

Creation Matters

Volume 19 Number 1
January / February 2014

A publication of the Creation Research Society
50th Anniversary (1963 – 2013)

Unique Trackway in Middle Jurassic Rocks Defies Evolution

by Terry P. Beh

Recently, while on a camping trip to Slick Rock, Colorado, I saw an unusual trackway in Jurassic sandstone, which locals have always called “cat tracks.” This by itself would be a major blow to evolution. But the most significant thing about them is that they do not lie on a single layer or bedding plane of sediment but ascend vertically, crossing a number of distinct depositional layers (Figure 1).

The presence of these tracks contradicts the uniformitarian belief that the formation is eolian, or wind-formed, and took a long time to form. Absent evolutionary preconceptions, we are also free to consider that the tracksite



FIGURE 1. Three distinct trackways in Jurassic sandstone near Slick Rock, Colorado.

was made by a creature that was not a dinosaur, such as a large feline. Cat-like and bear-like footprints have previously been reported in Cretaceous limestone (Morris, 1980).

Geology of the area

The geology surrounding the abandoned uranium-mining town of Slick Rock in southwestern Colorado is characteristic of the canyon country of the Colorado Plateau, spanning much of the Jurassic Period. In fact, the mine there was among the earliest sources of uranium for the atomic bomb in the 1940s (Davis, 2013). As in much of the “uranium country” of western Colorado and eastern Utah, this radio-

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Making Predictions in Biology Using the YEC Model

by Jean K. Lightner, DVM, MS

As a reliable source of natural history, the Bible provides some important information related to biology. Animals were created according to their kinds (Genesis 1:21; 24–25). They were to reproduce and fill the earth (Genesis 1:22; 8:17; Isaiah 45:18). At the time of the Flood, terrestrial and flying animals were reduced to very small populations; only two individuals of each kind in the case of unclean animals. In biology, a severe reduction in a population is known as a population bottleneck.

With my background in animal science and veterinary medicine, I am primarily interested in mammals. Using the historical



FIGURE 1. The red color of Irish setters is the result of a mutation in the *MC1R* gene.

information from the Bible and the patterns of living things we observe today, there are some conclusions we can make. As I researched the sheep and goat kind, I began to realize that an enormous amount of variability has arisen since the population bottleneck at the Flood. This includes different growth patterns in horns, variation in characteristics of the hair coat, and some differences in chromosome number. Yet these traits are not associated with obvious disease or deformity. It did not make sense to me that they arose from neo-Darwinian mechanisms: random genetic errors plus

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Predictions

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natural selection. So I predicted that a mechanism exists for germ-line mutations (i.e., changes in the DNA sequence which are heritable) in response to environmental signals (Lightner, 2006).

Forming and testing hypotheses

To follow up on this idea, I began studying genes for which there are many alleles (different versions). Not all genes are highly variable; some have only one or a few alleles. Changes in these genes may be associated with serious problems or death, at least if they become common enough in a population so individuals inherit a mutated copy from each parent. Other genes, however, tolerate mutation quite well. Some examples of the latter include a gene involved in pigmentation (*MC1R*), and genes associated with immune function (MHC genes).

Several important questions came to mind. Is the variability in these genes really from mutation? Couldn't it be from created diversity? The biblical history was essential to answer these questions. Regardless of how much diversity was initially created, only a limited amount could have made it through the Flood bottleneck. I tried to focus on unclean animals, such as dogs or pigs, where a maximum of four alleles (two per individual) could have made it through the population bottleneck at the Flood.

Consequently, where we see more than four alleles today, we know there has been mutation in that gene. Additionally, alleles from the animals coming off the Ark should be widespread in their descendants today. Different DNA sequences that are only found in a smaller segment of the kind can also be inferred to be the result of mutation.

The melanocortin-1-receptor gene (*MC1R*) affects coat color in animals, and both skin and hair color in humans (Lightner, 2008). Consideration of the *MC1R* gene in light of the Flood bottleneck suggests several important points. First, there is clearly more variation in this gene today than can be attributed to the limited number of ancestors on the Ark. This is true for humans (where a maximum of 10 alleles could have been present, unless Noah's sons carried mutations not present in their parents) and a number of other mammals.

Secondly, this gene codes for a single protein which can be modified without causing serious damage. Clearly that was no accident. These changes can be adaptive and contribute to interesting variety within kinds. It seemed clear that I was seeing evidence of God's provision in this gene in that it was designed to be able to change in useful ways.

Finally, there are some strange, non-random patterns that seem to indicate that these changes themselves were not accidental. For example, identical mutations were found in different kinds of animals. Evolutionists would attribute this to convergent evolution as opposed to common ancestry,

as would I. However, it is possible that the precise mechanism to effect such change involves a bias in what type of changes actually occur at the gene level. This bias seems to be further supported by a pattern of in-frame deletions in several kinds of animals.

Remember, amino acids in proteins are coded genetically by codons, which are specific sequences of three nucleotides. Deletions of nucleotides in multiples of three are thus termed "in-frame." In general, if the deletions are in-frame, some amino acids are removed from the protein, but the remaining amino acids are unchanged. In the case of the *MC1R* gene, this often results in a protein that was always switched ON to produce the darker pigment, eumelanin.

Deletions that are not in-frame will shift the reading frame. This frame-shift will cause the remaining codons to be read incorrectly, producing a nonfunctional protein. So where are all the deletions that are not in-frame, which should be much more common? If they are lethal or seriously debilitating, the neo-Darwinian model appears to provide a reasonable explanation for this pattern — those deletions were removed by natural selection.

Deletions in the *MC1R* gene which are not in-frame should destroy the function of the protein, producing only the lighter pigment, pheomelanin. However, this is not lethal or debilitating. In fact, red hair in humans and Irish setters is from mutation resulting in a non-functional *MC1R* protein. So there is no reason to believe natural

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Creation Matters

ISSN 1094-6632
Volume 19, Number 1
January / February 2014

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selection is the explanation for this bias towards in-frame mutations. Further investigation into other variable genes has shown similar patterns that don't fit well with the standard neo-Darwinian explanation (Lightner, 2009a).

