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Gravity Wave Observations Are Powerful Evidence for Relativity and Black Holes

by D. Russell Humphreys, PhD

On September 14 last year, at 09:50:45 universal time, the two detectors of the Laser Interferometer Gravitational Wave Observatory (LIGO) each observed an identical signal well above their noise level (Abbott *et al*., 2016; Chang, 2016). The detectors, one in Livingston, LA (Figure 1) and the other in Hanford, WA, are about 3000 km apart. A radio signal traveling at the speed of light needs about 10 milliseconds to travel from one site to the other. The signal arrived first at the Livingston detector and 6.9 milliseconds later at the Hanford detector. A plane-fronted wave (which we would expect from a distant source) traveling at the speed of light, would have to arrive at an angle of about 45° away from the line between the detectors (Figure 2).

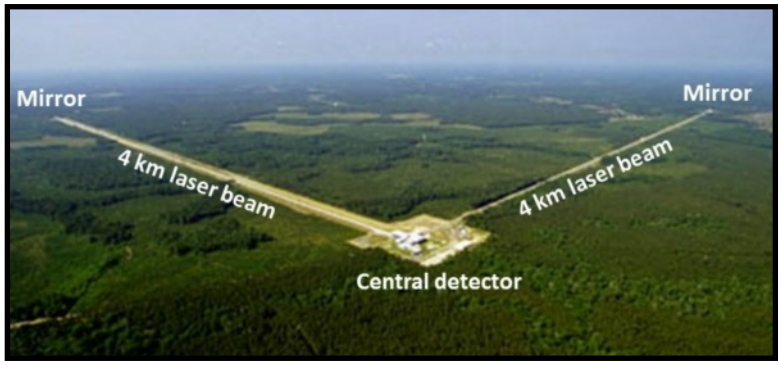


FIGURE 1. *LIGO detector at Livingston, LA. Each arm of the instrument is an evacuated 4-km pipe containing a laser beam reflected many times back and forth between mirrors at each end of the pipe. The mirrors are very well protected from ground vibrations. Finally a central detector compares the two beams, showing differences in the beam lengths as small as one ten-thousandth of the width of a proton.*

Tiny changes in the length of each arm produce the signals. Figure 3 shows the two signals observed, one shifted 6.9 milliseconds to lie over the other. Theorists using Einstein's general theory of relativity had predicted the basic shape and timing of these signals by calculating the gravity waves that would be made by the inspiraling and merger of two star-sized black holes (Baker *et al*., 2006). The large LIGO team of physicists and engineers spent about one month looking for ways, including a possible malicious hoax, that the signals might not have been caused by real gravity waves. But they found none.

Gravity waves are a necessary consequence of the gravitational field equations (the basis of general relativity) that Einstein published one hundred years ago. Just as in the 19th century, Maxwell's equations for electric and magnetic fields had predicted that accelerating electrons would make radio waves moving at the speed of light, so also Einstein's gravitational equations in the early 20th century predicted that accelerating masses should make waves in the fabric of space moving at the speed of light. But gravitational waves would be so weak that only astrophysical events with fast-moving star-sized masses would offer a chance of making waves strong enough to detect. Very compact massive objects, such as neutron stars, orbiting each other very fast, would be the most likely sources.

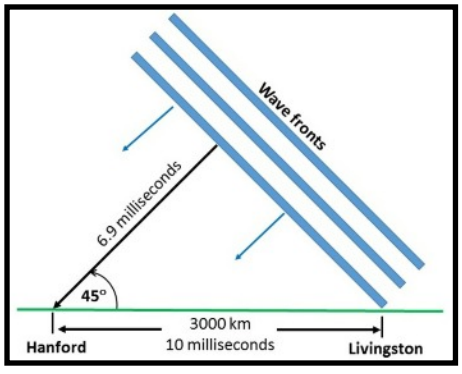


FIGURE 2. *Waves arrived at the two LIGO detectors traveling at an angle of about 45 °with respect to the line between them.*

Simple physics analysis of the LIGO signals showed that the source had to be two merging black holes. Black holes are a unique feature of general relativity. If a massive object gets small enough, a spherical "event horizon" comes into existence around it. At the event horizon, the gravitational energy (not force) in the fabric of space is so great that light waves come to a complete stop there. No light inside the event horizon can get outside it, so astrophysicists of the 1960's dubbed the then-theoretical objects "black holes."

Numerical relativity simulations fitting the signals say that the inspiraling black holes had about 29 and 36 Solar masses, and that the final (merged) black hole had about 62 Solar masses. The difference of about 3 solar masses was radiated as gravity-wave energy. The mass of three Suns, converted entirely to energy, made this a very bright source, but only in the gravity-wave spectrum, not as light. Knowing the brightness of the source allowed the LIGO team to estimate its distance as about 1.3 billion light-years. Various creation cosmologies would say the merger happened only thousands of years ago as measured by clocks on Earth, and that the gravity waves got here as fast as the light from distant galaxies.

Just before their event horizons

... continued on p. 6

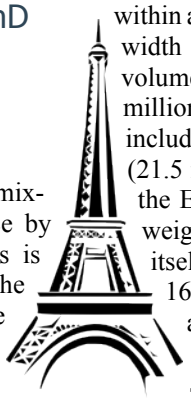
Math Matters

by
Don DeYoung, PhD

Thin Air

Our atmosphere consists of a mixture of gases held in place by gravity. The earth's radius is about 4000 miles, and 99 percent of the atmosphere is within 25 miles of the earth's surface. Thus, our precious blanket of air is comparable to the thickness of the skin on an apple.

At the earth's surface, air has a density of about 1.225 kg/m^3, or 0.0765 pounds/ft^3. Consider a comparison with the famous Eiffel Tower in Paris. This grand structure has a square base 125 meters (410 ft) on each side, and a height of 324 meters (1063 ft) including its antenna. The wrought iron lattice of the Eiffel Tower totals about 7.3 million kg (16.1 million pounds).



