the "uniformity of process." Because of the bad taste left by the term *uniformitarianism*, most geologists prefer to call uniformity of process *actualism*.

Second, Christian critics of creationism (e.g., Young and Stearley, 2008) claim that the four-definition grid illustrates the ignorance of creationists who continue to broadly apply Lyellian gradualism to geology as a whole, ignoring neocatastrophism.

## Answering Young and Stearley

Reed (2010) answered the criticism of Young and Stearley (2008), noting several flaws in their argument. First, he showed (Reed, 2010, p. 49) that the confusion over the term *uniformitarianism* was not of creationist origin, but was instead the failure of professional secular geologists:

> So while Young and Stearley (2008) go to great lengths to condemn creationists for equating uniformitarianism with gradualism, the shoe is actually on the other foot. Many of the older creationist references they cite merely mirror the contemporary opinions of geology as expressed in textbooks and technical publications. That is why Gould (1984) contradicts Young and Stearley, placing the blame squarely on the heads of professional geologists.

Second, Reed (2010) noted the inconsistencies in Young and Stearley's (2008) charge. They used selective citations, two-thirds of which were from a few older references cited by Henry Morris and Steve Austin, to bolster their case. Then, while claim-

*Table 2. Changing terms associated with uniformitarianism clarifies the concepts and improves the ability of thinkers to discuss the issues. Terms from Gould (1965; 1975; 1984) and from Neuendorf et al. (2005). Modified from Reed (2010a).*

| Old Term | New or Redefined Term |
|---|---|
| ~~1. Uniformity of law~~ | replaced by price term "[illegible]" |
| ~~2. Uniformity of process~~ | replaced by price term "[illegible]" |
| ~~3. Uniformity of rate~~ | replaced with synonym "gradualism" for the late Lyell |
| ~~4. Uniformity of conditions~~ | replaced with "Huttonian" for historical models of Hutton and early Lyell |
| 5. Actualism | rock record explained by observed processes |
| 6. Uniformity | [illegible] |
| ~~7. Uniformity of Nature~~ | replaced by price term "[illegible]" |
| ~~8. Methodological Uniformitarianism~~ | unnecessary and discarded |
| ~~9. Substantive Uniformitarianism~~ | unnecessary and discarded |

ing that creationists do not understand the multiple meanings of uniformitarianism, they cited Austin's (1979) paper, which includes a detailed discussion of those different meanings!

Finally, the publication of Reed (2010), which addressed uniformitarianism in some depth, further falsifies their claim. However, creationists should be aware that both secular geologists and compromising Christians will accuse them of not understanding uniformitarianism. For this reason, careful use of the vocabulary is essential. Its use as a synonym for secular geology should be avoided, as it is vague and imprecise. Twenty years ago, it was accurate to call secular geologists "uniformitarians" (after all, that's what they called themselves). This is no longer true.

Secular thinkers believe that defining *uniformitarianism* more carefully has solved their problem. In contrast, Reed (2010) noted the difference between *defining* the problem and *solving* the problem. He proposed actual changes in the terminology that would result in a much clearer vocabulary (Table 2).

Of nine terms related to uniformitarianism, two basic concepts emerge — *actualism* and *uniformity*. The outmoded concepts of Lyell and Hutton were replaced with the descriptive terms *gradualism* and *Huttonism*. Redundant words, such as *methodological uniformitarianism* and *substantive uniformitarianism* were discarded. Furthermore, Reed (2010) noted discrepancies in the *Glossary of Geology's* 1987, 1997, and 2005 definitions of "uniformitarianism" that illustrated the confusion in secular geology and the eventual transition to neocatastrophism (Neuendorf, 2005).

## Lessons for creationists

The uniformitarianism of the 1960s and 1970s is no longer the primary obstacle to recovering orthodox biblical earth history, if indeed it ever was. Instead, we must demonstrate the superiority of the worldview of Christianity over that of Naturalism. Vintage uniformitarianism (Lyell's gradualism) has been largely abandoned, replaced by neocatastrophism. Lyell's error of joining the method of geology with the narrative of geology has been corrected. The old term *actualism* has been resurrected to define the method of actual causes.

