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Herbivores and Plant Volatiles: Part 4—Vegetable Crops

by Emmett L. Williams, Ph. D. and George F. Howe, Ph. D.

Vegetable plants grown commercially are of particular interest to researchers who study defensive volatiles that are released from the plants in reaction to herbivore feeding. Such emissions attract parasitoids and carnivores to the feeding herbivores, thereby reducing and occasionally decimating their population on a crop. As Pare and Tumlinson (1999) noted:

> Leaves normally release small quantities of volatile chemicals, but when a plant is damaged by herbivorous insects, many more are released.

Figure 1. The large white butterfly, the adult form of Pieris brassicae. *Photographer, Hania Arentsen, Garden Safari, image no. 1372017.*

Induced volatiles

These induced volatiles may be of different composition and concentration than are the "normal" gases emitted by a plant. If the substances themselves or the substances that induce the formation of the defensive volatiles can be determined, it may be possible for humans to use these compounds on crops suffering herbivore damage. Such use may induce the damaged plants and their neighbors to activate defensive volatile attractants in a complex biochemical cascade of reactions. Gatehouse (2002) reported that:

> ... the accumulation of constitutive defenses is species-specific. Insect herbivores activate induced defenses both locally and systemically by signaling pathways... Plants also respond to insect attack by producing volatiles, which can be used to deter herbivores, to communicate between parts of the plant, or between plants to induce defense responses.

Ideally the herbivore damage will be lessened as enemies of the herbivore answer "the call for help" (Wolfrom, 1992).

Cole plants

Herbivores of cole plants (see glossary) include the larvae of *Pieris brassicae*, the cabbageworm (van Nouhuys, n.d.). The adult of this species is commonly called the large white butterfly (Figure 1). The volatiles released by the crops attract a

... continued on p. 6

Condemnation of Terms such as "Purpose" and "Design"

by Jerry Bergman, Ph.D.

Insect behavioral physiologist Graciela Flores recently published an article in *New Scientist* in which she condemned the use of certain terms in science articles such as "design," "gate keeper," and similar expressions because they convey what she calls "teleological language." The article was prompted by her recent reading of a scientific article that used the word "design" in an "unmistakable teleological way," which, she argues, is "improper."

She has "always avoided teleological language, not only because it can be misused when taken out of context, but because it is incorrect." The reason it is incorrect, she concluded, is because "evolution has no purpose" and has no designer as the word is commonly used (2005).

Making the case

Flores stressed that scientists "ought to be more careful, in the wake of the publication of a New York Times op-ed by Michael Behe of the Discovery Institute—the most visible arm of the Intelligent Design movement—in which he supports his thesis by using comments of National Academy Science President Bruce Alberts in the journal *Cell*" (Flores, 2005). Behe stated that the resemblance of life to engineered mechanisms, such as a watch, is "enormously

... continued on p. 2

Contents

"Purpose" and "Design"

...continued from page 1

stronger" than what Paley imagined. He added that, in the past half-century, science has demonstrated ways in which the cell is powered by nanomachines constructed of molecules, such as little molecular trucks used to ferry supplies and "little outboard motors to push a cell through a liquid."

After observing that a recent issue of one of the leading science magazines, *Cell*, was devoted to "molecular machines," and included articles with titles such as, "The Cell as a Collection of Protein Machines" and "Mechanical Devices of the Spliceosome: Motors, Clocks, Springs and Things" Behe (2005) noted that:

> Bruce Alberts, president of the National Academy of Sciences, wrote that "the chemistry that makes life possible is much more elaborate and sophisticated than anything we students had ever considered." In fact, Dr. Alberts remarked, the entire cell can be viewed as a factory with an elaborate network of interlocking assembly lines, each of which is composed of a set of large protein machines. He emphasized that the term machine was not some fuzzy analogy; it was meant literally.

Alberts (2005) responded to this article by adding that "the majestic chemistry of life should be astounding to everyone," but this fact

> should not be misrepresented as support for the idea that life's molecular complexity is a result of "intelligent design." To the contrary, modern scientific views of the molecular organization of life are entirely consistent with spontaneous variation and natural selection driving a powerful evolutionary process. ...Because "intelligent design" theories are based on supernatural explanations, they can have nothing to do with science.

Futuyma (1998, pp. 5, 8) explained the reason why there is an aversion to using terms such as "design" in science:

> Darwin's immeasurably important contribution to science was to show how mechanistic causes could also explain all biological phenomena, despite their apparent evidence of design and purpose. By coupling undirected, purposeless variation to the blind, uncaring process of natural selection, Darwin made theological or spiritual explanations of the life process superfluous.