Now, suppose the tower were incased within a large cylinder with an equivalent width and height. The total cylinder volume will be 7.95 million m^3 (281 million ft^3), and the total mass of the included air will be 9.75 million kg (21.5 million pounds). This means that the Eiffel Tower-sized cylinder of air weighs much more than the tower itself, 21.5 million ft^3 compared to 16.1 million ft^3. The earth's thin atmosphere does indeed add up to impressive weight and pressure.

The table shows the composition of clear dry air. These percentages were chosen from the beginning of time for our well being. Nitrogen, for example, dilutes the oxygen to a safe level. If the air held several percent more oxygen, spontaneous fires would result. If there were less oxygen, we would suffocate.

The earth's atmosphere takes considerable abuse from the worldwide emission of exhaust, explosions, and chemicals. Still, the air remains healthy in most locations other than polluted cities. There are multiple feedback mechanisms in place whereby the air cleanses itself when given a chance to recover. Take a deep breath and enjoy the air, an essential benefit of the planned creation.

Composition of clean dry air

Gas	Percentage
Nitrogen, N_2	78
Oxygen, O_2	21
Argon, Ar	0.93
Carbon Dioxide, CO_2	0.03
Other	0.04
Total	100.00

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Problem/Solution — Navigation by Magnetoreception

by Michael G. Windheuser, PhD

When he was 12, my youngest son won the local science fair using an observation about the ability of goldfish to sense and orient themselves in relation to the prevailing magnetic field. The initial observation was made by Vlastimil Hart using carp (*Cyprinus carpio*) held in live tanks at a European Christmas market. The fish oriented themselves in a preferential direction when at rest in the tanks (Hart, et al., 2012).

My son's project asked the question whether fan-tailed goldfish, also members of the cyprinid (carp) family, have a preferred direction when at rest, and whether that can be changed by 90 degrees through the use of a strong magnet placed outside the test bowl. It turns out that fan-tailed goldfish do have a preferred rest position, and the fishes' orientation at rest can be predicted when a strong, local magnet overwhelms the earth's magnetic field, changing the field axis by 90 degrees (Windheuser, 2014).

A number of animals exhibit magnetoreception, having the ability to sense the earth's magnetic field and navigate in relation to it. Some birds, like the Savannah sparrow, have both a magnetic sense, linked to its right eye, and a magnetic map sense resident in its brain (Denny and McFadzean, 2011). Sea turtles exhibit similar magnetoreception, returning to their breeding grounds each year. Pacific salmon apparently imprint on the magnetic field present where their freshwater breeding stream enters the ocean. And some sharks also have a similar ability which aids them in assembling for yearly gatherings.

It seems that magnetoreception is an elegant solution to the problem of navigation through an otherwise featureless environment like the ocean, but one that not all sea or land creatures share. Histologic analysis of brain sections of fish and other animals have demonstrated the existence of structures which are composed of tiny, iron-rich crystal cores that respond to the prevailing magnetic field. Movement of the cores within these cells in some way communicates the strength and direction of the magnetic field, and the animals' brains process this input into directional behaviors (Eder, et al., 2012).

These observations belong to a broad

Wikmedia

category of examples in the natural world that match appropriate engineering solutions to biological problems, such as navigation, when other directional cues are absent. But did magnetoreception evolve independently several times in different animals in response to similar problems, or is it an example of selective and intelligent application by the Creator of a solution for a known biological need or "problem"?

For the scientist who is also a Christian, the latter case seems more likely, since the evolutionary explanation would require incremental, gradual changes, all of which would need to impact survival in a positive way for each change to be retained. What selective advantage would partial receptor cells have, and when would the animal develop the mental understanding of the meaning of the signals from them?

Both a functioning magnetoreceptive cell and the non-physical, mental program to interpret its signals must be present for there to be a selective value for the animal. This is similar to the idea of irreducible complexity described by Michael Behe for the bacterial flagellum (Behe, 1996), but adds the concept of a non-physical, mental program converting physical signals into three-dimensional movements as a requirement for full functionality.

Magnetoreception is an appropriate and functional solution to the navigational needs of some animals. Our all-wise Creator had foreknowledge of the navigational challenges some animals would face, and created a perfect solution to the problem, one that is exactly matched to the needs of the organism, and that is always "on" because it is linked to the earth's magnetic field.

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FACADES & FOUNDATIONS

Worldviews in Natural History

by John K. Reed, PhD

How did the "historical sciences" gain such prominence? It can be traced to the Western conversion to the worldview of naturalism, combined with Christian blindness and apathy. Most of us dismiss worldviews as esoteric philosophies, but they steer the history of ideas. Finite, fallen creatures need a framework of belief to cover gaps in their knowledge and to suppress unpalatable truth (Romans 1). For centuries, Christianity provided this cultural consensus, but Enlightenment naturalism (Figure 1) has displaced it (Reed, 2001; 2013).

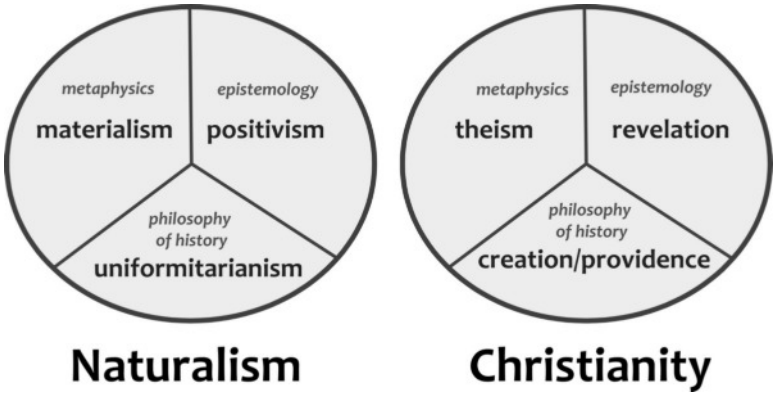

FIGURE 1. *Comparison of Christianity and naturalism in three basic elements: metaphysics, epistemology, and philosophy of history. Note internal logic in both, but external conflict in every area. For more explanation, see Reed (2013).*

Much of naturalism's success came from denying its own nature! Positivism—the assertion that science is the only path to truth—negates theology, putting science on the pedestal once occupied by divine revelation. It reassures secularists that their rejection of "religion" is rational, not moral. Free from that "taint," their knowledge is pure, as they gaze on their pitiful opponents, mired in superstition. Though logically falsified long ago, positivism remains a potent *emotive* force.