Uniformity is a general principle of science, long predating Lyell. Its misuse by geologists hoping to camouflage a weak position with a strong one should be exposed and rejected. Therefore, it is important to understand and use the new vocabulary. There are several other important lessons:

- Past debates about "catastrophism vs. uniformitarianism" were about the tempo and mode of the past, not the veracity of the Genesis record. As such, the argument is secondary to that over opposing worldviews — Naturalism and Christianity.
- Confusion and equivocation regarding *uniformitarianism* originated in secular geology. There is no excuse for continuing those mistakes.
- *Actualism* has replaced *uniformitarianism* (uniformity of process) as the term describing the method of geology, although the two are virtually synonymous. *Actualism* is preferred because the term is prior, introduced in 1825 by the French geologist, Constant Prevost. Actualism is the method of explaining the rock record by causes that have been observed.
- That the geologic time scale has remained untouched by the revolution in the earth sciences suggests that an extended prehuman prehistory, not uniformitarianism, is the fundamental principle of geology.

## Conclusion

Uniformitarianism ruled geology for more than 150 years. Empirical evidence has led many secular geologists to reject Lyell, and recent work by philosophers and historians has supported that position. The confused vocabulary surrounding uniformitarianism reflected equally confused thinking. It also has been used to divert attention from the real conflict between secular prehistory and Genesis, as has the equivocal red herring of "uniformitarianism vs. catastrophism." The recent triumph of secular neocatastrophism demonstrates that the philosophical argument was never about the Flood.

The first step in addressing the issues in defining Earth's biblical history is to force clarity of terms and ideas. Of the nine terms previously associated with uniformitarianism, two concepts emerge — *uniformity* and *actualism*, both assumptions of method based on a secular view of reality. Creationists should no longer use the term *uniformitarianism* in the contemporary discussion, but use instead the terms *uniformity* and *actualism*, depending on the context.

## References


CRSQ = *Creation Research Society Quarterly*

Ager, D.V. 1973. *The Nature of the Stratigraphical Record.* Macmillan, New York.

Alvarez, L.W., W. Alvarez, F. Asaro, and H.V. Michel. 1980. Extraterrestrial cause for the Cretaceous-Tertiary extinction. *Science* 208:1095–1108.

Austin, S.A. 1979. Uniformitarianism — a doctrine that needs rethinking. *The Compass of Sigma Gamma Epsilon* 56(2):29-45.

Gould, S.J. 1965. Is uniformitarianism necessary? *American Journal of Science* 263:223–228.

Gould, S.J. 1975. Catastrophes and steady state earth. *Natural History* 84(2):15–18.

Gould, S.J. 1984. Toward the vindication of punctuational change in catastrophes and earth history. In Berggren, W.A. and J.A. Van Couvering (editors). *Catastrophes and Earth History*, pp. 9–34. Princeton University Press, Princeton, NJ.

Gould, S.J. 1987. *Time's Arrow, Time's Cycle: Myth and Metaphor in the Discovery of Geological Time*. Harvard University Press, Cambridge, MA.

Neuendorf, K.K.E, J.P. Mehl, Jr., and J.A. Jackson. 2005. *Glossary of Geology*, fifth edition. Alexandria, Virginia: American Geological Institute.

Reed, J.K. 2001. *Natural history in the Christian Worldview*. Creation Research Society Books, Chino Valley, AZ.

Reed, J.K. 2008. St. Hutton's Hagiography. *Journal of Creation* 22(2)121–127.

Reed J.K. 2009. Lessons from twentieth-century geology: M. King Hubbert. *CRSQ* 46(2):133–136.

Reed, J.K. 2010. Untangling Uniformitarianism, Level I: A Quest for Clarity. *Answers Research Journal* 3:37–59.

Reed, J.K., P. Klevberg, C.R. Froede, Jr., A.J. Akridge, and T.L. Lott. 2004. Beyond Scientific Creationism. *CRSQ* 41(3):216–230.

Rudwick, M.J.S. 2005. *Bursting the Limits of Time: The Reconstruction of Geohistory in the Age of Revolution.* University of Chicago Press, Chicago, IL.

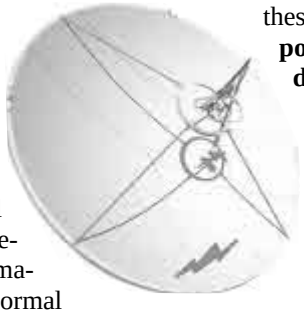
Shea, J.H. 1982. Twelve fallacies of uniformitarianism. *Geology* 10:455–460.

Whitcomb, J.C. and H.M. Morris. 1961. *The Genesis Flood*. Presbyterian and Reformed Publishing Company, Philadelphia, PA.