Using teleological language in science

Examples of the use of terms such as "purpose," "design," "invention," "molecular machine," and "gate keeper" in the scientific literature are legion. One example of the term "gate keeper" is the following (Lempinen, 2005):

> Through the eyes of molecular biologists Saba Valadkhan, the spliceosome is a huge, quirky *molecular machine* functioning as the *gate keeper* of human genetic information. With more than 300 parts, and constantly in flex, it had baffled scientists for two decades. So when Valadkhan saw the first research results suggesting that she'd begun to solve the riddle of the spliceosome, she was a little bit thrilled but largely skeptical." (emphasis added)

When such statements by Darwinian scientists are quoted by critics ..., the scientist quoted often claims that s/he was "misquoted" or "taken out of context" by people who believe structures that look and function like they were designed were, in fact, designed.

Valadkhan's research has revolutionized science, holding promise in such areas as cancer and Alzheimers disease research. As a result of her work, she was given the very prestigious *Young Scientist Award* (Valadkhan, 2005). Her work demonstrated that the spliceosome not only helps to copy genetic data and delete introns, but "if something is wrong in the genetic material, the spliceosome usually finds it and discards it" (Lempinen, 2205). Specifically, she found that five RNA molecules in the spliceosomes are central to the proper functioning of this critically important, complex correction system.

In another example, Neil Shubin (2004, pp. 90-93) and his colleagues at the University of Chicago discussed the role of several "appendices designs" in tetrapods. Their work illustrates one way to deal with the "problem" of teleological language, namely to use quotes around words that imply teleology, such as in the following example (Lieber and Fridén, 2000):

> Muscle fibers are often depicted as projecting in bundles (fascicles) from an origin on a proximal tendon plate to an insertion more distally. This simply does not do justice to the wide array of muscle "*designs*" that are apparent throughout the animal kingdom....
>
> The varying architectural *design* of human and other mammalian muscles was used to illustrate the fact that muscles can be "*designed*" to perform fairly specific functions. (emphasis added).

Note the word design is used in this quote three times, twice in quotes, evidently to indicate that the muscle *looks* like it is designed, but actually is not. Morris (2005) explained the reasoning behind this conclusion:

> Regardless of how much an organism looks like it had been intelligently designed, evolutionists (without even sounding embarrassed) will insist that natural selection has the power to make it *look like* it was designed, even though it wasn't.

One more paradigm is when Stephen Hetz and Timothy Bradley, both of the University of California, Irvine, stated that the insect respiratory system was "*designed* to function most efficiently at high levels of O_2 consumption" (Flores, 2005; Hetz and Bradley, 2005). These researchers claimed that they "did not intend to imply that the insects tracheal system is the result of the work of a designer," noting instead that they used the term design "as a shorthand for an awful lot of ideas, such as that the system has been shaped by selection pressures to

have a certain functional consequence" (quoted in Flores, 2005).

Bradley concluded that the word "design" could be used, but that he preferred the expression "shaped by selection pressure." When such statements by Darwinian scientists are quoted by critics of Darwinism, the scientist quoted often claims that s/he was "misquoted" or "taken out of context" by people who believe structures that look and function like they were designed were, in fact, designed.

Yet another case in point is a paper that concluded that "structural materials in nature exhibit remarkable designs" (Aizenberg, et al., 2005). The authors added that the sponge is "an example of nature's ability to improve inherently poor building materials" because the design used results in "exceptional mechanical stability" in spite of the poor building materials (Aizenberg, et al, 2005). The design is so superior that it produces a textbook example in mechanical engineering, namely

> ...the *Euplectella* sp. skeletal system is designed to provide structural stability at minimum cost, a common theme in biological systems where critical resources are often limited. We believe that the study of the structural complexity of unique biological materials and the underlying mechanisms of their synthesis ... ultimately will offer new materials concepts and design solutions.

Book titles, as well, use teleological language. An example is *Invention and Evolution: Design in Nature and Engineering* by French (1988). As he explained: "Design for function is even more important than design for appearance. It is also a fascinating pursuit which brings delight and challenge to engineers and others who engage in it." French (1988, p. 1) then stressed that life *looks* designed, but is not—even though the design of life "exceeds" that designed by humans:

> Living organisms are examples of design strictly for function, the product of blind evolutionary forces rather than conscious thought, yet far excelling the products of engineering. When the engineer looks at nature he sees familiar principles of design being followed, often in surprising and elegant ways. Sometimes, as in the case of flight, he is inspired to invention: more commonly, he discovers his ideas are already embodied in some animal or plant.

