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Biomaterial from Dinosaur Fossils: Implications and Challenges, Part 2

by Kevin Anderson, PhD

For over a decade there has been a steady output of reports documenting the extraction and analysis of biomaterial from dinosaur fossils (Anderson, 2017). As discussed in Part 1 (Anderson, 2018), this includes the detection of various protein fragments, as well as intact cells and pliable tissue. However, because the presence of this biomaterial is not consistent with the assigned ages of the fossils, the evolutionist community continues to struggle with these discoveries.

Is keratin still present?

Recently, a study has challenged previous descriptions of keratin and blood cells found in some fossils (Saitta et al., 2017a). Several media accounts misleadingly imply that this research draws into question all discoveries of dinosaur proteins and cells (e.g., see Univ. of Bristol, 2017). Even the lead author of the report (a graduate student) exaggerates the conclusions of the study (Saitta, 2017). This will likely lead some critics to claim that reports of dinosaur tissue have now been shown to be erroneous.

What the new study does suggest is that descriptions of some dinosaur red blood cells may simply be an electron microscope (EM) artifact of degraded organic material. While anomalous structures can be a potential problem when interpreting electron micrographs, the artifacts shown from this study do not have the detailed characteristics of the dinosaur red blood cells previously reported (Bertazzo et al., 2015). Plus, the 2017 study assumes that once fossilized, this degraded organic material will still mimic the morphology of red blood cells. However, this was not specifically demonstrated. Moreover, bone osteocytes, which have been repeatedly found in several dinosaur bones, retain significant morphological detail not displayed by these EM artifacts.

Actually, a key focus of this 2017 study, and a second study (Saitta et al., 2017b), is the fossilization of dinosaur feathers. In particular, the researchers analyzed the fate of keratin (a major feather protein). In their simulated burial and fossilization conditions, they report that keratin structures degraded into nondescript masses. These researchers conclude that keratin likely does not survive long enough to enable different feather patterns to be preserved in dinosaur fossils, specifically calling into question some claims regarding feathered dinosaurs and feather evolution.

Not surprisingly…many in the evolutionist community are extremely reluctant to accept the discovery of any dinosaur protein fragments.

These studies also challenge various claims that the chemical nature of keratin enables it to readily survive millions of years in geologic environments. In addition, a reanalysis of some reports of keratin survival in fossils may prove necessary. It should be noted, though, that these recent studies did not address the detection of other proteins, or the persistent discovery of pliable tissue remaining within dinosaur fossils.

See what sticks?

Several mechanisms have been proposed to explain how tissue and proteins could survive within a fossil for millions of years. Schweitzer and a team of researchers offer several suggestions for extensive preservation (Lindgren et al., 2017). They seem to approach the topic with the strategy of throwing out for consideration as many ideas as possible and seeing if any of them "stick."

One of their suggestions is that a clay environment could reduce degradative events. For example, clays have been reported to inhibit the growth of a few marine bacteria (McMahon et al., 2016). However, inhibitory effects of clay on a wider array of environmental bacteria are less well documented, and probably vary dramatically.

Another report states that preservation could be enhanced by tissue interaction with phyllosilicate minerals in clay (Edwards et al., 2011). However, these minerals are highly absorbent, effectively interfering with the water necessary for other proposed preservation mechanisms. Wilson and Butterfield (2014) suggest that minerals in the clay (esp. chromium and aluminum) induce a type of tanning reaction in the tissue. Chemical analysis of a tissue-bearing fossil, though, failed to detect significant levels of these minerals (Anderson, 2017), indicating that the minerals were not present to enhance preservation.

Other environmental conditions have been suggested to contribute to tissue preservation. However, these conditions tend to offer contradictory circumstances. High temperature and high/low pH can inhibit enzymatic and microbial activity, which enhance tissue preservation. Yet, these same conditions can also accelerate tissue and protein degradation.

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Math Matters
by
Don DeYoung, PhD

Phyllotaxis

Phyllotaxis, also called phyllotaxy, describes the arrangement of leaves along the stems of plants and tree branches. Leaves variously appear as 180° opposites at the same locations along a stem, as whorls on some cacti, or in a spiral distribution along the stem. It is this latter alternate spacing which is of interest here.

Such leaves on a vertical stem are typically offset at a constant angle from the leaf just below. Vegetation shows considerable variation in this alternate leaf spacing. Some stems grow leaves on opposite sides along the spiral, designated by the ratio ½, with one-half of a full turn between leaves.

Other common fractions of a circle between adjacent leaves are shown in Table 1. Interestingly, each fraction consists of Fibonacci numbers. Readers may recall that the Fibonacci sequence follows from the pattern of adding together the two preceding numbers: 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, … (see DeYoung, 2018).

The table lists several examples of plants with alternate leaf spacings. These are generalizations, and exceptions can occur within plant species. The numbers in the third column show how many leaves spiral up a stem before an upper leaf occurs directly above a lower leaf. The evolutionary explanation is that plants have evolved to the point where leaf spacing minimizes shading from leaves higher on the stem, thus maximizing the amount of solar energy received.

Two comments are in order here. First, the existence of Fibonacci numbers throughout the botanical world remains a mystery. One might suggest that we are observing the Creator's fingerprint on his world; as we've said before, mathematics is truly the language of creation (DeYoung and Wolfrom, 2017).

As a second comment, a possible research project would involve analyzing plant leaf spacings in the fossil record, where such detail is available. Evolution predicts that the present-day, optimum leaf positions should not exist in the distant past, before mutations and natural selection fine-tuned the spacing to minimize shading on lower leaves. The creation viewpoint predicts optimum, designed leaf spacing from the very beginning of vegetation on day three of the creation week.