A closer look

The basic mechanisms of neo-Darwinian evolution are random genetic changes acted on by natural selection. The genetic changes are essentially believed to be random errors. When mutations appear in non-random patterns, natural selection is believed to be the explanation. Superficially, this can make a great sounding story. In fact, some creationists have assumed that these mechanisms can account for the changes that have occurred within kinds as they diversified and filled the earth.

However, this naturalistic explanation rarely holds up well when investigated in detail. In other words, neo-Darwinian mechanisms fail to explain these patterns. There are two problems: (1) it is known that mutations do not occur randomly, and (2) natural selection is not as powerful in the real world as it is in evolutionary story-telling.

My doubts about natural selection are tied to my familiarity with 'artificial' selection, particularly as it applies to livestock. Many genetic diseases are recessive, and there is not an obvious problem if an animal has only one mutated gene. In these cases it is almost impossible to eliminate the deleterious allele from the herd based on how the animal looks or behaves (phenotype). In the same way, natural selection is not a mechanism by which recessive deleterious alleles can be eliminated. When a producer selects, he can use good records and/or genetic testing to help eliminate deleterious alleles from his herd. This requires intelligence and foresight, something absent from valid natural selection explanations.

Secondly, I know that good progress can be made in selecting for a trait as long as individuals with the desired trait contribute genetically to the herd. However, when more than one trait is desired, progress is significantly slowed. For example, a dairy producer may want to select for increased milk production. Using artificial insemination he can bring the genetics for this trait into his herd.

However, all that milk weighs a lot in the udder of the cow as she is waiting for the next milking. Sometimes a cow's udder will be unable to support the weight and

will drag on the ground, which is very undesirable for the health of the cow and quality of the milk. Or the cow's feet will become too stressed and she will go lame. So not only does one trait depend on others, but the progress towards increased milk production will be significantly slowed as the producer adds other traits, such as udder support and soundness, to what he wants for his herd.

Contrast this reality to the way biologists imagine that natural selection can simultaneously fix mutations, as needed, to support their naturalistic stories — not to mention the miraculous chance appearance of the appropriate mutations on which natural selection could work at the appropriate time.

Mathematically, it has been shown that natural selection is not effective at eliminating most deleterious mutations or preserving beneficial ones. Most mutations entering a population are lost due to genetic drift, even when they are beneficial. For those mutations surviving the effects of drift, they must have dramatic effects on fitness for natural selection to significantly impact their frequency in the population.

If mutations are really the result of random errors, deleterious mutations would arise with much greater frequency than beneficial ones. Since most mutations are near neutral (i.e., they do not have dramatic effects on fitness) and natural selection has little effect on them, the deleterious mutations are fixed with much greater frequency than are beneficial ones, and this occurs largely by genetic drift (Rupe and Sanford, 2013).

God's provision

Neo-Darwinian mechanisms were conceived as a way to explain the diversity of life we see today without recognizing the work of a Creator. When examined in depth, it appears these mechanisms have little to do with reality. From a biblical worldview, it is clear that adaptive mutations have arisen. It is also clear that in most cases, at least in mammals, if mutations arise purely by chance they will not occur in a timely fashion, and natural selection is not a mechanism that can effectively fix them in a population. This is exciting, because it means the mechanisms by which life has adapted as creatures have filled the earth will point more clearly to our awesome Creator. "He is before all things, and in him all things hold together." (Colossians 1:17)

There are two examples I want to describe here. The first involves humans and the *MC1R* gene. In one study, over 100 Africans were tested and no variations were found affecting the amino acid sequence of the protein (Harding et al., 2000). In contrast, there is variation in the amino acid sequence in other human populations, especially where skin color is lighter. This lack of variation in Africans was explained as constraint; natural selection was supposedly eliminating variants in the African population, but they were tolerated in other populations.

However, there is no logical reason why this should be the case. Dark skin is certainly believed to protect Africans from the high level of UV exposure characteristic of where they live, but fair skinned people don't just die or fail to have children if they live in these parts of Africa. The risk of skin cancer is greater for fair skinned people, but the average age of onset *if* it does develop is over 50, after the child bearing years! Natural selection cannot account for this pattern. Instead, it points to a wise and caring Creator who has graciously provided a means by which these people could be protected from the harmful effects of UV radiation.

The second example involves leaf-eating monkeys (Lightner, 2009b). It appears that the gene for an important digestive enzyme has been duplicated and a series of mutations has occurred in one copy that allows the enzyme to function more optimally on the specialized diet of these monkeys. Again, naturalistic processes cannot explain this. However, given that animals adapt so well in the short term by physiologic changes (e.g., adjusting to high altitude or increased exercise), it seems reasonable that creationists should expect God to have provided the means by which his creatures can adapt genetically too.

What mechanisms could cause this?

When I proposed the idea of directed genetic changes in animals, I was challenged by a fellow creationist about the mechanism for such changes. At first it did not seem too important. Physiologic adaptation is well documented and we are only now learning about the underlying mechanisms. It seemed obvious to me that interpreting the current genetic data within a biblical framework led to the conclusion that such a phenomenon exists.

Upon further reflection, I realized that homologous recombination may explain

some changes. Crossing over occurs during meiosis (gamete formation), and can change the nucleotide sequence in a gene. Unequal crossing over may result in duplication or deletion of segments of DNA. Gene conversion, where the sequence on one chromosome was “written over” the corresponding sequence on the other, could affect the frequency of an allele. In fact I had predicted that gene conversion may have been involved in increasing the adaptive alleles in leaf-eating monkeys, even though I was not aware of any studies that showed this could happen.

A series of articles came out in 2012 about meiosis which confirmed much of what I had suspected (see review by Lightner, 2013). They summarized much of what has been learned about homologous recombination over the last decade or so. Homologous recombination is now considered an essential step in meiosis, the cell division responsible for the next generation of life in most animals. There are specific enzymes which cut the DNA to begin this process, and others which influence whether crossing over or gene conversion results. Some methods of DNA repair utilized during this

process are quite susceptible to mutation. These mutations do not appear to be just accidents. Instead, there seems to be template switching, which requires specific enzymes to be present. In some cases of template switching, complex rearrangements such as duplications occur.