French (1988, pp. 17–18) added that the "design in nature" is powerful enough to convince any observer of its "excellence," yet

> so much of it is beyond our understanding at present that we are usually in the position of believing that the design is excellent, without being able to explain it fully. For instance, a cursory examination might suggest that the human knee is a simple pivot or hinge joint, like a door hinge. It is much more complex than that, however ... it is not at all easy to be sure that all its peculiarities are improvements over a plainer design. However, while there are cases where natural design does appear to be at fault, it is much more probable that it is our understanding that is lacking when anything seems to us unaccountable or wrong.

Concluding that the universe was not designed (when it appears to be) is not science, but is rather an attempt to inject one's philosophy and religion into science.

This observation strongly supports the conclusion that structures that appear to be designed, in fact, are.

Another example is a book titled *The Architecture and Design of Man and Woman* which is about "The Marvel of the Human Body, Revealed" (Tsiaras and Werth, 2004). The book explains in text and stunning photographs the "intricately constructed systems and isolated structures" in the human, and freely uses words such as designed, purpose, ingenious, and similar. For instance, the section on page 60 covers the "arterial design," and page 69 the "astonishing efficiency" that the "ingenious plumber" used to design the human "sound machine." Page 80 shows the "brilliantly engineered ... living skeleton," and page 116 discusses "the wisdom of the body"—the endocrine system.

Reverse engineering

A major problem with censoring the use of words such as "design" is that scientists in many fields work from a design mind set called "reverse engineering." The researcher asks himself "how was this structure (or system) designed to function?" The thought process is similar to a company's purchasing its competitor's product in order to disassemble it, to determine how it was engineered, with the goal of learning from the design how to improve one's own product.

My own experience in the area of molecular biology at a major research university from 1986 to date, first as a student, then as a research scientist and associate professor, is that the foremost question asked is: "how was this cell organelle or structure designed to function?" A whole new field called "systems biology" tries to do just this. Gray (2005) explained that research on the heat-shock response, which is "the organism's ability to repair protein damaged by heat or other stresses," uses mathematical modeling to demonstrate how

> complex workings of the heat-shock response reflect features that make the protein repair fast, robust and efficient. "It is how, if you had a good engineer, the process would be designed," ... the time is right for systems biology.

Gray (2005) concluded that life-sciences researchers require

> [the] analytical tools of the engineers and their computer-science partners to make sense of data that is just too much for the unaided human brain to handle. But engineers need the data and experiments of biology to test their quantitative models; otherwise, they are just speculating—reverse-engineering natural systems in theory but not in practice. ... To understand their data ... "They need quantification." And on the engineering side it's not enough to come up with a design, whether of a spacecraft or a heat-shock reac-

tion. The engineer has to know if the design will work in the real world.

Ignoring the obvious

Because of the growth of the Intelligent Design movement, Flores (2005) recommended that scientists never use words such as "design." She quoted Ken Miller, who has stated that he would not use the word "design" with students because "they are going to take the language too literally, and it will cause a misunderstanding." Instead of saying that a structure is designed, Miller suggested that the expression "it evolved" or "was shaped by selection pressure" to accomplish a certain function should be used instead. Michael Ruse even admitted, according to Flores (2005), that "we all think in terms of design, although not in terms of a hands-on designer," to refer to the orthodox belief among scientists that "natural selection" or "evolution" designs life. Thus, Flores stressed, it should not be implied in science articles that a "designer" refers to an Intelligent Designer, such as God, but rather to a blind watchmaker designer, such as natural selection.

Flores (2005) added that "other scientists refuse to self-censor" these words, and then quoted Miller who concluded that "I wouldn't like to have to be aware that the enemies are looking over our shoulder" and for this reason "have to choose your words carefully." Note that those who believe that Intelligent Design is behind the natural world at some level are termed "enemies" by these scientists.

Concluding that the universe was not designed (when it appears to be) is not science, but is rather an attempt to inject one's philosophy and religion into science. It appears that this is an example of Darwinists having to strain to get around the idea that complex nanostructures, which clearly appear to be designed, are, in fact, designed in the way most of us think as being intelligently designed. The controversy is thus not over the question of whether life was designed, but rather on the identity of the designer.