Another source of success is naturalism's ability to keep debate on safe secular ground. Christians affirm science—truth is integral to Christianity—but they also affirm its modern distortions. And science is just one path, not the guaranteed truth of divine revelation (Hebrews 6:18). Christians who have fallen for that scam cannot both refute naturalism and retain science, so they retain science and "fix" the Bible. Paralyzed by accusations of a mythical war between science and religion, and by the insistence that "methodological" naturalism is inherent to science (cf., Reed and Williams, 2011), they have no effective reply, even though the "war" is a myth and naturalism is a parasite of science, not its foundation.

Naturalism relies on deception to overcome inherent self-contradictions in natural history. Early on, it faced two great barriers. The first was the Bible's coherent framework of the past, and the second was the inability to adequately test hypotheses about unique, unobserved past events (Reed and Klevberg, 2014a, b). Early secularists such as Lyell overcame both using *uniformitarianism*. It twisted the well-accepted axiom of uniformity into a philosophy of history. It then claimed a sufficient similarity between past and present geological processes to guarantee a "scientific" understanding of ancient processes. This opened the door to the "scientific history" that displaced Genesis.

Theologians were largely asleep, mesmerized by "science," or wolves in sheep's clothing. Ongoing compromise allowed naturalism to displace Christianity. Today, a secular natural history that features evolution and billions of years is so well-entrenched that it is embraced by many churches.

If naturalism has evolved into the dominant system, why should Christians stand in its way? First and foremost, we should obey God. Second, naturalism *as a worldview* fails *logical* tests (Lisle, 2009; 2010; Reed et al., 2004; Reed and Williams, 2012). These contradictions stem from naturalism's reliance on science, which in turn relies on Christian axioms, such as the inherent rationality of nature. Science developed and thrived in, *and only in*, the Christian West. Therefore, its underlying presuppositions are justified only by Christian theology.

Creationism is fighting far more than twisted facts, incoherent theories, and incomplete forensic history. At root, it is a conflict between worldviews. In recent decades, we have seen the degradation of the old optimistic naturalism towards nihilism in the current postmodernism rejection of truth. Science cannot survive those forces; even now we see its vanishing integrity. Only a Christian worldview could create and contain science and its discoveries; only a robust Christianity can save it from naturalism.

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Speaking of Science

from the Creation-Evolution Headlines

by David F. Coppedge

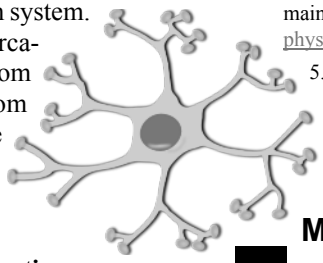
*Editor's note: These S.O.S. (Speaking of Science) items have been selected from "**Creation-Evolution Headlines**" by David F. Coppedge at http://crev.info and are used by permission. Unless otherwise noted, emphasis is added in all quotes.*

Life as the Communication of Information

Could the essence of life be not so much the material substrate, but the transfer of information? At every level, we see life transmitting and receiving information. Organelles send and receive information from the DNA library. Colonies of cells transmit and receive molecular signals to each other. Sperm communicates with egg. Tissues communicate with organs, which communicate with bodies and brains. Groups of organisms transmit and receive information with their multiple senses: birds chirping, wolves howling, elk bugling, etc. Ecological systems communicate.

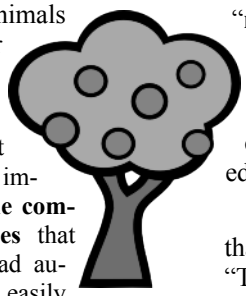
Finally, the master communicators on earth are human beings who can send and receive information across the world in seconds, and even receive and send information through outer space to and from their machines. Let's see some examples from the news of living communication.

Neurons: A network is a basic communication system. Networks of nerves synchronize to keep the circadian clock in working order, a press release from UC Santa Barbara explains.[1] "Taking a cue from information theory," researchers measured the information transmitted in the part of the brain that runs our biological clock. Prof. Linda Petzold wanted to know how it was wired:



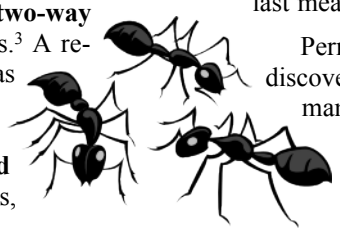
> By understanding which **cells** are **communicating** as they perform certain tasks, she explained, it is possible to gain insight into how this small organelle of about 20,000 neurons keeps the entire body on a 24-hour clock, regulating essential functions such as sleep, hunger, body-temperature regulation, hormone release and gene expression.

Trees: The role of "fruit aroma" in attracting animals to plants so that they will aid in spreading their seeds is explored on *ScienceDaily*.[2]



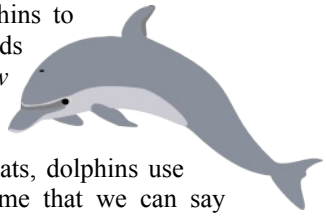
> "Taken together, our studies demonstrate for the first time that the pleasant aroma that characterizes many ripe fruits may have an important ecological function of **mediating the communication between plants and primates** that disperse their seeds," says Omer Nevo, lead author… "Primates benefit from the ability to easily and reliably identifying [sic] ripe fruits. In return, plants are selected to provide odorous fruits that attract primates and promote seed dispersal."

Ants: Why do ants touch their antennae as they pass each other on their long ant trails? They're using a "**two-way communication system**," *ScienceDaily* says.[3] A researcher at the University of Melbourne was surprised: "An ant's antennae are their chief sensory organs, but **until now we never knew** that they could also be **used to send out information**." They're not just receptors, in other words, but transmitters, too. "**Like everyone else, we assumed** that antennae were just receptors, but **nature can still surprise us**."