We have much to learn about what induces these changes in DNA sequence and how the cell controls the process. What is clear is that certain enzymes are required for these processes, so they appear designed, as opposed to the naturalistic proposal that they are haphazard accidents. I also found it exciting to learn that biased gene conversion has been documented in mammals (see review by Lightner, 2013). In mice the double stranded break initiating homologous recombination occurred more commonly at one allele, leading to an over-transmission of the other. This is a designed mechanism by which an allele can become more frequent in a population. From here the future looks bright for the biblical model.

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Math Matters
by
Don DeYoung, PhD

Random Walk

A mutation is an alteration in the structure of a gene which may be passed on to future offspring. These genetic changes arise from radiation, chemicals, heat, and random molecular fluctuations. Most often, if not always, mutations are harmful to an organism. After all, mutations are mistakes. Nevertheless, they are assumed to be the driving force behind evolutionary change and progress. Mutations are said to occasionally give survival advantage to offspring. These positive mutations then are selected and passed on to future generations. In time, entirely new plants or animals then arise.

Biologists realize that a mutational change in just one organism would likely be lost in a large population. In fact, animals tend to eliminate any of their own progeny which show a deformity or unfamiliar behavior. This instinct may be designed for

the welfare and conservation of species. To allow evolutionary advancement, it is suggested that some mutations are preserved in small isolated groups of animals. However, a new problem then arises: A major alteration, such as reptile scales converting into bird feathers, would surely require hundreds or thousands of successive mutations. In the transition from water to land, at least 40,000 mutations are estimated (Wells, 2000).

Consider just ten random sequential mutations which change the form of an organism (Newman, 2003). The following analysis is called a “random walk” problem.

To illustrate, suppose a person is blindfolded and told to walk away from a lamppost. Assume that each additional step is in a random direction. What distance d will the person be from the lamppost after n steps? With a step length of l , the statistical answer is

$$d = l\sqrt{n}$$

For example, if $l = 2$ feet and $n = 16$ steps, then $d = 8$ feet. Now apply this random walk to mutations. Assume that a mutation is represented by a length l . To cross a distance

equal to 10 mutations, $d = 10l$. Then from the previous formula,

$$\sqrt{n} = 10$$

$$n = 100$$

It thus requires 100 mutations to move just 10 steps in an improving direction. However, many additional mutational steps are surely required for significant biological change. The fossil record displays no such record of great numbers of transitional stages. Clearly, substantial mutational change via a random walk conflict with both theory and fossil evidence.

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THE TESTIMONY OF FIRE ANTS

by Timothy R. Stout

Red imported fire ants (RIFA) are the scourge of the South. They have fierce stings and if you step on an ant mound without realizing it, many of them will crawl onto you unnoticed. Then, on a pheromone cue, all of them will suddenly sting simultaneously. It is an experience not easily forgotten and which no one cares to go through twice, as I found out personally after moving into RIFA country a few years ago.

However, from an engineering perspective, RIFA exhibit other kinds of cooperative behaviors that are scientifically intriguing. For example, RIFA have a natural tendency to link to one another and, therefore, can readily form a large, cohesive ball of ants. You can place a ball of them into a tea pot and they will pour out through the spout like a syrupy liquid. Yet, when placed onto a table, that same ball will act like a solid — springing back into shape after being flattened by a spoon. They can form a “raft” that floats on water, and if damaged, can even self-heal. Because every ant in a colony is more or less interchangeable, ants fill in gaps to repair the damage, keeping the raft water-tight.

When the ants form a solid-like substance, they grab tightly onto each other’s legs with their mandibles, with claws at the ends of their legs, and with adhesive pads at the tips of their feet. When an external stress is applied, the ants turn loose from each other, causing the agglomeration to flow like a liquid. The communication algorithms between ants are still a mystery, but are under study at the Ant Lab at Georgia Institute of Technology (Georgia Tech, GT).

Nathan Mlot, a recent doctoral graduate from the School of Mechanical Engineering at GT, spent five years developing his dissertation on the swarm intelligence that emerges from the cooperative behavior of fire ant self-assemblages. He hopes that what he has learned can lead to the development of novel “active materials” which can be applied to real-world engineering problems — from modular robots that can self-assemble into larger functioning structures using micro components, to concrete bridges that repair themselves.

On his GT web page, Mlot quotes Proverbs 6:6–8, “Go to the ant, you sluggard;



FIGURE 1.
A ball of fire ants can be poured out of a tea pot into a tea cup, an expression of liquid behavior. The same ball can act as a solid in a different environment.

consider its ways and be wise! It has no commander, no overseer or ruler, yet it stores its provisions in summer and gathers its food at harvest.” He explains (Mlot, 2013),

My motivation for studying cooperative fire ant behavior roots in a desire to better understand God’s creation and the design behind it. I also hope our research will promote and foster an interest within the scientific community to take an engineering approach to biological and naturally occurring systems.

The web page also has links to many video clips illustrating various aspects of RIFA ball behavior, including those mentioned above. In addition, a search of YouTube for “antlabGT” reveals other videos showcasing the fascinating, collective behavior of fire ants.

Mlot’s work is an application of *biomimicry*, “the design and production of materials, structures, and systems that are modeled on biological entities and processes” (Anonymous, 2013). Biomimicry is not new. The first time man used a lever to move a large rock, he was copying the way God uses joints, muscles, and bones for controlled, powerful movement of our bodies. A modern, pixel-based digital camera uses an array of photo sensors to generate

a set of discrete signals which represent the image of an object, mimicking how the eye uses rods and cones to generate discrete nerve impulses to see an object. Biomimicry has become so established as an engineering discipline that, recently, the University of Akron at Akron, Ohio added a PhD in biomimicry to its degree program (St. Clair, 2013).

In Romans 1:20, the Bible says that God reveals Himself through the things he has made. Certainly, biomimicry demonstrates this truth very clearly. The organizational details of living organisms are complex beyond comprehension. Even with tens of thousands of the world’s most brilliant scientists studying the structure and function of living organisms, over many, many years, we merely find out more things we don’t yet understand.