TABLE 1. Examples of Plants with Alternate Leaf Spacing

Fraction of a circle between adjacent leaves on a stem	*Angle between adjacent leaves*	*Number of leaves before one occurs directly above a lower leaf*	*Examples*
1/2	180°	2	elm, lime, linden, mulberry
2/5	144°	5	apple, apricot, cherry, holly, oak, plum
5/13	138.5°	13	almond, white pine, willow
3/8	135°	8	pear, poplar, rose, sunflower, sycamore
1/3	120°	3	alder, beech, birch, blackberry, hazel

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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. Content may be edited for style and length.*

More Underwater Wonders Revealed

In ancient times, people didn't know much more about sea life than what they dragged up in fishing nets (or what they saw on the way down to Davy Jones' locker, where dead men tell no tales). Pondering the bones and muscles of fish while eating seafood undoubtedly sparked some curiosity about their form and function.

A few took more than a casual interest in studying fish. Wise King Solomon "spoke also of animals and birds and creeping things and fish" (I Kings 4:33). A psalmist included in his list of awesome creations "the sea, great and broad, in which are swarms without number, animals both small and great." (Psalm 104:25) Sailors told tales about sea monsters. Those living by the sea undoubtedly saw ocean-going mammals like seals or sea lions, and some probably saw dolphins at play. Only a lucky few ever witnessed a whale.

Today, we have ships and boats of all kinds, scuba gear, submarines, robotic vehicles, scientific instruments, satellites, and detailed maps of ocean currents and the ocean floor. If anyone should be awestruck by sea creatures, it's us. And yet the sea is still at the frontier of scientific knowledge. Illustra's film *Living Waters*[1] featured just a few cases of amazing marine animals: dolphins, sea turtles, salmon, and humpback whales. Here, now, are some of the latest findings from marine biologists about life under the water, where the vast majority of animals on the planet live out their complex lives.

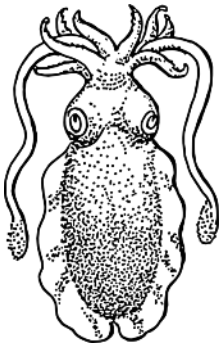
Which Way Is Up? Some of the stars of Illustra's film were Pacific salmon, which migrate from fresh water out to sea, travel thousands of miles, then return. A few scenes, very cute, showed the little hatchlings emerging from their gravel nests, or "redds," dug out for them by their mothers. If you picture yourself as a hatchling just beginning independent life after using up your yolk sac, you have a problem: which way is up? It's not as easy as it might seem. Knowing that hatchlings rise up unerringly, day or night, scientists at Oregon State[2] wanted to figure out how the hatchlings know to swim upward as they emerge from the nests for the first time. They know that adult salmon have exquisite magnetic sensing out at sea. Could the tiny hatchlings also be using the earth's magnetic field?

They performed experiments in a lab with controlled lighting and magnetic field generators. Sure enough, the hatchlings could use magnetic information alone, even in pitch darkness, to figure out which way is up.

> One group of salmon were exposed to the **normal magnetic field** in Oregon and another group of salmon to an **inverted magnetic field**. Fish in the **normal** magnetic field **moved significantly further up the tubes** than did those that experienced the inverted magnetic field. The team **ruled out the possibility that fish were simply startled** by the sudden change in electromagnetic conditions by running the same amount of electric current required to invert the magnetic field in the opposite direction.
>
> "Given that **only inverting the magnetic field influenced fish movement, it seems salmon use the direction of field lines to orient vertically** during their emergence from gravel — our findings are **difficult to interpret in any other way**," said Nathan Putman, senior scientist at LGL Ecological Research Associates in Bryan, Texas, and co-lead author on the study.

What's required to sense the earth's magnetic field? Humans can use a compass, but have very little sensation of its presence otherwise. Like the adult fish, these tiny hatchlings can not only sense the field, but determine its intensity and direction enough to figure out which way is up.

Invisibility Act Cuttlefish can disguise themselves within seconds to look like coral, evading any predator that might come looking for them. How do they do it? According to *ScienceDaily*,[3] scientists from the Marine Biological Laboratory (MBL) studied the phenomenon in cuttlefish (not fish, but cephalopods related to octopus and squid). They were amazed to watch the animals raise little spikes, called papillae, from their skin and hold them in that position for more than an hour. You can watch it happen in some embedded video clips. The scientists wondered how the cuttlefish were able to lock the papillae in place without spending excess energy, then unlock them later, to resume their smooth-skinned normal appearance. It reminded them of how clams can slam shut at the sight of a predator, and lock shut with a catch mechanism that works against the prying fingers of predators and children.



> "The catch mechanism allows a bivalve to snap its shell shut and keep it shut, should a predator come along and try to nudge it open," says corresponding author Trevor Wardill, a research fellow at the University of Cambridge and a former staff scientist at the MBL. **Rather than using energy (ATP) to keep the shell shut, the tension is maintained by smooth muscles that fit like a lock-and-key, until a chemical signal (neurotransmitter) releases them.** A similar mechanism may be at work in cuttlefish papillae, the scientists found.