Bats: Bats emit and receive high-frequency auditory signals on their nightly hunts, but they live in a very noisy environment. *PhysOrg*[4] talks about how they deal with the "constant din" of noise without going deaf.

Dolphins: Researchers in Florida gave dolphins a puzzle to solve. A canister with food required two dolphins to work together to pull on ropes at both ends simultaneously to open the device. *New Scientist*[5] tells how they heard the dolphins who solved the puzzle employ a special language when working together. Like bats, dolphins use sonar to find prey. "This is the first time that we can say conclusively that dolphin vocalisations were used to solve a cooperative task," researchers found.



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More Examples of Exceptional Preservation

Tired Blood: A video posted by Reuters[1] shows the "**'oldest in world' fossilized blood vessels.**" Found by Polish scientists, this fossil reptile appears to have original traces of proteins—including the amino acids of collagen—in rock said to be 240 million years old. It clearly shows traces of blood vessels and their "**molecular remnants**" in bones found during an excavation. "Researchers were soon able to show that **there was organic matter** from prehistoric animals **present in the bone**," including "**fragments of amino acids** that are typical components of collagen." This was apparently "**among other proteins**" detected.

This new claim is much older in the evolutionary time scale than was the previous record, which they cite as 80 million years. "The latest discovery goes back 3 times further," the video concludes. How could structures this delicate survive the ravages of tens or hundreds of millions of years?

Puppies in permafrost: They say these dogs are 12,400 years old, but their organs and fur are intact, along with remains of their last meal.

Permafrost is thawing in Russia, and with it, astonishing discoveries of animals and plants from long ago. Siberia's frozen mammoths are well known, but *PhysOrg*[2] reports that the discovery of two exquisitely-preserved puppies is a first:

... continued on p. 8

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merged, these very massive objects were within just a few hundred km of each other, orbiting each other more than 100 times per second (6000 r.p.m.) at over half the speed of light. Figure 4 illustrates the waves in the fabric of space that this violent event produced.

For 100 years now, a small but determined cadre of critics has been taking pot shots at general relativity (GR), special relativity (a subset of GR), and black holes. Some creationists are among the critics. Their thought seems to be that since evolution is so drastically wrong, any hard-to-understand ideas in modern science must be wrong also. The critics have persisted despite a series of ever-more-stringent experimental tests over the century that GR has survived (Will, 1986). These include:

1. deflection and time delay of radar beams and pulsar signals passing close to the Sun
2. now very precise measurements of gravitational and velocity time dilation by atomic clocks and the GPS system
3. satellite measurements of gravitomagnetism
4. gravitational red shift of light and gamma rays
5. orbital perturbations of planets
6. rundown of binary pulsar orbits (Taylor and Weisberg, 1982)
7. … and now, gravitational waves from merging black holes.

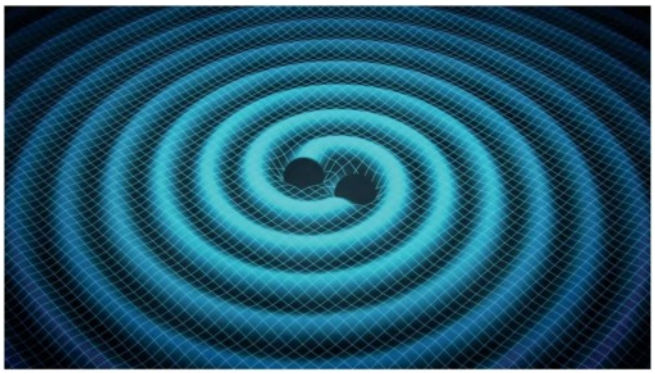

FIGURE 4. *Gravity waves, distortions in the fabric of space moving outward at the speed of light, made by two black holes spiraling in towards each other very rapidly. Used by permission, Cho, 2016.*

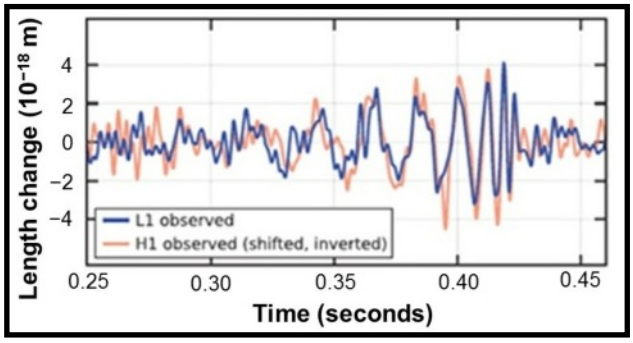

FIGURE 3. *Signals observed by LIGO. Blue is signal at Livingston detector. Orange is signal at Hanford detector, shifted by 6.9 milliseconds and inverted. Graphic from Cho, 2016: Used by permission; annotation added by Humphreys.*

Item (7) requires not only that black holes exist, but that their orbits follow GR precisely at up to half the speed of light, in regions where gravity is so strong that departure from Newtonian theory is quite large. The more one knows about the LIGO observations, the harder it is to avoid the conclusion that GR is very accurate, a basic feature of God's creation. That is good news for creation cosmologists who have been using GR to reconcile astronomical observations with a straightforward understanding of Scripture.

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Matters of Fact

by

Jean K. Lightner, DVM, MS

Created Versus Mutated: How Do We Know?

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 How can we recognize when an allele is the result of mutation?

A That is an excellent question. Certainly humans and animals were likely created with some built-in variation. In genetics there is a term, heterozygous, that is used to indicate that two different versions of the gene (alleles) are present in an organism. In most instances, this is considered a healthy situation. Therefore, we need to recognize that more than one sequence may have been created for any particular gene in which we have an interest.

What is a mutation?