Science is certainly not running out of things to study, giving testimony of the unlimited wisdom, intelligence, and creative genius of God. It is foolish to think that random actions could provide the creative genius which is demonstrated in living organisms. Even the study of ant balls bears testimony of God’s unfathomable wisdom and insight.

An atheist may claim that the origin of life was brought about by random, naturalistic, evolutionary processes, but anytime he tries to prove his claim with a detailed, honest, statistical analysis, or with a detailed flowchart of chemical reactions, all he finds are roadblocks. Believers have been quick to appreciate and recognize the testimony of God provided by biomimicry. Surely, a person is without excuse who cannot see the hand of God in the design of biological systems.

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active element is commonly found in the Late Jurassic Morrison Formation, which is also famous for fossil bones of *Allosaurus*, *Apatosaurus* and *Stegosaurus*.

The footprints were found in a rock face below the Morrison Formation and above the early (or Lower) Jurassic Navajo Formation (Table 1). The rock is composed of light gray, fine- to coarse-grained sandstone and includes at least four beds. The lower two are horizontally bedded while the upper two are cross-bedded. From my research, I believe the trackway lies either in the Slick Rock Member of Entrada Sandstone or in Junction Creek Sandstone. According to a USGS geology report on the area (Shawe, 1976), the Junction Creek had an eolian or sand dune origin:

Certainly the great sweeping cross beds displayed by the Junction Creek south of the Slick Rock district suggest origin in immense barchan dunes. The movement of dunes northward terminated in the southern part of the Slick Rock district, where the Junction Creek merges with the Summerville Formation.

However, exact stratigraphic identification is difficult because the Entrada and Junction Creek formations resemble each other (Hansen, 1965). Among the similarities, although the Entrada is commonly light buff or light reddish-brown in color, in some places it is known to be more gray. It is also described as a combination of tidal flat (horizontal) and sand dune (crossbedded) layers (O'Sullivan, 2004). Because it is more typically light buff to white-gray (Hansen, 1965), I favor the Junction Creek (sometimes called the “Bluff”) formation, as the more likely host of the tracks. In either case, both are mid-Jurassic formations dated by evolutionists at 120–150 million years old.

The trackways

There are three distinct trackways of varying lengths, which ascend vertically across several bedding planes of a 15- to 20-foot-thick exposure of Junction Creek Sandstone. The trackway to the left in Figure 1 is composed of larger footprints than the other two, which are of similar size. It is possible that these tracks represent an adult with two juveniles. The left side trackway is also the longest. It consists of at least 10 footprints and crosses the entire face of the exposure,

including four separate beds, and extends up and over the topmost, cross-bedded layer.

The middle trackway has at least four prints and crosses three bedding planes. The final trackway has only three prints and crosses two planes. However, photos taken approximately 15 years ago show seven to eight footprints in the shorter tracks and suggest that they may once have extended onto the two topmost crossbedded layers, as well.

Identifying the track maker

Are these human artifacts? While the outcrop is on a working farm, there is no evidence that the tracks were carved by people. The top of the rock face is easily accessed; there is no need for hand or foot holds. On the other hand, there is significant evidence of natural origin (Figure 2), including:

- 1) Some of the prints reveal the “up-push” of footprints typically made in wet sediment or mud.
- 2) Others clearly show deformation of the surrounding sediment.
- 3) One of the footfalls from the longest trackway even lies *directly* on the interface or contact between two separate beds.

The evidence not only indicates that the footprints were formed naturally, but suggests that all four sediment layers were equally soft when the tracks were made and deposited in a relatively short time.

Identifying the track maker is difficult,

TABLE 1. A partial listing of the geological formations of the Slick Rock District (after Shawe, 1968).

Age	Formation and member	Thickness (feet)	Description
Late Jurassic	Entrada Sandstone Slick Rock Member	100-120	Medium to thick bedded, fine to coarse grained sandstone, fossiliferous, and contains thin beds of siltstone, shale, and lignite. The Slick Rock Member is the uppermost member of the Entrada Sandstone.
	Entrada Sandstone Junction Creek Member	70-80	Thin bedded, fine to coarse grained sandstone, fossiliferous, and contains thin beds of siltstone, shale, and lignite. The Junction Creek Member is the lowermost member of the Entrada Sandstone.
	Entrada Sandstone Summerville Member	20-30	Thin bedded, fine to coarse grained sandstone, fossiliferous, and contains thin beds of siltstone, shale, and lignite. The Summerville Member is the lowermost member of the Entrada Sandstone.
	Entrada Sandstone Slick Rock Member	70-80	Medium to thick bedded, fine to coarse grained sandstone, fossiliferous, and contains thin beds of siltstone, shale, and lignite. The Slick Rock Member is the uppermost member of the Entrada Sandstone.
Early Jurassic	Navajo Formation Lower Bedded Member	10-15	Thin bedded, fine to coarse grained sandstone, fossiliferous, and contains thin beds of siltstone, shale, and lignite. The Lower Bedded Member is the lowermost member of the Navajo Formation.
	Navajo Formation Upper Bedded Member	10-15	Thin bedded, fine to coarse grained sandstone, fossiliferous, and contains thin beds of siltstone, shale, and lignite. The Upper Bedded Member is the uppermost member of the Navajo Formation.

as the tracks are strongly eroded. At present, they appear roughly equidimensional, probably one reason locals have traditionally identified them as cat tracks. Figure 3 shows a comparison of one of the Slick Rock prints with a modern cougar print (Hanson, 2009). The similarity is another likely reason they have been attributed to a big cat.

However, four-legged (quadrupedal) animal tracks usually overlap a bit, with the hind foot landing near or on the front print (Thompson et al., 2013). The Slick Rock tracks do not show this pattern. Indeed, none of them appears to be made by forepaws, which suggests that they might have been made by a two-legged animal.

Still, the Slick Rock footprints neither display the classic round shape of sauropod tracks, nor the typical three-toed imprint made by bipedal theropods and ornithomys. A recent visit to the Dinosaur Journey Museum in Fruita, Colorado, may suggest an answer. There on the wall was mounted a cast of an *Otozoum*, described as the type of trackway made by four-toed prosauro-



FIGURE 2. Slick Rock footprints display “up-push” (left), sediment deformation (middle), and imprinting on bed interface (right).

pod “mostly” in Early/Lower Jurassic rocks, though some scientists more strictly limit their age-range: “*Otozoum* are restricted to Lower Jurassic strata in North America” (Rainforth, 2003).