Young, D. and R. Stearley. 2008. *The Bible, Rocks, and Time*. InterVarsity Press, Downers Grove, IL.


◁ CM ▷

## Unique Mammal Senses



The ability to sense the environment is vital to all living things, and is a key characteristic that separates life from non-life. The senses are not limited to the five we learned about as children — sight, hearing, touch, taste, and smell. In the animal kingdom there are more. Some of them repurpose existing organs; some detect information from the world not detectable with the normal sense organs. Among mammals, two very different animals, bats and dolphins, have expanded our understanding of sensation.

Two recent papers in *Science* added to our understanding of echolocation in bats. One paper explored how bats are able to separate target information from background clutter. Bates, Simmons, and Zorikov[1] experimented with "big brown bats" and found that they "**exploit harmonics to distinguish clutter echoes from target echoes, sacrificing delay acuity to suppress masking.**"

That ability would be amazing enough for a stationary target, but bats do this while flying rapidly through complex aural surroundings. One would think, from the researchers' description, that the bats are sophisticated audio engineers:

> The **key** to how the bat **recognizes** weaker FM2 from **lowpass filtering** is an **interaction** between the **amplitude** of an echo and the timing, or **latency**, of the neural responses it evokes — an effect called **amplitude-latency trading.**

In the other paper, Simon, Holderied, Koch, and von Helversen[2] discovered a neat cooperation between a nectar-eating bat and its host plant. Targeting of the plant is enhanced by a specialized, dish-shaped leaf that reflects the bat's echoes like a satellite dish. *ScienceDaily*[3] showed a picture of the plant with the sonar "dish" right over the flowers.

This host plant lives in low abundance in the tropics, so it relies on the bat's wide foraging range and excellent spatial memory. By providing the bat with an echolocating enhancer, the plant has a 50% higher chance of being found. The bat gets its energy drink, and the flower benefits from the pollination that occurs. The shape of the leaf, therefore, serves a similar purpose to an echolocating bat that beautiful colors in flowers serve for daytime pollinators. "Because of their peculiar shape and presentation, **we hypothesize that these special leaves evolved** as **echo beacons that attract pollinating bats**," the authors said.

In the same issue of *Science*,[4] Fenton analyzed these two papers, remarking that:

> The **sophistication of bat echolocation** is becoming increasingly apparent — **they "design" echolocation signals (by manipulating the frequency, intensity, and harmonics** in their calls, for example) as well as their **patterns of call production** (such as call duration and time intervals between calls) in particular situations. Furthermore, the echolocation signal that one individual bat uses to collect information can simultaneously serve **a communication function**, allowing, for example, group members to remain in contact with one another.

In addition, bats have to control their calls to outsmart rivals and to sneak up on prey that can hear the bats coming.

Fenton ascribed the phenomena to "**evolutionary arms race**" and to "**coevolutionary relationships**," but did not describe how these abilities might have arisen by random mutations. "**At what point in their evolution did echolocation appear? How often did echolocation evolve in bats?**" he asked, indicating that fundamental questions remain for evolutionists.

Reviewing the history of how bat echolocation was discovered, first suggested by Spallanzani in 1794, then confirmed by Donald Griffin in 1944, Fenton added,

> Simon *et al.* and Bates *et al.* have demonstrated that **echolocation is a gift in research that keeps on giving**, whether the study organisms are **bats, birds, shrews, toothed whales, or even people.**

He was referring to experiments on blind people that show their enhanced ability to locate objects by sound.

Dolphins and toothed whales are also among the mammals with the sixth sense of echolocation, but now a seventh sense has been found in at least one species. *NewScientist*[5] reported that Guiana dolphins can sense electrical fields of their prey. This species forages in the murky coastal waters of its habitat and finds prey at close range, where echolocation is less effective.

Experiments by German scientists show that the organs for sensing electrical fields are in pits corresponding to the whiskers of land mammals. As *LiveScience*[6] put it, "**Through evolution**, the dolphins have lost their whiskers, but kept the pores."

Prime researcher Wolf Hanke from the University of Rostock also ascribed this ability to evolution. Believing that electrical sensing also evolved in the duck-billed platypus and echidna, he reasoned that "it is **relatively easy to evolve**, to **change mechanoreceptor organs into electroreceptors.**" That opinion was not supported by any empirical evidence mentioned in the article.

1. Bates, M.E., J.A. Simmons, and T.V. Zorikov. 2011. Bats use echo harmonic structure to distinguish their targets from background clutter. *Science* 333(6042):627–630.