The story caught the attention of Veronique Greenwood of the *New York Times*,[4] who calls the cuttlefish the "master of camouflage" and the "chameleons of the sea." Side-by-side photos show the remarkable difference in appearance with papillae raised (see more photos on *Phys.org*[5]). For the ultimate disappearing act, the creature can also change its color, and then bend its body to the reef to mimic the shape of coral as well as its texture. Octopuses have been known to do this, too, but "This is the first time anyone has seen anything like this in cuttlefish," Greenwood says, "a reminder that **even much-studied species still have some surprising secrets.**"

The Survivor Did you know that some fish can reproduce asexually? The *BBC News*[6] shows a photo of an Amazon molly, a freshwater fish that can save a lot of trouble by doing away with

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Implications and Challenges

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It almost becomes a race; will the high temperature or low pH preserve the tissue faster than it will degrade the tissue? Removal of oxygen is frequently suggested as a preservation mechanism, since oxygen typically accelerates chemical reactions. However, the presence of oxygen may also aid in preservation (Schweitzer et al., 2014).

A water-free environment may help preserve the tissue, but water is needed for the fossilization process that facilitates tissue preservation. A dry environment may enable tissue mummification, but some water is needed for prolonged preservation of collagen (Miles and Ghelashvili, 1999). Furthermore, no preservation condition would protect the tissue from the devastating effect of millions of years of exposure to ground radiation (Anderson, 2017).

Obviously, certain conditions will increase preservation of tissue. For example, well-preserved human bodies, such as Lindow Man and Tollund Man, have been recovered from European peat bogs (e.g., see Painter, 1991). But, there is no justification for extrapolating this level of preservation (over the course of one or two millennia) to millions of years of preservation.

In fact, Matthew Collins (who has conducted numerous protein decay studies) continues to struggle with the claims of dinosaur protein discoveries. He acknowledges that certain conditions may slow the rate of degradation, "but not by a lot" (Service, 2017). "Since proteins decay in an orderly fashion," he considers it very unlikely that any condition "could arrest protein degradation for tens of millions of years (Service, 2017)." Thus, he faces the conundrum of his evolutionist position: Protein cannot last millions of years in a buried fossil, but he rejects the possibility that these fossils are not millions of years old.

Not surprisingly, as with Collins, many in the evolutionist community are extremely reluctant to accept the discovery of any dinosaur protein fragments. The presence of these proteins is simply not consistent with the assigned ages of the bones. In fact, the proteins' persistence is completely contradictory to these ages.

More than proteins

If preservation of proteins is astonishing to the evolutionist community, the preservation of intact pieces of actual dinosaur tissue should be considered even more so. This tissue still retains some of its original transparency, elasticity, and reactivity to specific antibodies. Such pliable tissue has been found in numerous dinosaur fossils by several different researchers.

For example, tissue has been detected in the femur of a *T. rex* (Schweitzer et al., 2005), blood vessels extracted from the femur of a hadrosaur (Cleland et al., 2015), sheets of pliable tissue removed from the brow horn of a *Triceratops* (Armitage and Anderson, 2015), and a large segment of tissue was found in the vertebra of a *Thescelosaurus* (pictures of the tissue are published in Anderson, 2017, and some video footage of the tissue is presented in the documentary movie, *Echoes of the Jurassic*). There have even been pieces of flexible material (tissue?) observed in a Cambrian fossil (Moczydłowska et al., 2014).

These are not just trace amounts of protein fragments. Some of these extracted tissues represent significant quantities of biological material within these fossils. The presumption that these sheets of tissue survived some 65+ million years of exposure to a host of potential environmental encroachments (e.g., ground radiation, microbial attack, and groundwater infiltration) stretches the bounds of preservation beyond any form of biological reality.

Iron to the rescue?

By far the most popular explanation for prolonged tissue preservation is the "iron model" (Schweitzer et al., 2014). This model proposes that iron (which is released from hemoglobin in red blood cells, and from myoglobin in muscle cells) initiates chemical reactions within tissue that cause proteins to cross-link. By forming cross-links, proteins essentially tie themselves into knots. This potentially makes the protein (and surrounding tissue?) more resistant to microbial and enzymatic attack.

As experimental verification of this model, ostrich blood vessels were soaked in water and various iron solutions for a period of months. The researchers reported that vessels soaked in iron were preserved significantly longer than were vessels soaked only in water (Schweitzer et al., 2014). At the time of the 2014 report, the vessels had been soaking in iron solutions for two years. While not a trivial length of time, it is very difficult to appropriately apply the results of a two-year laboratory trial to the internal dynamics of subsurface fossils, over a period of 70+ million years (or 200 million years).

However, water offers a rather poor comparison since it tends to accelerate tissue and protein degradation. So, it would be expected that the water-soaked vessels would degrade faster. Moreover, rather than allowing hemoglobin to naturally release from the red blood cells, the researchers osmotically lysed the cells (reported in the online supplement for Schweitzer et al., 2014). Was insufficient hemoglobin released by natural cell lysis? Regardless, the researchers failed to demonstrate that the iron model could actually function in a natural setting.

It is also unlikely that dinosaur carcasses would have contained enough iron for this model to even achieve preservation (Surmik et al., 2016). Preliminary work of the CRS iDINO project indicates that much higher levels of iron are needed than what would naturally be found in animal blood. Therefore, some researchers have suggested that iron from the surrounding environment could serve as an alternate source (Surmik et al., 2016).

This assumes that sufficient geologic sources of iron are available. But, most geologic iron sources (e.g., goethite) are in a crystalline form, dramatically reducing their solubility. Environmental iron is also typically soluble only in highly acidic solutions (Keenan and Engel, 2017), and readily precipitates as the solution's pH increases. Yet, an acidic environment will accelerate tissue and protein degradation. So, even the presence of high levels of environmental iron is unlikely to help in tissue preservation.