Other museum information stated that the tracksite was found in 206 to 180 million-year-old Wingate Sandstone in the vicinity of Gateway, Colorado, and describes the prosauropod that made them as “a moderately large, bipedal animal.” These dinosaurs, whose name means “before the sauropods,” were once thought to be evolutionary precursors to sauropods; however, secular scientists now believe that they evolved together from a common ancestor (Sereno, 1997). The exhibit also states that tracks like these were created when a prosauropod “crossed wet inter-dune areas within large fields of sand dunes.” An accompanying illustration depicted a four-toed, five-fingered, bipedal dinosaur about 25 feet long.

The phrase “wet inter-dunes areas” wasn’t further defined, but since Wingate sandstone is also regarded as an eolian/sand dune formation (O’Sullivan, 2004), it appears to be a concession to evidence that such footprints can only be made in watery conditions. For example, distinct amphibian and/or lizard footprints found in Permian Coconino Sandstone in the Grand Canyon, which secular scientists also regard as eolian/desert/sand dune, have been shown to require wet, if not subaqueous, conditions (Brand, 1978).

The footprints also resemble those of *Pseudotetrasauropus* from the Late Triassic Chinle Formation in Utah (Foster et al., 2001), though this creature is now considered a variety of non-dinosaurian archosaur (Rainforth, 2003). Formerly considered *Otozoum*, *Anchisaurus* ichnofossils from Lower Jurassic sediments in the Connecticut Valley (Yates, 2010) may point to this dinosaur, especially since fossil bones of this dinosaur have also been found in that part of the country.

Anchisaurus (“near lizard”) bones, first discovered in 1818, were among the earliest dinosaur fossils found in America. Bipedal and estimated to have been 6–7 feet long, it was originally considered a prosauropod by Othniel Marsh, who named it. Another similar dinosaur found in the same area, that reached a length of 13 feet, was named *Ammosaurus* (“sand lizard”) by Marsh, due to its slightly

larger size (Yates, 2010). However, these two dinosaur names are now considered synonymous (Milan et al., 2008).

Other candidates for the Slick Rock site include *Massospondylus*, a prosauropod with five digits on its hands and feet that was about the same size as *Ammosaurus*. However, a skull found in the Kayenta Formation of northeastern Arizona originally believed to belong to *Massospondylus* (Attridge et al., 1985) has since been reassigned, and the fossils of this dinosaur are currently restricted to South Africa (Rowe et al., 2011). The picture is further complicated by the recent discovery of two new species of sauropodomorphs in early Jurassic sandstones in Utah and Arizona.

In the last few years the bones of *Seitaad ruessi* (pronounced: SAY-todd ROO-ess-EYE), named after a mythological Navajo monster that buried its victims in sand dunes, have been found in Navajo Sandstone in both southeastern Utah and northeastern Arizona (Sertich, 2010). With five fingers and four toes, it was about the same size as *Anchisaurus*.

The second species, found in 2010, was named *Sarhsaurus* after Sarah Butler, a patron of the arts and sciences from Texas (Rowe et al., 2011). Its fossils were discovered in northeastern Arizona in the Lower Jurassic Kayenta Formation, which falls one layer below Navajo SS on the geological chart. Its estimated size of 14 feet long and 250 pounds (Handwerk, 2011) is similar to that of *Seitaad* and *Anchisaurus*.

I sent photos of the Slick Rock footprints to ICR staff geologist Dr. Tim Clarey, who concurred that they could represent a prosauropod or similar bipedal dinosaur



FIGURE 3. Slick Rock print (left) and modern mountain lion footprint (right; Hanson, 2009; used by permission).

trackway (Clarey, 2013). Based on the size of the tracks (scaled to a quarter coin in Figure 3), Dr. Clarey also calculated that the creature would have stood a little less than three feet high at the hips and was “moving at about 2.6 miles per hour across wet sand” (Clarey, 2013). At 6 to 14 feet long, these estimates correlate well with all three sauropodomorphs mentioned above, which would have resembled the *Anchisaurus* illustration in Figure 4.

The identification of ichnofossils like those at Slick Rock is admittedly difficult, particularly when it involves prosauropods (*Otozoum*), the classification of which seems to be in a state of constant flux. While *Anchisaurus* tracks have been previously identified as *Otozoum* (Rainforth, 2003), scientists now consider *Anchisaurus* a basal sauropodomorph (Milan et al., 2008) not a prosauropod. Nor have its fossils been found in the western U.S. Though *Massospondylus* is regarded as a true prosauropod and is identified with *Otozoum*, to date its bones are unknown in North America.

This leaves *Seitaad* and *Sarhsaurus* as the best candidates for the Slick Rock footprints. Of these two basal sauropodomorphs, because its fossils are nearest to them in both physical (southeastern Utah) and geological (Navajo Formation) proximity, *Seitaad* is probably the most likely Slick Rock footprint maker.

Importance of the trackways

While further work is necessary to confirm the identify of the footprint maker, whether they are prosauropod or basal sauropodomorph tracks, their presence at this site would mark their first known occurrence in Middle Jurassic rocks. More importantly, this trackway suggests that the current interpretation of these strata, both in the duration of emplacement and paleo-environment, is incorrect.

Track morphology indicates that all four beds were unlithified at the same time, which suggests that they all were rapidly

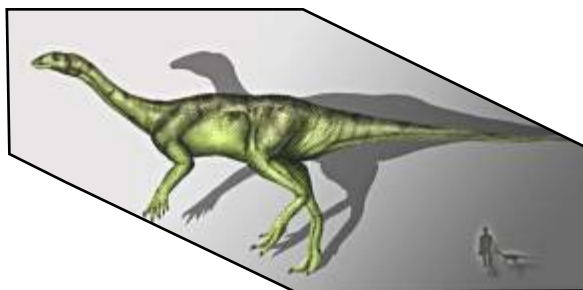


FIGURE 4. Artist’s rendering of *Anchisaurus polyzelus* (Camargo, 2013).

deposited. The distinct track preservation also suggests they were lithified quickly enough to preserve the footprints. Furthermore, the preservation of tracks, the deformation of the surrounding sediment, and the presence of mud up-push all strongly imply an environment other than eolian. As Oard (2009) stated about the “eolian” source of the early Jurassic Navajo Formation, “dinosaur tracks...should be a big hint to uniformitarian scientists that this sandstone is not from a desert environment.” Likewise, this rare and unusual trackway points to sediments deposited during flooding. The areal extent of the Entrada and Junction Creek formations over many thousands of square miles further indicates a large event.