For the purpose of this discussion, a mutation can be defined as a change in the DNA sequence. During meiosis, the cell division responsible for making eggs and sperm, a shuffling goes on (i.e., homologous recombination, which includes crossing over and gene conversion) that may change the sequence of a gene, but many people do not tend to think of this as a mutation. The idea that other designed mechanisms may also be involved in DNA changes has been discussed previously in this column [*Creation Matters* 18(1):6–7, 2013 and 19(3):3–4, 2014]. At the popular level, many assume that mutations are *all* just the result of unrepaired copying errors or damage by harmful mutagens. While it is known that *some* mutations are from these sources, it is purely an assumption to believe that this is the typical mechanism by which mutations arise.

Comparing offspring to parent

The most direct way to demonstrate that a mutation has occurred is to compare the DNA sequence of a person or animal with that of its parents. If there is a place where the sequence doesn't match either parent, then a mutation has occurred.

Interestingly, this can be done with plants too. In a study in which many such comparisons were made, the researchers found that when a parent carried two different alleles, mutation was more likely to show up in the offspring (Yang et al., 2015). This implies that some genes may have been created heterozygous to aid in the further development of variety in those particular regions of the genome.

We don't always have the ability to directly compare the DNA sequence between parents and offspring, but there are several other ways we can infer that a mutation has occurred.

A New Trait

On occasion, a white foal is born to solid-colored horses with no history of white individuals in their pedigree. In many cases, investigation has revealed that this trait is attributable to a mutation in the KIT gene (Haase et al., 2009). KIT is involved in regulating the migration of pigment cells during embryogenesis. In white horses, as well as many with white spotting patterns, there are no pigment cells in the white areas.

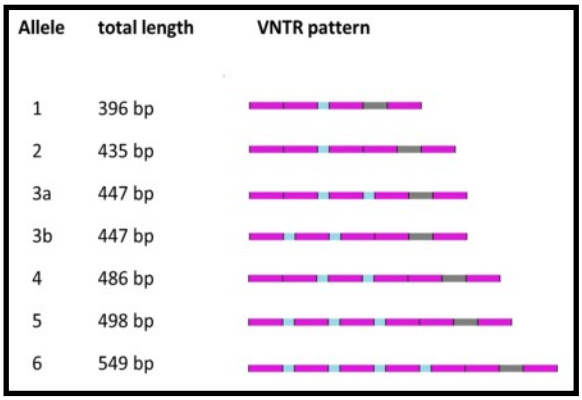

FIGURE 1. *Seven different nucleotide sequences found in exon 3 of dopamine receptor D4 in dogs. Since any one dog may carry up to two versions, and only two ancestors survived the Flood of Noah's day, some of these alleles are clearly the result of mutation. This is not random mutation; instead the changes involve duplicating or deleting tracks of 12 base-pair (light blue) and 39 base-pair (purple) sequences.*

Thus, an altered sequence of KIT can disrupt the normal migration pattern of pigment cells, resulting in white areas. Currently, there are close to two dozen different variants in the KIT gene associated with white color patterns (Haase et al., 2015; supplementary material). All these appear to be from mutation.

Disruption of a Pathway

Living things are incredibly complex. Our bodies can make hundreds of thousands of different proteins, and there are many factors that control when and where they are produced. Numerous pathways connect to form complex networks which ensure that our bodies are regulated so that life is possible.

In many cases, whether it involves antibiotic resistance in bacteria or coloration patterns in animals, we know that an allele is the result of mutation because it disrupts a pathway (Anderson, 2005). For example, the coat colors of black cattle or red Irish setters are each the result of mutation in the MC1R gene. Under normal conditions the MC1R, a protein on the surface of pigment cells, acts as a switch. When it is ON, a darker pigment is produced; when it is OFF, a lighter pigment is produced. In black cattle, the mutation results in only black pigment being produced because the protein switch is "stuck in the ON position." In contrast, in the Irish setter, the switch is broken and no black pigment can be produced, leaving only the lighter red pigment. In both of these cases, the protein no longer responds to its normal signaling molecules (Lightner, 2008).

While altering a protein so it disrupts a pathway can sometimes create problems, in the cases mentioned above it is not usually harmful to the organism. Some mutations in the MC1R gene of wild mice provide a protective coloration so they can blend into their environment (Nachman, 2005). In the case of dogs and cattle, these mutations provide interesting variety that we can enjoy.

Isolated

Most alleles that were created would be expected to be widely distributed. In contrast, alleles that have arisen since the dispersion following the global Flood would not be expected to have a cosmopolitan distribution. Alleles which are confined to a particular ethnic group (in humans) or only a few breeds or species within a created

kind are more likely the result of mutation.

In the case of *KIT* mutations, often only a few animals or even a single individual carry the allele. For *MC1R* mutations, frequently it is restricted to one or a few breeds in domestic animals, or to a specific species or subspecies in wild animals.

Too many versions

The history in Genesis provides another good clue to get an idea of how much mutation has affected life on earth. At the time of the Flood, only two representatives, a male and a female, from each of the unclean land animal kinds were preserved on the Ark. That fact alone tells us that no more than four alleles (two in each animal) were present for any particular gene in these animals. If we evaluate how many genes we see today within, for example, the domestic dog, we see that more than four alleles exist for many genes (Lightner, 2009).

Sometimes we cannot tell for sure which alleles were created and which ones arose by mutation. For example, one portion of the gene coding for dopamine receptor D4 in dogs has 12 base-pair and 39 base-pair segments that are repeated a variable number of times (Figure 1). The general term for this is "variable number tandem repeats" (VNTRs), and they are quite common in various parts of the genome. Since dogs are unclean, a maximum of 4 of the 7 alleles shown could have been carried by their ancestors during the Flood. Therefore, we know that at least 3 have arisen through mutation.

Notice that these mutations are not random. Both 12 and 39 are multiples of three, and DNA is read three bases at a time to code for each amino acid in a protein. Thus, these repeats change how many amino acids are in the final protein, but they do not cause a frameshift, which would result in different amino acids downstream. One might propose that natural selection has caused this non-random pattern, but that is far-fetched. Not only are the repeats too neatly copied, but there are examples (in humans and mice) where mutations in other exons of this gene do cause a frameshift, yet the lack of a functional protein is not associated with any disease (Lightner, 2009).