In addition, there are numerous chemistry problems with the iron model. The same chemical reactions that cause cross-linking in proteins will catalyze other reactions that will accelerate protein decay (DeMassa and Boudreaux, 2015). Plus, these same chemical reactions would cause the amino acids within that protein to be chemically altered. However, several "unaltered" amino acids, such as methionine and tyrosine, are frequently found in extracted dinosaur proteins. These are highly reactive amino acids that would almost certainly be chemically altered following an appreciable level of iron-induced reactions within a protein molecule (DeMassa and Boudreaux, 2015). If iron-induced cross-linking significantly contributed to dinosaur protein preservation, we would expect a specific chemical "footprint" to be present in the

protein's amino acids. This expected "footprint" is simply not found.

Either…or

Dr. Schweitzer continues to be one of the leading researchers in dinosaur tissue. Even though she is a committed evolutionist, she has provided a valuable summary of the discovery. She concludes that we have "two alternatives for interpretation: Either the dinosaurs aren't as old as we think they are, or maybe we don't know exactly how these things get preserved" (quoted in Ruppel, 2014). This is a reasonable conclusion, except that the evolutionary community does not consider the first alternative as a possibility. So, they do not really accept such an "either/or" option. In their view, the fossils *must* be old, and therefore the tissue *must* somehow have survived (biochemical contradictions not withstanding).

In his *Letters to Creationists*, Scott Buchanan dismisses the potential challenge of dinosaur tissue to the standard geologic dating paradigm. He insists that the current inability of researchers to provide a complete account for the mechanism of the tissue preservation "is not some unique, embarrassing case;" such a "situation arises constantly during scientific discovery" (Buchanan, 2015).

Mr. Buchanan is correct; physical mechanisms can often be one of the more complex aspects to understand. However, he misses the point. This is not a situation where a natural phenomenon is consistently observed, but the mechanism for the phenomenon remains unresolved. Rather, no one has ever observed multi-millions of years of animal tissue preservation. Thus, the only reason there is even a search for some unknown preservation mechanism is simply because evolutionary presuppositions require such a mechanism. Remove this presupposition, and there is no need for a search.

Buchanan attempts to dismiss some of my arguments (e.g., those offered in Anderson, 2016) with the claim that I ignore "the fact that protein degradation rates vary wildly depending on conditions" (Oct. 20, 2016 posting to original Buchanan, 2015). Again, he misses the point. These degradation rates are not random. Proteins decay in a predictable, condition-dependent manner. Many conditions will affect the rate of protein degradation, but experimental data show that bone collagen will degrade in about 1 – 1.5 million years, even under ideal conditions (e.g., Buckley and Collins, 2011). This establishes an approximate upper limit for preservation. As conditions change, the environment becomes less than ideal and the rate of degradation increases.

Buried bone does not offer some type of idyllic setting for protein preservation. On the contrary, it offers a host of factors that will accelerate degradation. Many of the tissue-bearing fossils have been found in the Hell Creek Formation. As part of their critique of the discoveries, Buckley et al. (2008) note that at the time of the dinosaurs' burial (using standard geologic dates), Hell Creek would have been a megathermal environment (> 20°C), resulting in a collagen half-life of only 2,000 years.

…the experimental data firmly support a biblical creation interpretation.

In point of fact, the experimental data firmly support a biblical creation interpretation. Protein decay studies contradict claims of 200, 100, or even 70 million years of preservation. The evidence simply challenges the belief that even the most degradative-resistant proteins could last so long inside a fossil—let alone a variety of proteins with different levels of resistance. Any possible exceptions to the experimental data are simply conjecture.

Dinosaur tissue and biblical creation

Ultimately, critics of biblical creation struggle with explaining the preservation of dinosaur tissue (or tissue from even more "ancient" fossils). Instead, they primarily offer inferences with very little experimental support. Neither do they provide a cogent defense of the iron preservation model. This is not surprising, per se, as virtually none of the experimental work supports their presumptions.

This adds to the irony of Buchanan's rather predictable claim that biblical creationists simply dismiss the scientific evidence, making "them, and their version of the Christian faith, look silly" (Buchanan, 2015). In the case of dinosaur tissue, "old earth" advocates are scrambling for explanations, offering speculations and conjecture, but very little experimental evidence (Anderson, 2017). The discovery of flexible biomaterial in a supposed 550-million-year-old beard worm (Moczydłowska et al., 2014), and evidence of trace amounts of protein fragments still retained in a 417-million-year-old arthropod (Cody et al., 2011) stretches the credibility of any preservation mechanism (no matter how fanciful) beyond the breaking point.

The preservation of dinosaur tissue and protein remains strong direct biochemical evidence that these fossils are not millions of years old. Despite attempts to explain the presence of this biomaterial, there exists no viable explanation for its extensive preservation. Other dating methods (such as radiometric measurements) do not automatically erase the significance of the biomaterial. Tissue and individual proteins degrade at measurable rates. Their use as a "clock" requires no more supposition or conjecture than do other geologic dating methods.

On the other hand, the presence of dinosaur tissue clearly fits within a young earth, global flood framework. A rapid, watery burial during the Genesis Flood would enhance fossilization of dinosaurs and other creatures. This would potentially increase tissue survival. Protein decay data, while contradictory to a multi-million-year preservation period, readily fit within a few-thousand-year time frame. This is fully consistent with an Earth that is less than ten thousand years old.

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Matters of Fact

by

Jean K. Lightner, DVM, MS

Discontinuity

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 What is discontinuity as it relates to creation biology?