Acknowledgments

I would like to acknowledge a number of people for their contributions to this article, including: Dr. Tim Clarey of ICR for his professional evaluation of the photos, Joe Taylor for molding and casting the footprints, Ron Steele for providing earlier photos of the tracksite, and Don Ensign for reviewing this paper. Helpful comments were also provided by the editor and an anonymous reviewer.

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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.

Surprising Things Science Didn't Know

Scientists presume to speak with confidence about the origin of the universe and billions of years, but have been clueless about some everyday things close to home in the present.



Mystery of the whistling teakettle: *PhysOrg*¹ reported that two Cambridge researchers “... have finally worked out where the noise that makes kettles whistle actually comes from — a problem which has puzzled scientists for more than 100 years.” *Science News*² wrote wittily about this, saying:

For centuries, physicists have made their living by illumi-

nating the secrets of our universe, from gravity to electricity to black holes. But among the search for Higgs bosons and the endless unspooling of string theories, there remained a particularly glaring mystery: Why does a teakettle whistle? “Oh that,” they said, standing at their stoves in between bouts of programming supercomputers. “Vibrations. Or something.” Now, we are happy to report, human intellect has at last triumphed over the dark shadow of ignorance and solved the conundrum lurking within one of our lowest-tech kitchen appliances.... And having solved another mystery of our vast but perhaps ultimately knowable universe, they smile and sip their tea.

Discovery in the knee: One would think after centuries of dissections and surgeries that the human knee is pretty well understood. Not so; a “new” ligament has been discovered, reported the *BBC News*, named the anterolateral ligament.³ It looks pretty obvious from the photo in *Medical Xpress*.⁴ It’s important, too: it helps protect the knee when we twist or change direction.

Without it, the knee can suddenly give way. A surgeon outside the study group remarked, “If you **look back through history** there has been a **veiled understanding** that **something is going on** on [sic] that side of the knee but this work **finally** gives us a better **understanding**.”

Manhattan’s Grand Canyon: Just 100 miles off Manhattan’s shores, a canyon rivaling the Grand Canyon plunges off the continental shelf into the deep sea. *Live Science* says that Hudson Canyon is “**a city in its own right, brimming with an extraordinary universe of life**.”⁵ So close to the busiest city on earth, it’s a gigantic feature biologists are only beginning to inventory, inhabited by animals small and great — from plankton to sperm whales, corals, squid, sea anemones, swordfish, and much more, some of which are shown in an embedded video clip.

Hudson is just one of 15 such large submarine canyons along the east coast south of Cape Cod that the article says are remnants of ancient rivers that flowed off the continental shelf when sea level was lower. Beyond the canyon is a series of prominent seamounts — dormant volcanoes rising thousands of feet from the seafloor.

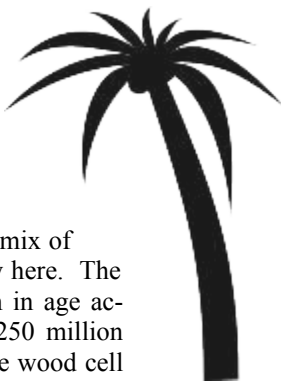
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Tropical Trees Found in Antarctica

Fossilized stumps of tropical trees show that Antarctica was once forested. A photo of a tree stump sticking out of the ice begins a report on *LiveScience*¹ about “weird forests” that once sprouted in the land of the midnight sun. Leaf impressions and tests of carbon by the University of Kansas show that a mix of deciduous and evergreen trees once grew here. The stumps are estimated to be late Permian in age according to the evolutionary timescale (250 million years old). Researchers can examine the wood cell patterns under the microscope to try to resolve how trees grew without sun for half the year.

In order for forests to have grown on this now icy continent, evolutionists surmise that “Some 250 million years ago, during the late Permian and early Triassic, the world was a greenhouse, much hotter than it is today.”

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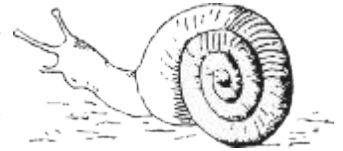
Three New and Different Biomimetics Stories

There appears to be no end of ways to imitate nature’s designs.

Stingray sub: “Stingrays swim through water with such ease that researchers from the University at Buffalo and Harvard University are studying how their movements could be used to design more agile and fuel-efficient unmanned underwater vehicles.”¹



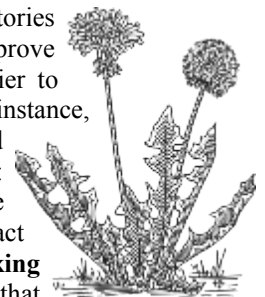
Snail digger: Headline on *ScienceDaily*: “An Intersection of Math and Biology: Clams and Snails Inspire Robotic Diggers and Crawlers.”² MIT scientists like how snails can move in any direction.



That’s why they built RoboSnail. It “can climb walls and stick to overhead surfaces much like its living counterpart.” What’s in it for you? “Such a device can have potential uses in invasive surgery and oil well drilling, among other applications.”

Biomimetic cocktail: This one is weird. *ScienceDaily* says, “An MIT mathematician and a celebrity chef have combined talents to create two **culinary novelties inspired by nature**.”³ And what’s being served? “**Cocktail novelties inspired by nature’s designs**.” Somehow, insects and water lilies provided the inspiration for this unusual application.