2. Simon, R., M.W. Holderied, C.U. Koch, and O. von Helversen. 2011. Floral acoustics: conspicuous echoes of a dish-shaped leaf attract bat pollinators. *Science* 333(6042):631–633.

3. University of Bristol (2011, August 1). Rainforest plant developed "sonar dish" to attract pollinating bats. *ScienceDaily*. Retrieved August 9, 2011, from www.sciencedaily.com/releases/2011/07/110728144717.htm

4. Fenton, M.B. 2011. The world through a bat's ear. *Science* 333(6042):528–529.

5. Hooper, R. (2011, July 27). Electric dolphins: cetaceans with a seventh sense. *NewScientist*. Retrieved August 9, 2011, from www.newscientist.com/article/dn20732-electric-dolphins-cetaceans-with-a-seventh-sense.html

6. Welsh, J. (2011, July 26). Dolphins' "Sixth sense" helps them feel electric fields. *LiveScience.* Retrieved August 9, 2011, from www.livescience.com/15240-dolphins-sense-electric-fields.html

## Living Fossils Rise from the Dead

The oxymoron "living fossil" is suggestive. Seeing a plant or animal come to life, when it was only known from fossils, might seem miraculous. Perhaps, though, the phrase was invented to rescue Darwinian theory from the vast ages it requires. Is it credible to believe the time gaps? Here are two recent stories about creatures long thought dead, only to be found doing "Quite well, thank you."

**Tick talk**. Researchers in South Africa were sure that the living fossil they found represented an "evolutionary missing link" that might help explain relationships between several lineages of arthropods that "evolved" the blood feeding trait independently. This led to queer sentences like this in their *PLoS One* paper.[1]

> Thus, even though blood-feeding **evolved** in the ancestral tick lineage, the **adaptation** to the mammalian and avian blood-feeding interfaces **occurred independently** in the soft and hard tick families.

It also seems weird for the ancestor of diverse lineages of ticks to be doing just fine in a living form, with no evolutionary change for many millions of years:

> In conclusion, phylogenetic analysis indicates that *N. namaqua* groups **basal to both tick families** and is the **closest extant lineage to the last common ancestral tick lineage**. Its argasid-like feeding behaviour and biology provides **compelling evidence** for the **evolution** of a blood-feeding lifestyle within the **last common ancestral tick lineage**. The semi-arid nature of the Northern Cape as found in Namaqualand and the Karoo has been maintained since Permian times. The partiality of *N. namaqua* for xeric environments and small reptiles could therefore be **an indication of a lifestyle maintained for more than 250 million years. This would truly make this tick species a living fossil.**

**Real eel**. Another living fossil announced recently is a "primitive" looking eel found swimming in a cave on Palau that *PhysOrg* said is squirming into the record books.[2] Why? "A new species of eel found in the gloom of an undersea cave is **a 'living fossil' astonishingly similar to the first eels** that swam some **200 million years ago**, biologists reported on Wednesday."

The *BBC News* included a short video clip of the slick-looking swimmer.[3] Going on about how "primitive" it looked (at first glance, it looks rather stylish), the article quoted the scientists giving their evaluation:

> In some features it is **more primitive than recent eels**, and in others, **even more primitive than the oldest known fossil eels**, suggesting that it **represents a "living fossil" without a known fossil record.**

This begs the question of why it survives intact to this day, unevolved. Even worse, the article put forth an apparent contradiction:

> Their results suggest **this new family has been evolving independently for the last 200m years**, placing their **origins** in the early Mesozoic era, **when dinosaurs were beginning their domination of the planet.**

If it has been evolving for 200 million years, why does it look primitive? Why is it a living fossil?

"The term 'living fossil' was **coined by Charles Darwin** in his book *On the Origin of Species*," the article on *PhysOrg* informed its readers. "It is **used to describe** species that have survived for millions of years, **exploiting niches that are so stable** that there is **little pressure on them to evolve.**"

Of course, *to evolve* is an active verb infinitive that cannot be applied to dumb eels, as if they had any choice in the matter, environmental pressure or not. And if stable niches reduce the pressure on evolution, it would be surprising that anything in the ocean, one of the first stable habitats on earth, ever evolved as Darwinians claim they did.

Stop letting Darwinists get away with these word games. If their theory explains extreme diversification alongside extreme stasis, then it is explaining opposite things with equal ease. Therefore, "living fossil" explains nothing. As an oxymoron, it is all moron and no oxy.