A Discontinuity involves the idea that there are pronounced morphological (and underlying genetic) gaps between groups of organisms. This creationist concept stands in contrast to the evolutionary view of universal common ancestry, which would imply continuity among all life forms.

The idea that discontinuity (or significant, holistic differences) should exist between living organisms is an inference consistent with Genesis 1. Plants, sea creatures, flying animals, and various groups of terrestrial animals were each created "according to their kinds." Finally, humans were created in the image of God. The idea that the descendants of these originally created kinds retained distinctive features separating them from other kinds has been an important component of creationist thinking for many years (Wood, 2003; Lightner et al., 2011).

Yet it is important to recognize that it is not merely an abstract concept; we certainly do see clear evidence of discontinuity in the natural world. As the eminent entomologist, Erich Wasmann (1910, pp. 291–292) said:

> All honest supporters of the theory of evolution, who pay due attention to the facts, acknowledge further that the grounds for assuming the existence of a real relationship between the forms in question become more scanty when the higher divisions are considered. For the species of one genus these grounds often amount to great and even irrefutable probability, and the same may be said in not a few cases of the genera of one family, and occasionally for the families of one order, but it can seldom be maintained of the orders in one class. The evidence afforded by natural science for the theory of common descent becomes steadily weaker the higher we ascend the system …

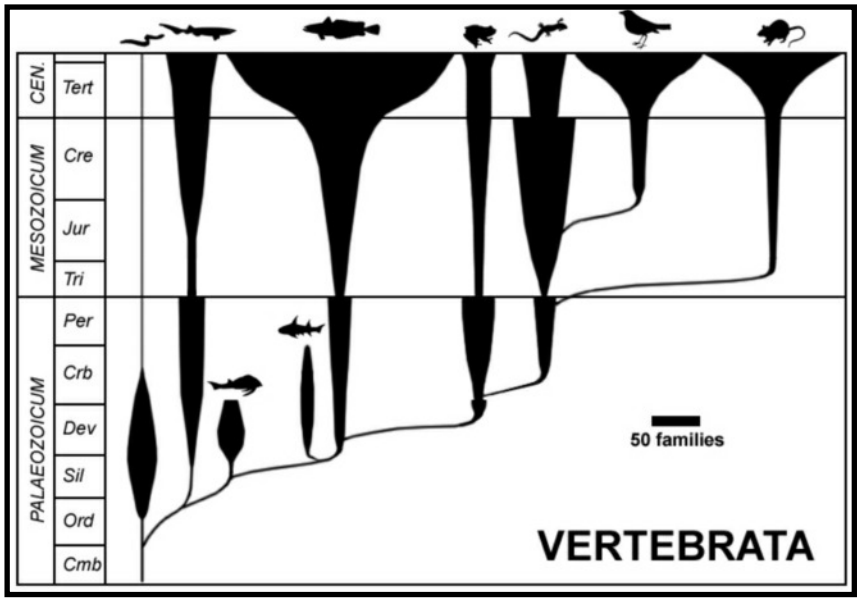

FIGURE 1. *This spindle diagram represents various classes of vertebrates found in the fossil record (from left): Agnatha, Chondrichthyes, Placodermi (extinct), Acanthodii (extinct) Osteichthyes, Amphibia, Reptilia, Aves and Mammalia. Note that the number of families (width of the spindle) varies in different layers. The semi-horizontal lines connecting the families are based on inference, and in earlier diagrams were represented as dashed lines. If you remove the lines of inference, the discontinuity is obvious. (public domain)*

Wasmann, the Jesuit scientist for whom Wasmannian mimicry is named, believed in the doctrine of Creation. He supported evolution (as opposed to species fixity) in the sense that organisms can and do change over time. However, he argued against universal common descent based on many observations, which he summarized in the quote above. It is interesting to note that, in keeping with Wasmann's statement, recent creationist attempts to estimate kinds have this grouping placed anywhere from the level of the subfamily to the order (Lightner, 2012; Lightner, 2013).

In biology

This obvious discontinuity has long been a major source of arguments against the concept of universal common ancestry, which is associated with Darwininsm. For example, Alfred Russel Wallace was a contemporary of Darwin who, unlike Wasmann, embraced a theistic evolutionary perspective. Thirty years after the release of Darwin's famous book, Wallace published a book promoting universal common ancestry by natural selection. He remarked, "Whether the distinctions between the higher groups termed Classes and Subkingdoms may be accounted for in the same way is a much more difficult question." (Wallace, 1889, p. 8) He then proceeded to argue that they are related, despite their "vast" differences.

Wallace spent a whole chapter of his book attempting to address the most common objections to universal common ancestry by means of natural selection. In this chapter, the discussion of the origin of new organs (wings, eyes, mammary glands, etc.) is obviously weak, and begins with the excuse that it happened so far in the past that we can't be expected to have a clear explanation. (Wallace, 1889, p. 128)

Yet, it is clear in the way Wallace addresses the subject that, especially at the taxonomic level of Class and higher, discontinuity has long been obvious. Wallace also implies that the intermediary organisms died out long ago, making the gaps seem larger.

In paleontology

If Wallace's argument is correct, then we would expect the discontinuity to disappear with extensive study of the fossil record, especially at lower levels in the geologic column. This has not proved to be the case. In the past, pictures depicting various taxa

present in the fossil record would show a vertical column indicating the portions of the geologic column where those organisms have been found. Dotted lines would be used to connect major groups together, but these were based on inference rather than actual fossil finds. Though dotted lines are used less commonly today, the discontinuity is still obvious (Figure 1, from Bøckman, 2011).