Dandelion rubber: The usual biomimetics stories keep coming, like studying insects to improve flying robots.⁴ Sometimes, though, it’s easier to harvest nature rather than imitate it. For instance, European researchers found something good about a common garden weed, the dandelion: it produces good quality rubber. They are “building the first ever pilot system to extract vast quantities of **dandelion rubber for making tires**,” *ScienceDaily* reported.⁵ And noting that microbes can fight harmful pathogens for us, scientists at Virginia Tech are looking into hiring microbes to clean up pipes.⁶



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Hummingbird Metabolism a “Marvel of Evolutionary Engineering”

Unlike humans, hummingbirds are equally good at extracting energy from fructose as from glucose. They are marvels of evolutionary engineering. That makes perfect evolutionary sense.

It’s uncanny how some reporters credit Darwin with engineering designs so good, we can’t duplicate them, let alone understand them. Consider these excerpts from a University of Toronto press release about hummingbirds.¹ First, the marvels of engineering:

- Hummingbird metabolism is a **marvel of evolutionary engineering**. These **tiny birds can power all of their energetic hovering flight** by burning the **sugar** contained in the **floral nectar** of their diet.
- ...they are **equally adept at burning both glucose and fructose**, which are the individual components of sugar; **a unique trait other vertebrates cannot achieve**.
- [quoting the researcher] “Hummingbirds have an **optimal fuel-use strategy** that powers their high-energy lifestyle, **maximizes fat storage, and minimizes unnecessary weight gain all at the same time**.”
- [quoting the researcher] “What’s **very surprising** is that unlike mammals such as humans, who can’t rely on **fructose** to power much of their exercise metabolism, **hummingbirds use it very well**.”
- Hummingbirds require an **incredible amount of energy to flap their wings 50 times or more per second** in order to maintain hovering flight. In fact, if a hummingbird were the **size of a human, it would consume energy at a rate more than 10 times that of an Olympic marathon runner**. They are able to accomplish this by **burning only the most recently ingested sugar in their muscles while avoiding the energetic tax of first converting sugar into fat**.
- [quoting the researcher] “Hummingbirds are able to **move sugar from their blood to their muscles at very fast rates, but we don’t yet fully understand how they are able to do this**.”
- ...if a hummingbird were the **size of an average person** they [sic] would use sugar **fast enough that they [sic] would need to drink more than one can of soda every minute** even though it’s mostly made of high-fructose corn syrup.

Now, how the credit is given to evolution:

- Hummingbird metabolism is a marvel of **evolutionary engineering**.
- **From an evolutionary perspective** the findings **make perfect sense**, says [Ken] Welch. Whereas humans **evolved** over time on a complex diet, hummingbirds **evolved** on a diet rich in sugar.

It seems premature to attribute this high-efficiency, optimal design to unguided process of nature when scientists still don’t understand how the hummingbirds do it. Saying it evolved doesn’t



make it so.

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Reporter Says Scientists Are Like Cattle



A science reporter lists several reasons why scientists are about as trustworthy as bankers. The Science and Technology Editor at *The Conversation*, Akshat Rath, should know about scientists. Not only does he hold that prestigious editorial position, he has a PhD in organic chemistry from Oxford University as well as a Bachelor of Technology in chemical engineering from the Institute of Chemical Technology in Mumbai.

Rath doesn’t trust the opinions of scientists to be right any more than he trusts other fallible professionals, judging from his latest column, entitled, “**Scientists falter as much as bankers in pursuit of answers**.”¹ He also has help from a *Nature* article² that found serious flaws in that paean of scientific reliability, peer review:

Here we show that **even when scientists are motivated to promote the truth**, their **behaviour may be influenced**, and even **dominated**, by **information gleaned from their peers’ behaviour**, rather than by their personal dispositions. This phenomenon, known as **herding**, subjects the scientific community to an inherent risk of **converging on an incorrect answer** and raises the **possibility** that, under certain conditions, **science may not be self-correcting**.

Here are some of Rath’s reasons for keeping scientists off their pedestals:

- One of the reasons is that, once a hypothesis becomes widely accepted, it becomes very difficult to refute it, which makes it, as Jeremy Freese of Northwestern University recently put it, “**vampirical more than empirical — unable to be killed by mere evidence**.”
- ... as humans, scientists try to be rational but **remain stuck on certain views in the face of contrary evidence**.
- ... some scientists **make up data** to further their careers.
- ... the “**publish or perish**” culture **forces scientists to consciously or unconsciously gravitate towards results that support their conclusions**.
- ... the peer review system does not always live up to its high aims.
- **Subjectivity** wins.
- Scientists are subject to a “herd mentality.”

Rath ends by quipping that the *Nature* article itself might be an example of herding.

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Trillions of Helpers in Your Body and Brain

Recent discoveries in human physiology should cause us to stand in awe of the design of our earthly dwelling, especially at the scale of cells.

Minicomputers in your mainframe: You don't just have a mainframe that outshines all processors in the world combined. Each of those 100 billion neurons has dendrites (branched endings), making a total of a quadrillion connections, *LiveScience*¹ reminds us. But that's not all. Those dendrites themselves act like minicomputers, new research has found. The complexity of the brain has just shot up by orders of magnitude:

Now scientists find **dendrites** may be more than passive wiring; in fact, they **may actively process information**.

"Suddenly, it's as if the processing power of the brain is much greater than we had originally thought," study lead author Spencer Smith, a neuroscientist at the University of North Carolina at Chapel Hill, said in a statement.

No longer seen as just channels passing signals, the dendrites now appear to help sort and interpret the barrage of inputs continually coming into the neuron. "Dendrites thus act as miniature computing devices for detecting and amplifying specific types of input." See also the *Medical Xpress* article on this find announced by University of North Carolina researchers.²

Another *Medical Xpress* article reported that an assumed "primitive" or "ancient" part of the brain (the thalamus) helps us avoid accidents by interpreting edges in the visual field.³ Still another *Medical Xpress* article said a lot in its headline: "The glial menagerie: From simple beginnings to **staggering complexity**" — and that's just about the glial cells in roundworms.⁴ And yet another *Medical Xpress* article discussed "**Sensational barrels in the brain**" involved in "circuitry for **high resolution signal processing**" — and that's just in mice.⁵

Galaxies in your gut: *ScienceDaily* described the "galaxy within us" — the horde of bacteria that help us digest our food.⁶ We have 10 times as many gut microbes as we have of our own cells. Research is underway trying to understand all the ways this community of microbes helps us. "Research is starting to show that the food we eat has a huge bearing on the composition of this collective and also that the profile of the collection of bacteria can be associated with a person's health status," the article says.