There is a good reason to believe that at least two alleles were created, and at least two were present at the time of the Flood. Recent studies have shown that VNTR mutation rates are greater in those individuals who are heterozygous (Jin et al., 2016; Amos, 2016). Thus, this appears to be another example where created diversity underlies the further development of diversity in that region.

Results of mutation

The results of mutation vary widely. Some mutations are lethal. It is believed that this is the case for some *KIT* mutations when two copies of the mutant gene are in a single animal (i.e., the animal is homozygous), since these *KIT* mutations have only been found in the heterozygous condition. Other mutations can cause disease. The mutations discussed here are adaptive and/or add interesting variety that we can enjoy. None of the mutations added complexity, as is required by the evolutionary model of universal common ancestry. Instead, all these changes required pre-existing complexity designed in a way that allows for change. For this reason, they point to an awesome Creator, as described in the Bible.

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Speaking of Science

...continued from page 5

"**To find a carnivorous mammal intact with skin, fur and internal organs—this has never happened before in history**," said Sergei Fyodorov, head of exhibitions at the Mammoth Museum of the North-Eastern Federal University in the regional capital of Yakutsk.

It's been reported in *Discovery News,*[3] *Science Alert,*[4] and *The Guardian*.[5] Well, maybe the latter's headline "Bark to the Future" is over the line, along with suggestions that the find will reveal something about "canine evolution," but really: scientists are eagerly examining the remains, dubbed the "Tumat puppies" after the nearest village. They are hoping to do genomic testing to compare the dogs' brains with those of modern dogs. The newly discovered specimen appears to be from the same litter as one found in 2011.

The most complete report, with the most photos, is in the *Siberian Times,*[6] with a video clip of scientists holding and cleaning the specimen, chattering in Russian and English. Apparent butchering marks on some nearby mammoth bones, along with evidence of fire, suggest that humans were on the scene. Maybe these were domesticated dogs, at least partially.

Dates of 12,400 years are being assigned to the carcasses. Preservation of puppies is rare, the reports say, because they have thin bones and delicate skulls. What did it eat for its last meal? "When we opened it [the stomach], we were very surprised. The second puppy's stomach is mostly full of twigs and grass," Fyodorov said. He thinks "perhaps the animals were not exclusively carnivorous or whether they started eating grass after they were trapped by a mudslide and began to starve."

"The fact that **soft tissue is preserved** will give much more information compared to information that can be obtained from 'normal' fossils," she said [Mietje Germonpre, a palaeontologist from the Royal Belgian Institute, quoted by The Guardian].

The exceptionally warm weather is motivating local people to go deeper into the Siberian permafrost where excavation of mammoth tusks for sale is permitted. The tusks can sell for tens of thousands of dollars. They "are increasingly prized by Chinese carvers given trade bans on elephant ivory," *PhysOrg* says. New discoveries have risen several-fold over the last few years, a researcher said, hinting that "Yakutia's melting permafrost is likely to yield up even more treasures in the coming years."

The Guardian quotes a researcher saying "Everyone understands that the tissue of mammoth fauna loses its structure with every passing second, even in the freezer." It sounds like a good reason to question the assigned dates.

Echinoderms and Paleozoic tissue: *Geology*[7] announces a near-record find of original organic molecules from echinoderms:

> Isolation of **organic molecules directly from Paleozoic to Cenozoic fossils** has been documented, which **raises important, new questions about the conditions of preservation** and the range of paleobiological issues that can be addressed with these new data. Herein, molecules are isolated from fossil **echinoderms exceeding 445 Ma in age.**

The authors quickly shift gears, however, showing more concern about what the molecules might teach about evolution:

> Previously, morphological data have been insufficient to **establish a consensus** regarding **early echinoderm evolution.** Thus, organic molecules extracted from fossil echinoderm specimens (mostly Paleozoic) … are used to assess the position of crinoids and blastozoans within competing echinoderm **phylogenetic hypotheses**.… These new data **support the hypothesis** that living eleutherozoans **diverged** early from stemmed echinoderms.…

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Arad Texts Confirm Widespread Literacy in Judah

Analysis of 16 texts written on pottery shards confirm that ordinary people were literate in Old Testament times.

The Bible is not often mentioned in the *Proceedings of the National Academy of Sciences*.[1] A paper by scholars including Israel Finkelstein (advocate of a late chronology) concludes that ordinary soldiers at a remote desert outpost called Arad were literate. By doing handwriting analysis of inscriptions on 16 pottery shards, they deduced that there were at least six different individuals, each of which knew how to write and spell correctly. Rachael Pells writes in The Independent:[2]

> The writing, dating back to around 600 BC, **details nothing extraordinary** and consists mostly of shopping lists and broken military commands. By comparing the different handwriting however, historians were able to deduce that the messages had been **written by several different people across a range of social classes**.
>
> "In other words, **the entire army apparatus**, from high-ranking officials to humble vice-quartermasters of small desert outposts, was literate," the academics wrote in the journal *Proceedings of the National Academy of Sciences of the United States of America (PNAS)*.

What this implies is that Judah had an educational apparatus capable of teaching these representative individuals reading and writing. "We're dealing with **really low-level soldiers in a remote place** who can write," Finkelstein told *Live Science*.[3] "So there must have been **some sort of educational system** in Judah at that time."

Six hundrerd BC was just before the Babylonian Captivity (586 BC). Advocates of the late chronology used to believe that most of the Old Testament was compiled after the return to Jerusalem. This new analysis supports the idea that literacy was widespread earlier, meaning that Judeans were capable of compiling lengthy Biblical texts before the invasion. The *PNAS* paper states,

> The spread of literacy in late-monarchic Judah provides a possible stage setting for the compilation of literary works. True, biblical texts could have been written by a few and kept in seclusion in the Jerusalem Temple, and the illiterate populace could have been informed about them in public readings and verbal messages by these few (e.g., 2 Kings 23:2, referring to the period discussed here). **However, widespread literacy offers a better background for the composition of ambitious works** such as the Book of Deuteronomy and the history of Ancient Israel in the Books of Joshua to Kings (known as the Deuteronomistic History), which formed the platform or Judahite ideology and theology (e.g., ref. 25).