There are some instances where proposed transitional fossils have been put forward. Yet these are generally disputed, even within the evolutionary community. One example would be *Tiktaalik*, initially claimed to provide evidence of transition between fish and tetrapods. Currently considered an extinct lobe-finned fish, the fossil remains do bear some features similar to those seen in tetrapods. However, discovery of fossil trackways believed to be older has brought into question *Tiktaalik*'s position as a proposed ancestor of today's tetrapods (Wikipedia, 2018a).

The bottom line is that we do find new and interesting species as we uncover more fossil finds. Yet, the discontinuity remains. The vast chasm between higher taxonomic ranks should make up a majority of our finds in the lower levels of the geologic column, but they do not.

This pervasive discontinuity has been noticed by paleontologists, and was the motivation for the proposal of Punctuated Equilibrium. This contrasts with Darwin's idea of slow, gradual change by positing that stasis is the norm, with occasional bursts of rapid morphologic change that are not preserved in the fossil record (Wikipedia, 2018b).

In genetics

Discontinuity involves more than just morphologic gaps between groups of organisms. There are significant genetic gaps as well. Recent molecular data have forced some evolutionists to conclude that in the unobserved past, there were short, explosive, innovative phases of evolution leading to abrupt increases in genomic complexity which were associated with major transitions (Wolf and Koonin, 2013). These were then followed by much longer reductive phases, which are consistent with the type of changes we can observe today.

Since explosive increases in genomic complexity are not observed today, and there is no reasonable known mechanism by which it could occur (apart from divine intervention), creationists have a valid reason for questioning this evolutionary inference. A realistic alternative is to see this as evidence that should cause a person to question the hypothesis of universal common ancestry. It is evidence that is consistent with biblical creation, where genomic complexity was created.

Thus, discontinuity is clearly seen between major groups of organisms, whether one considers morphology of extant organisms, genetics, or the fossil record. This is not expected if life really shared common ancestry, but it is fully consistent with the biblical teaching that God created various groups of living things according to their kinds.

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Speaking of Science

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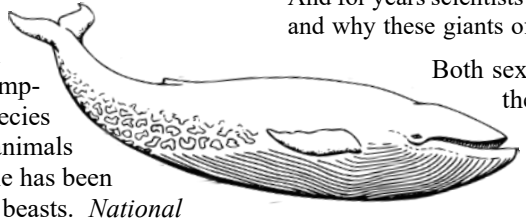
males, and reproducing directly. While this costs less energy, it has the downside of accumulating mutations more rapidly. According to a principle known as Muller's Ratchet, asexual species should go extinct faster because they lack the mutational sponge of sexual species. "The Amazon molly had been around for half a million generations — **far in excess of what theory would suggest,**" Jonathan Ball writes. This leads to a conundrum for Darwinism: "Evolutionary theory suggests that species favouring asexual reproduction will rapidly become extinct, as their genomes accumulate deadly mutations over time." Scientists are not sure how this fish beat the odds.

Underwater Troubadours Illustra's film showed a memorable segment about singing humpback whales, but those aren't the only whale species with a song to sing. Blue whales—the largest animals in the ocean—are talented singers, too, but little has been known about the music of these secretive beasts. *National Geographic*[7] reported on a 14-year effort by Scripps Institute in California to decode the vocalizations of 100 blue whales. Since the sound travels for miles, they could pick up the sounds remotely with underwater microphones, but they also synced the sounds with individual whales by outfitting them with suction-cup trackers. The results were surprising, changing assumptions about blue whale behavior:

> The **biggest** animal to ever live is **also the loudest**, and it **likes to sing at sunset, babble into the night, talk quietly with those nearby, and shout to colleagues 60 miles away.**
>
> The blue whale, which can grow to **100 feet long** and **weigh more than a house**, is **a veritable chatterbox, especially males,** vocalizing several different low-frequency sounds. And for years scientists had only the vaguest notion of when and why these giants of the sea make all those sounds.



Both sexes vocalize, but only the males 'sing,' the researchers found. They're also the loudest. The reasons for all the noise are not well known, but the males seem to begin their "deep melodic songs"

... continued on p. 11

Szent-Györgyi's Proposed Syntropy Theory

by Jerry Bergman, PhD

[Editor's note: The author has previously written on this subject. The current article is an update and makes several corrections to the earlier publication (Bergman, 1977)]

Albert Szent-Györgyi (1893–1996) was an eminent scientist who was born in Hungary. He was educated at both the University of Budapest, where he earned his M.D. degree, and Cambridge University, where he obtained his Ph.D. A genius, he published his first scientific paper while still a teenager. In 1937 he was awarded the Nobel Prize in "Physiology or Medicine" for his scientific research. He is credited with multiple accomplishments, including the discovery of Vitamin C, and reactions of the citric acid cycle.

The problem of evolution

Realizing that entropy is a universal force, Szent-Györgyi pictured the world as a great machine running down and decaying. Because the law of entropy would prevent evolution, Szent-Györgyi postulated that there exists what he called the syntropy, or "negative entropy," to explain the creation of more complex structures from simpler ones (Downs and Ambrose, 2001). This counterforce, Szent-Györgyi argued, must exist in order to explain why "putting things together in a meaningful way…is one of the basic features of nature" (Szent-Györgyi, 1977). As Scaruffi explained, Szent-Györgyi proposed syntropy to explain "a drive towards synthesis, towards growth, towards wholeness and self-perfection" (Scaruffi, 2003, p. 282).