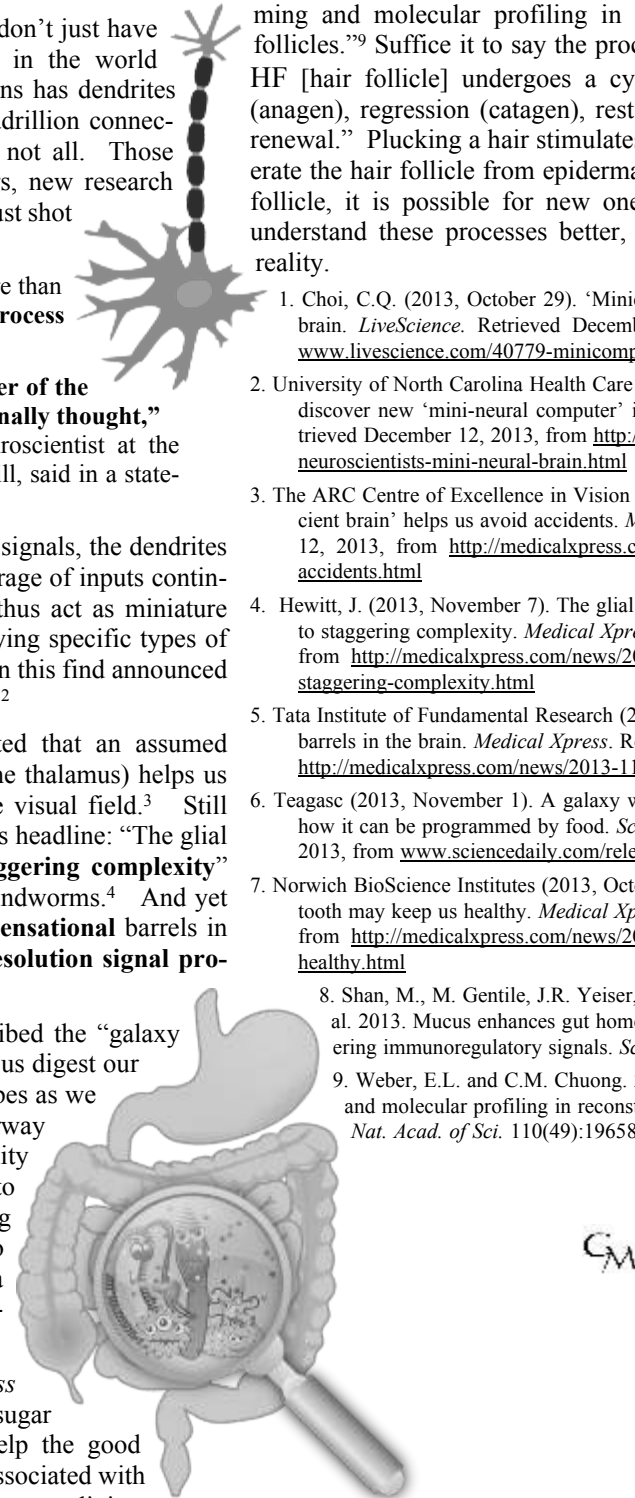
Sugar babies in your colon: *Medical Xpress* discussed how certain microbes recognize sugar molecules in the lining of the colon to help the good bacteria colonize the gut. Those sugars are associated with mucins, protein molecules that make up the mucus lining. "We live in a symbiotic relationship with trillions of bacteria in our gut," the article explains. "They help us digest food, prime our immune system and keep out pathogens."⁷

Guards in the mucus: *Science* elaborated on the role of mucus in the gut by describing how it delivers immunoregulatory signals to the microbes, regulating the immune response to create homeostasis (dynamic equilibrium). "Thus, mucus does not merely form a nonspecific physical barrier, but also constrains the immunoge-

nicity of gut antigens by delivering tolerogenic signals."⁸

A hair is grown: There's been news recently about a possible cure for baldness. To shed light on what goes on in a hair follicle, *PNAS* published a commentary titled, "Environmental reprogramming and molecular profiling in reconstitution of human hair follicles."⁹ Suffice it to say the process is complex. "The mature HF [hair follicle] undergoes a cyclical pattern of hair growth (anagen), regression (catagen), rest (telogen), loss (exogen), and renewal." Plucking a hair stimulates the dermal papillae to regenerate the hair follicle from epidermal stem cells, but if there is no follicle, it is possible for new ones to form. If scientists can understand these processes better, cures for baldness may be a reality.

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All by Design

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

The student of creation might everywhere see in nature evidences of intelligent design in living things, special properties of living things that defy any attempt to explain their existence as the result of random chance. For example, one might recall the tubercles on the front edges of the humpback whale's pectoral fins that create vortices of water, which draw them through the water almost effortlessly.

Very well — here is another marvel to ponder. Some marine fish feed on tiny crustaceans known as “copepods,” including the majestic seahorse, whose tiny mouth is perfectly suited for such small prey. However, copepods are sensitive to the least disturbance created in the water by an approaching predator, reacting within 2 to 3 milliseconds. They then swim away quickly, at a velocity equivalent to that of an adult person swimming at 2,000 mph.

Don't worry. This does not bother the seahorse in the least. You see, the snout of the seahorse is uniquely shaped, and as it approaches a copepod, water moves around

its snout in such a way that no waves are created, allowing the seahorse to move to within about 1 mm of the copepod. The seahorse then quickly raises its head and draws water (and the unsuspecting copepod) into its mouth, all within about 1 millisecond. These amazing fish also maintain a 90



o Wake Zone

percent rate of prey capture, thus wasting little energy on missed attempts.

Logic suggests that this feeding ability had to be present at the beginning for these fish to survive. Was this design the handiwork of an intelligent Creator, or did this unique feature evolve completely by accident over vast periods of time? The reader is asked to consider which viewpoint requires more faith.

References

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