Arad is a desert outpost west of the southern tip of the Dead Sea. The paper did not make clear if these ostraca are new discoveries or re-analyses of existing finds from the site. The inscriptions mention the "king of Judah" and "the house of YHWH" (the temple)—a reference to the first temple built by Solomon, validating its existence.

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... continued on p. 11

Letters

The Geologic Column and Biblical History: A Response

In their recent article, Froede and Akridge (2015) claim that "many young earth creationists" have mistakenly absorbed naturalism in their thinking about earth history. In their view, this has happened because they have adopted the Geologic Column. They claim that the Geologic Column is inherently linked to the "philosophical framework" of naturalism. However, Diluvialists who recognise the validity of the Geologic Column do not accept the premise of Froede and Akridge, namely that the Column is "naturalistic" and comes with an embedded "philosophical framework". Froede and Akridge are asserting rather than reasoning their case.

In their comments, Froede and Akridge refer to difficulties reconciling the CPT flood model and the biblical flood. They say that the "naturalistic Geologic Column" provides the conceptual framework — again they insert the word "naturalistic" without arguing the case. It is fair to say that the Geologic Column provides a time-sequenced framework for interpreting Earth history. However, "conceptual framework" is too strong an expression, because the Column provides a sequence that needs interpretation, and this is where naturalism comes into the picture.

Again, the word "naturalism" is asserted when Froede and Akridge refer to "naturalistic Sloss stratigraphic sequences." No attempt is made to challenge the description of a megasequence: a package of strata bounded top and bottom by erosional surfaces with coarse sandstones at the bottom, followed by shales, and then limestones. Yet the definition shows that the megasequence is not a philosophical construct, but one based on empirical observations. Again we ask, where does the "naturalism" come in? The answer is that it comes into the timescales and the depositional mechanisms associated with the rock layers, not in empirical observations of the succession of lithologies and associated fossils.

Froede and Akridge propose a "simple test" which involves comparing the way the CPT and Megasequences models propose to reconcile the rock record with biblical history. They claim that this is also a test of the naturalistic Geologic Column — but the logical reason for this is not explained.

An inconsistency does not mean that both models are wrong, simply because it is still possible that one may be correct! If this is acknowledged, where does this leave Froede and Akridge's argument? Furthermore, the identified inconsistency is not that marked. In both models, the onset of the Flood is in or at the end of the Proterozoic, and the Flood culminates after the Cretaceous.

Froede and Akridge refer to "a Bible based geologic timescale and stratigraphic column." However, although Earth history is linked to geologic energy, there is no clear link to a stratigraphic column in their Figure 2. Rather, this is a timescale that can be applied to "each outcrop, basin and region." Furthermore, their geologic energy curve leads directly to similar problems of interpretation that affect all Flood models. Arguably, both YEC approaches the authors criticise are attempting to relate geologic energy considerations to regional stratigraphic data. Furthermore, both of these approaches acknowledge the importance of recognising "unnecessary philosophical baggage" — nevertheless, they regard the Geologic Column as an empirical rather than a philosophical construct.

This debate about naturalism in geology is marred when assertions replace reasoned arguments. The phrase "the naturalistic Geologic Column" begs too many questions, and other Diluvialist geologists have adopted a more nuanced position (Snelling et al., 1996; Tyler and Coffin, 2006). If this contentious issue of the Geologic Column cannot be resolved, then Diluvialists should be free to pursue their research projects and not feel obliged to revisit this foundational issue over and over again.

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—— David J Tyler

Response to Tyler: Geologic Column and Biblical History

We appreciate the time Dr. Tyler has taken to review and respond to our recent article (Froede and Akridge, 2016). It is through the exchange of ideas that Creation Science will develop and mature.

Dr. Tyler's letter can generally be divided into three subjects: 1) questions regarding Naturalism in the young-earth creationist Geologic Column (GC), 2) the validity of young-earth creationist megasequences, and 3) our assertions versus Dr. Tyler's reasoned arguments and the revisitation of the GC.

First, for the purposes of clarification, Dr. Tyler is defending the Naturalistic Remodeler's philosophical worldview of Earth history, and Mr. Akridge and I defend a Biblical Reconstructionist worldview (Froede and Akridge, 2013; see Figures 1 and 2). **All of science and scientific investigation is derived from a philosophical worldview**. The claim by Dr. Tyler that the creationist GC is independent of Naturalism and the naturalistic standard geologic timescale (SGT) indicates nescience of its philosophical underpinnings (Figure 1). The Remodeler's GC follows the same Precambrian to Holocene progression as the SGT, and its support is derived from the same naturalistic datasets (in a time compressed manner). The article by Snelling et al. (1996), which Dr. Tyler cites, defends the naturalistic philosophical underpinnings of the SGT. In their claims, Remodelers have never demonstrated that a lithostratigraphic column can exist outside of biostratigraphic correlation.

Along with Dr. John Reed, we have already provided a technical assessment of creationist megasequences (Froede et al., 2015). Most importantly, the naturalistically-claimed transcontinental unconformities do not actually exist but are derived from biostratigraphic methods. Biostratigraphy is based on evolution over time and the transformation of one life-form to another — a subject clearly outside the teachings of Scripture but consistent with the SGT and GC. We encourage Dr. Tyler to read and respond to our full article.

Our article in *Creation Matters* demonstrates (not asserts) that following the popular Remodelers' Sloss-derived mega-

sequences and young-earth creationist Catastrophic Plate Tectonics creates two geologic starts to the global Flood recorded in Genesis and at least three ending points (Froede and Akridge, 2015). This was not mentioned by Dr. Tyler and we want to reiterate the confusion that these two naturalistically-based concepts bring to Creation Science. They are both based in Dr. Tyler's GC derived from the SGT, and are defended using data derived from Naturalism (Figure 1). It should also be pointed out that Dr. Tyler's cited references in support of a "more nuanced position" are the last published works on this subject by Remodelers in the technical literature. It is hard to revisit the "Geologic Column" issue when the Remodeler position has not been presented in any detail in 10 to 20 years.