The evidence only makes sense without the millions of years. The living creatures resemble the fossil creatures because they are not separated by vast swaths of mythical time, but came from a created world with much more diversity than our impoverished remnant. Close the time gap.


1. Mans, B.J., D. de Klerk, R. Pienaar, A.A. Latif, 2011. *Nuttalliella namaqua*: A living fossil and closest relative to the ancestral tick lineage: Implications for the evolution of blood-feeding in ticks. *PLoS ONE* 6(8):e23675. doi:10.1371/journal.pone.0023675
2. Anonymous. (2011, August 17). "Fossil eel" squirms into the record books. *PhysOrg*. Retrieved September 5, 2011, from www.physorg.com/news/2011-08-fossil-eel-squirms.html
3. Rincon, P. (2011, August 16). New Pacific eel is a "living fossil," scientists say. *BBC News*. Retrieved September 5, 2011, from www.bbc.co.uk/news/science-environment-14547942


◁ CM ▷

# Membership Matters

**by Glen Wolfrom, Ph.D.**

## Price Increases

At the recent meeting of the CRS board of directors, price increases were approved for memberships and subscriptions which include the print copies of our periodicals ($3 domestic, $5 international). These increases will be effective March 1, 2012. There will be no increase for the "paperless-only" or life-membership options.

Members may order single or multi-year renewals at the current prices through February, 2012. In fact, you are encouraged to do so to take advantage of the current rates.

## Limited-Time Offer for New Student Members

The Board also approved a special offer for new student members. For $15 they may purchase a one-year membership (*includes online access only*). The regular price for this paperless option is $26. **This offer expires November 1, 2011**. See www.creationresearch.org/student_special to order online or to download an application form.

Eligible for student membership are those who are enrolled full time in high schools, undergraduate colleges, or post-graduate science programs (e.g., MS, PhD, MD, and DVM). Those holding post-doctoral positions are not eligible. A graduate student with a MS degree may request voting member status while enrolled as a student member.

◁ CM ▷

...without excuse!

# The Testimony of Clones & Telomeres

**by Timothy R. Stout**

Fifteen years ago, an event took place that stunned and fascinated both the popular press and the scientific community. A sheep named "Dolly" had just been cloned from the mammary-gland cell of a six year old donor. There was discussion as to whether humans were next (Anonymous 2002). Would this be a scientific way for a person to achieve immortality, or at least for a succession of copies of him to live for an indeterminate length of time?

One would expect that by today, fifteen years after Dolly was cloned, the cloning of animals would have advanced far beyond Dolly's example. Yet this is not what has happened. Notice the extended quote below taken from a recent fact sheet put out by the U.S. Government's Genome Project web site (Anonymous, 2011):

> Reproductive cloning is a very inefficient technique and most cloned animal embryos cannot develop into healthy individuals. For instance, Dolly was the only clone to be born live out of a total of 277 cloned embryos. This very low efficiency, combined with safety concerns, presents a serious obstacle to the application of reproductive cloning.
>
> Researchers have observed some adverse health effects in sheep and other mammals that have been cloned. These include an increase in birth size and a variety of defects in vital organs, such as the liver, brain and heart. Other consequences include premature aging and problems with the immune system. Another potential problem centers on the relative age of the cloned cell's chromosomes. As cells go through their normal rounds of division, the tips of the chromosomes, called telomeres, shrink. Over time, the telomeres become so short that the cell can no longer divide and, consequently, the cell dies.
>
> This is part of the natural aging process that seems to happen in all cell types. As a consequence, clones created from a cell taken from an adult might have chromosomes that are already shorter than normal, which may condemn the clones' cells to a shorter life span. Indeed, Dolly, who was cloned from the cell of a 6-year-old sheep, had chromosomes that were shorter than those of other sheep her age. Dolly died when she was six years old, about half the average sheep's 12-year lifespan.

What is of particular interest for us in this article is the shortening of telomeres during cell division. This process can easily be stopped. Living cells already contain an enzyme, telomerase, which extends shortened telomeres back to their original length. This enzyme is used by germ cells as well as in young cells which are growing towards maturity. However, at a certain point in an organism's development, particularly in mammals, the production of telomerase shuts down in most of an organism's cells. Once the shutdown takes place, it will only be a matter of time until the cell dies. For large, complex, multi-cellular organisms, this will eventually result in the death of the entire organism. The ultimate death of the organism is programmed into its gene structure!