The theory was developed after 50 years of research on the problem of evolution (Szent-Györgyi, 1966). The fundamental problem in evolution that Szent-Györgyi identified is that there exists a "basic difference between the living and the non-living" world, and "as scientists we cannot believe the laws of the universe should lose their validity at the surface of our skin" (Szent-Györgyi, 1977). The contrast between entropy in the non-living world and the living world was described by Szent-Györgyi, namely, as the greatest wonder of creation,

> …a cell, with its astounding inner regulations. Then it goes on putting cells together to form 'higher organisms' and increasingly more complex individuals: … At every step new, more complex and subtle qualities are created, and so in the end we are faced with properties which have no parallel in the inanimate world (Szent-Györgyi, 1977).

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Albert Szent-Györgyi, circa 1948 at the NIH..

Syntropy postulates the existence of a force that causes living things to reach "higher and higher levels of organization, order, and dynamic harmony" (Vargiu, 1977). The theory of syntropy was also proposed to provide a source of new genetic variation, solving the problem that natural selection is an incomplete theory because it "offered no explanation for the origin of the traits that are subjected to evolution" (Piel, 2001, p. 324).

Szent-Györgyi used his molecular biological research findings as a basis to reason about the entropy problem. His research left him with many questions, such as why are all higher life forms "built of such small units of approximately equal size? ... The electron microscope has revealed a wealth of structure and organization within the cell, dominated by laminar formation" (Szent-Györgyi, 1963, p. 191). He then explored how life is able to develop "from the molecular dimensions to the higher sub-cellular and cellular dimensions" (Szent-Györgyi, 1963, p. 191). To determine this requires one to explore the wide gulf which separates us from understanding life, "a gulf which also separates molecules from higher structures" (Szent-Györgyi, 1963, p. 191).

Szent-Györgyi's theory of syntropy touches on one of the strongest arguments for Intelligent Design, *viz.,* that a body organ generally is useless during evolution because "survival of the fittest" would select against *most all* mutations until enough had occurred so that a new, working structure improved the organism's chances of survival (Behe, 1996). Szent-Györgyi believed that the Darwinian mechanism proposed to explain macro-evolution is inadequate for many reasons, including the fact that in order for a biochemical system to function in an orderly way from one step to the next one, a chain of reactions must occur in a precise order and time, just as the

> …cog-wheels of a Swiss watch do. But if this is so, then how can such a system develop at all? For if any one of the specific cog wheels in these chains is changed, then the whole system must simply become inoperative. Saying it can be improved by random mutation of one link … [is] like saying you could improve a Swiss watch by dropping it and thus bending one of its wheels or axles. To get a better watch all the wheels must be changed simultaneously to make a good fit again (Szent-Györgyi, 1977).

These mutations, then, would have to be passed on from generation to generation until the set required to produce a survival advantage was present as a unit. Only then could natural selection preferentially select the organism with the new functioning structure. This difficulty is summed up by Szent-Györgyi in a speech that he presented at Columbia University, using the example of the red patch located on the beak of herring gulls. This patch is critical for feeding its young. First, the gull goes fishing and swallows a fish. Then when mother gull returns home,

> …the hungry baby gull knocks at the red spot. This elicits a reflex of regurgitation in mama, and the baby takes the fish from her gullet. All this … involves a whole series of

> most complicated chain reactions with a horribly complex underlying nervous mechanism. How could such a system develop? The red spot would make no sense without the complex nervous mechanism of the knocking baby and that of the regurgitating mother. All this had to be developed simultaneously, which, as a random mutation, has a probability of zero. I am unable to approach this problem without supposing an innate "drive" in living matter to perfect itself (Szent-Györgyi, 1977).

To counter the law of entropy

For evolution to occur, the normal universal increasing of entropy must be countered and overcome in some way. In the words of Scaruffi, the paradox underlying natural selection

> …is that on one hand it proceeds in a blind and purposeless way and on the other hand produces the illusion of more and more complex design. This continuous increase in information (i.e., the spontaneous emergence of order) seems to violate the second law of thermodynamics, the law of entropy (Scaruffi, 2003, p. 280).

Syntropy, Szent-Györgyi concluded, must exist in order to explain the phenomena observed in nature (Szent-Györgyi, 1977). A concern Szent-Györgyi wrote about in detail is the enormous complexity of life:

> I started my research in histology. Unsatisfied by the information cellular morphology could give me about life, I turned to physiology. Finding physiology too complex I took up pharmacology, in which one of the partners, the drug, is of simple nature. Still finding the situation too complicated I turned to bacteriology. Finding bacteria too complex I descended to the molecular level, studying chemistry and physical chemistry. Armed with this experience I undertook the study of muscle. After twenty years' work, I was led to conclude that to understand muscle we have to descend to the electronic level, the rules of which are governed by wave mechanics (Szent-Györgyi, 1960, p. 2).

The differences between life and nonlife, and how life could evolve, was of such importance to Szent-Györgyi that he once stated he planned to spend the rest of his life working on this problem. Szent-Györgyi explained that the symbol of a specific molecule, such as riboflavin, expressed in the language of classical chemistry, consists of simple geometric figures plus the symbols C, N, and H that are as simple as the building blocks of children. (Szent-Györgyi 1963, pp. 193–194). Furthermore, the molecules must properly interact with other molecules that must be

> ..built with the same precision. Our bodies are built of thousands of such different molecules, and chains of molecules… I find it difficult to believe that such an enormously complex system could have been built by blind, random mutation (Szent-Györgyi, 1963, pp. 193–194).