We encourage young-earth creationist Remodelers to publish their concepts and ideas in support of their philosophy in technical journals in an effort to exchange ideas in the advancement of Creation Science.

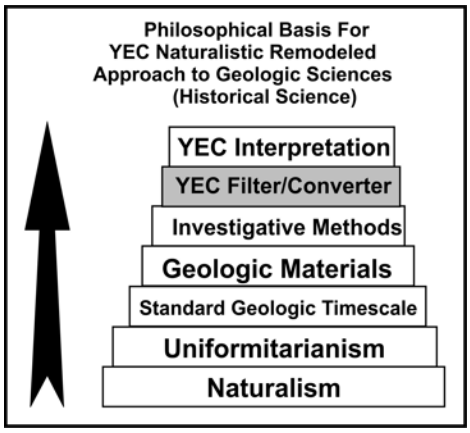

FIGURE 1. *Remodelers accept (either knowingly or not) the philosophic worldview of Naturalism and uniformitarianism in support of a time-compressed, standard geologic timescale (SGT) renamed by Dr. Tyler, a "Geologic Column." Most importantly, the Remodelers apply a young-earth creationist (YEC) filter to naturalistic concepts and methods that conforms to their biblical framework. The SGT and the Geologic Column create an anti-biblical history when animal footprints are applied (Froede et al., 2014).*

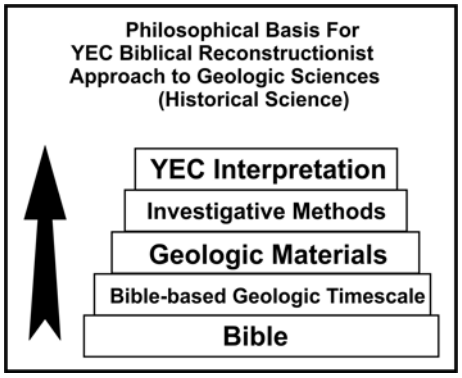

FIGURE 2. *Reconstructionists completely abandon Naturalism, uniformitarianism, the standard geologic timescale, and all of its inherent evolutionary assumptions. The biblical account of Earth history forms the biblical geologic timescale from which rocks, minerals, sediments, and fossils would be defined. The biblical account of Earth history forms the biblical geologic timescale from which rocks, minerals, sediments, and fossils would be defined (e.g., Froede, 2011).*

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CRSQ = Creation Research Society Quarterly

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—— Carl Froede Jr. and A. Jerry Akridge

Speaking of Science

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http://www.livescience.com/54368-bible-compiled-early.html

When Scientists Go Wrong

Scientific studies on scientists are not always encouraging. You probably shouldn't rely on yesterday's scientific guidelines about diet. *The Guardian*[1] begins a critique of scientific consensus about nutrition with these words:

> In 1972, a British scientist sounded the alarm that sugar —and not fat —was the greatest danger to our health. But his findings were ridiculed and his reputation ruined. **How did the world's top nutrition scientists get it so wrong for so long?**

Flawed conclusions taught as fact for 40 years cannot be laid at the foot of corporations, Ian Leslie says. Nor does it show that scientists are open to new ideas as more evidence becomes available. Instead, this incident proves Planck's maxim that science advances one funeral at a time. So how confident can we be about their advice today?

At *The Conversation*,[2] Jeremy Gibbons teases with the headline, "Science relies on computer modelling—so what happens when it goes wrong?" We don't do science the old fashioned way, verifying the properties of nature by hands-on experiment. Gibbons, a professor of computing at Oxford, warns that computer models are simplifications of nature that cannot be precise:

> Modelling is used across scientific fields — ranging from astrophysics and climate prediction to bioinformatics and economics. But there is increasing debate about the fact that this science is **difficult to validate** through reproduction.
>
> It turns out that simply describing experimental methods in words is not enough. That's partly because natural **languages such as English are simply too vague** for describing computations precisely. There is, after all, a reason why programmers use programming languages. One of the biggest challenges in software development is in converting vague requirements into precise specifications of behaviour.

He points to clear cases of bugs in inputs and outputs. Often, results are not reproducible because other scientists may not understand what the authors did, what they meant, or even because of the way different programs handle the same numbers.

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All by Design

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

Frog-sicle, Anyone?

The northern forests of Canada and Alaska contain a remarkable animal, the wood frog. We think of amphibians as warm weather animals, yet the winter temperatures in these forests can reach minus 50 to minus 80 degrees F. One might suspect the poor frogs would freeze during the winter. Well, in fact, they do — solid. The funny thing is that they are equipped to do so, and then thaw out each spring, just as healthy as can be.

Come winter, wood frogs burrow under leaf litter on the forest floor and, when it gets cold enough, they freeze solid. Normally, freezing is dangerous, because ice crystals forming within the body can rupture cell walls, and of course, frozen blood cannot circulate and deliver oxygen and nutrients to organs. However, wood frogs can remain frozen solid for up to eight months out of the year. How? Antifreeze!

At the time they begin to freeze, the wood frogs' livers produce massive amounts of glucose, which enters all the body cells, preventing ice from forming within the individual cells, and binding water molecules inside the cells to prevent the animals' becoming dehydrated. They can tolerate glucose levels 100 times normal without the sort of damage diabetic patients would suffer with blood sugar levels only 2–10 times normal. This glucose prevents ice crystals' forming inside the cells while allowing ice crystals to form outside the cells, allowing for a controlled freeze without tissue damage.

Lithobates sylvaticus
public domain (Wikimedia Commons)

Evolutionists tend to regard amphibians as "lower," less "evolved" creatures when compared with mammals. The truth is that the Mighty Creator designed each type of animal with great care and attention, providing each living thing with exactly what it needs to survive.

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