However, there may be an advantage to the shutdown of telomerase in a large, complex mammal. A cell's chromosomes invariably become damaged over time. When telomerase production is shut down, there is a limited number of replications before the telomeres become too short and the cell suffers a natural death. This removes cells with damaged chromosomes from the body, including cells that could easily become cancerous.

By contrast, cancer cells are typically characterized by telomerase reactivation, such that the normal process of telomerase shutdown has been bypassed (Hayflick, 2000). Thus, without telomerase shutdown the animal is at higher risk of death from cancer due to chromosomal damage. With telomerase shutdown, it dies, too. One way or another, the organism will be doomed to die.

I find it fascinating that science is now showing us all kinds of ways that eventual death is programmed into all living organisms. The matters briefly mentioned here are representative of the difficulties to be encountered in the study of aging.

God told Adam that if he were to eat the fruit of the tree of the knowledge of good and evil, he would die (Genesis 2:17). Through Adam, death has spread to all men (Romans 5:12) and, beyond this, even to the entire creation (Romans 8:21). Here, the Greek word *phthora* which is translated *corruption*, in its literal sense typically refers to physical death (see also 1 Corinthians 15:42, 2 Peter 2:12). Thus, every living thing in nature is subject to death.

Certain difficulties associated with the cloning of animals illustrate principles which ultimately result in the death of all living organisms. Such principles are consistent with what we should expect based on the testimony of Scripture. God's Word is true because He is true. He designed His creation to bear testimony of Him, as science demonstrates to anyone who is willing to see it. For those unwilling to see God in His creation, God considers them to be "without excuse."

## References


Anonymous. 2002. *Class Notes: The Cloning of Dolly, 'Cc', and other Mammals* (see paragraphs V and VI). IUPUI Department of Biology. Retrieved August 18, 2011 from www.biology.iupui.edu/biocourses/N100/2k2cloning.html

Anonymous. 2011. What are the potential drawbacks of cloning animals? *Fact Sheets about Science: Cloning*. National Human Genome Research Institute. Retrieved August 19, 2011, from www.genome.gov/25020028#al-11

Hayflick, L. 2000. The Illusion of cell immortality. *British Journal of Cancer* **83**(7), 841–846. Retrieved August 19, 2011, from www.ncbi.nlm.nih.gov/pmc/articles/PMC2374692/pdf/83-6691296a.pdf


*Photo credit:* A photo of Dolly in her taxidermied form. Original photo by Toni Barros. From Wikimedia Commons, http://commons.wikimedia.org/wiki/File:Dolly_face_closeup.jpg

◁ CM ▷

Creation Research Society
P.O. Box 8263
St. Joseph, MO 64508-8263
USA
Address Service Requested



Creation Matters
July / August 2011
Vol. 16 No. 4

All by Design

by Jonathan C. O'Quinn, D.P.M.,

# Shooting Silk from the Feet

The dry attachment systems that most spiders have at the tips of their legs allow them to climb on most surfaces, even very smooth surfaces. Tarantulas, which can weigh up to 50 grams, are too bulky for this. In spite of their large size, their bodies are quite fragile, and thus they would not survive a fall from any height.

Everyone knows that spiders produce silk from spinnerets located at the rear portion of their abdomens. However, researchers have looked at a fascinating fact about tarantulas. If a tarantula is climbing a vertical surface and begins to lose its footing, it may slip a bit, but it will rarely fall. This is amazing, given the large body size of these spiders.

Investigating the cause of this, researchers have learned that when tarantulas begin to slip, they produce microscopic strands of silk from their feet. In fact, there are silk-producing "spigots" on the feet of tarantulas, which extend beyond the microscopic attachment hairs on their feet. These spigots are activated by a sudden loss of footing when climbing, providing life-saving attachments to the surface on which the spider is climbing. What's more, they activate automatically, so the spider doesn't have to think about it! Evidence was shown for this phenomenon in three species, leading the authors to suggest that it is common among tarantulas.

Everywhere in nature, we see example after example of creatures that are perfectly designed for their unique habitats, endowed with special abilities which are critical to survival. Such perfection is not random, nor could it have developed by accident or in stages.

## Bibliography

Rind F.C., C.L. Birkett, B.-J. A Duncan, and A.J. Ranken. 2011. Tarantulas cling to smooth vertical surfaces by secreting silk from their feet. *J. Exp. Biol.* 214:1874–1879. doi: 10.1242/jeb.055657, June 1, 2011.

◁ CM ▷