Szent-Györgyi determined that syntropy, the counter force to increasing entropy, was necessary to solve the paradox underlying natural selection, namely the problem that evolution proceeds in a blind and purpose-less way that violates the second law of thermodynamics (Scaruffi, 2003, p. 280).

Problems with the syntropy theory

Syntropy theory was proposed to account for several major problems that Neo-Darwinism cannot explain, but a number of serious problems have mitigated against the theory's acceptance. Although the concept of syntropy offers an explanation to some of the problems in the evolutionary model, a scientific hypothesis must be validated empirically before it can be accepted as science. The most critical obstacle to the syntropy theory is accounting for both the cause and the origin of this hypothetical, internal, biological drive that counters entropy. A mechanism must be found to explain the existence of this hypothesized drive, that cannot be accounted for by mutations and natural selection. A major problem is that the concept of syntropy is wholly metaphysical, similar to Henri Bergson's *Creative Evolution* (1944).

The need to develop a theory of syntropy demonstrates the major difficulties with the mutation-natural selection evolution model. These difficulties are such that Szent-Györgyi concluded that the currently accepted mechanism of evolution has "a probability of zero" for producing life as we know it (Szent-Györgyi, 1977).

Szent-Györgyi's summary of the need for a concept such as syntropy illustrates the difficulties in the current evolutionary model, because

> Life appears to be a revolt against the rules of Nature… Life is a paradox. It is easy to understand why man always divided his world into "animate" and "inanimate," *anima* meaning a soul, the presence of which was needed to explain [this] queer behavior (Szent-Györgyi, 1972, pp. 1–2).

The solution Szent-Györgyi proposed to this problem is that there must exist an "innate force" in all living things that functions to counteract entropy and improve the organism. His proposal raises many important questions, and the recognition of these is an important first step in re-examining evolution.

A second problem that syntropy attempted to respond to is the fact that Darwinism

> …proposed a mechanism for transmutation, involving natural selection of random inborn variations—but this aspect of Darwinism encountered continued objections from scientists for more than a half century. Darwin himself waffled on mechanisms (Larson, 2001, p. 90).

Only when a serious examination of these problems is undertaken can we begin to identify concepts that fit the facts better than the current transmutation view that has dominated scientific circles for so long. Szent-Györgyi recognized that intelligent design was everywhere in life, and as he aged he asked, is the

> '…hypothetical Creator an anatomist, physiologist, chemist, or mathematician? My conclusion is that he had to be all of these, and so if I wanted to follow his trail, I had to have a grasp on all sides of nature.' The scientist added that he 'had a rather individual method' (Moss, 1988, p. 36).

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around sunset, serenading into the night, probably to attract mates. "But no one has ever witnessed blue whale reproduction," one researcher commented. For all the research effort, scientists are only beginning to decipher this underwater performance.

The more details you learn about living things, the less excuse you have to chalk it up to evolution.

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Quarterly Research Matters

Summaries of Cutting-edge Research from the Creation Research Society Quarterly

This feature will return in the next issue (May/June, 2018).

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Creation Matters
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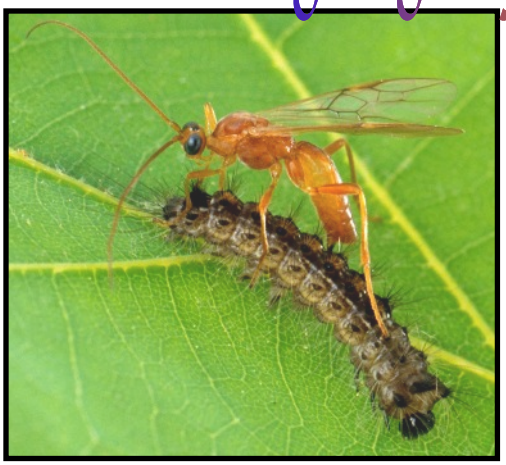
All by Design
by Jonathan C. O'Quinn, D.P.M., M.S.

The Language of Trees, Part 1

Pheromonal Phenomena

As science furthers its understanding of how living organisms function, even on the chemical and cellular levels, what becomes clear is that life—and all the physiological and biochemical processes that are a part of living—is anything but simple.

When giraffes feed on acacia leaves, the trees react to the "injury" within minutes by pumping toxic substances (tannins) into their leaves to discourage the giraffes from eating their leaves. The giraffes react by consistently moving to acacia trees at least 100 yards distant or upwind of where they were just eating. Why? "Wounded" acacia trees release ethylene gas from pores in their leaves, which is carried by the wind up to 50 yards, serving as a warning to nearby acacia trees that danger is at hand; the mechanism by which other acacias detect this is being studied. Upwind or past 100 yards, the ethylene gas will not have reached other acacias in the vicinity.



Aleiodes indiscretus *wasp parasitizing a gypsy moth caterpillar. USDA photo by Scott Bauer. Image Number K7659-1. (public domain)*

Here is another example: when certain insects feed on their leaves, elm and pine trees can recognize the insect species by their saliva, releasing specific pheromones to attract predators that target that species of insect. For instance, the trees "call" the parasitic *Aleiodes indiscretus* wasp when attacked by gypsy moth caterpillars. The wasps lay their eggs inside the caterpillars, which are then consumed by the developing wasp larvae.

Pheromonal communication between trees, or between trees and certain insects, is a phenomenon that could not have developed in small stages, by accident, in the various organisms. The relationships had to be fully developed from the start to be beneficial.

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