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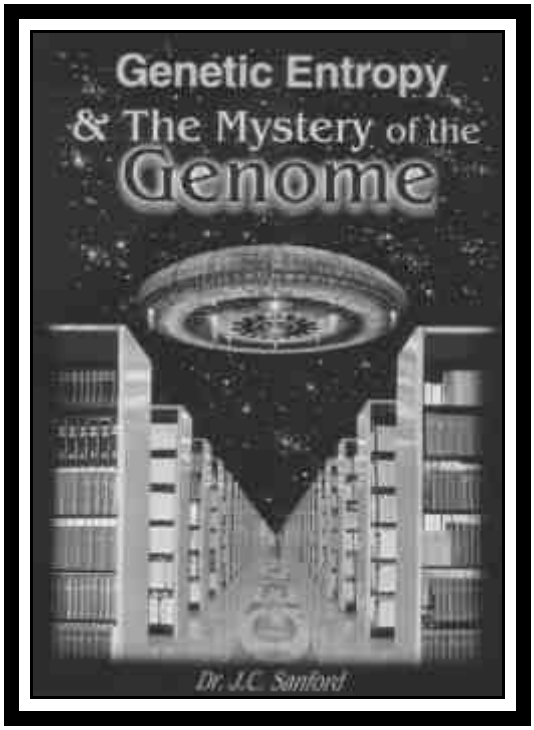

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Membership Matters

by Glen Wolfrom, Ph.D.

From time to time in this space we will feature information which is important to our members. This may consist of an explanation of current membership policies and benefits. It may also be an opportunity to announce new policies and opportunities for members.

At the recent (June 1–3, 2006) annual board-of-directors meeting, a number of motions were passed which will be of interest to members.

Expansion of student membership eligibility

When the student membership category was first implemented many years ago, eligibility was limited to those full-time students who had not yet obtained a bachelor's degree. Thus, student membership has been comprised of high school and undergraduate students.

Realizing that the future of the creationist movement lies with those who are able to obtain advanced degrees in key scientific disciplines, the board of directors (BOD) agreed that it is important to reach these persons while they are undergoing their advanced education. Thus, the policy was changed to also grant student member status to those who are enrolled in full time postgraduate science programs (e.g., MS, PhD, MD, and DVM). Those holding postdoctoral positions are not eligible. Additionally, a graduate student with a MS degree may request voting member status while enrolled as a student member.

This policy is effective immediately. A description of the new requirements for student membership will be included on the membership application page in the September issue of the *Quarterly*.

Group rates

This next item is for those who participate in organizations that have interests which are compatible with those of the CRS. The BOD has established a group rate of $27 each ($35 for foreign members) when 10 or more new memberships are submitted together. The payment must consist of a single check or credit card charge for the entire amount. An individual application form must be provided for each new member.

Examples of those who might benefit from the group rate include members of local creation groups, Sunday school classes, Christian school science classes, high school creation clubs, etc. If you have questions regarding the procedures to qualify for group rates, please contact the membership secretary:

members@creationresearch.org
816-279-2312

Increase of annual membership and subscription fees

Effective September 1, 2006, the basic membership annual dues will be increased by $3, with other membership and subscription categories adjusted accordingly. The new rates will be:

- Voting — Regular $35; Senior $30
- Sustaining — Regular $35; Senior $30
- Student $30
- Subscriber $38

Additionally, the postage surcharge for foreign members and subscribers will be increased to $8 per year.

This new fee structure will offset recently-incurred cost increases for printing and postage. As has been our practice, each membership will continue to automatically include a subscription to both the *Creation Research Society Quarterly* and *Creation Matters.* We appreciate the continued support by our members and subscribers who choose to renew each year.

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...continued from page 1

tiny (7 mm, or 0.3 inches in length) wasp parasitoid, *Cotesia glomerata*, which can destruct up to 75% of the cabbageworm population on cole plants (van Nouhuys, n.d.).

In a study employing Brussels sprouts (*Brassica oleracea*), it was found that the oral secretions from a feeding cabbageworm induced the release of attractant volatiles (Mattiacci et al., 1995). While eating, the larva often may be sealing its own doom! These researchers, after considerable chemical analyses, proposed that the elicitor in the caterpillar regurgitant is β-glucosidase. Mechanically damaged leaves coated with regurgitant resulted in the attraction of *C. glomerata*. This work is similar to the one reviewed previously by Williams and Howe (2005), except that it involves different elicitors and wasp parasitoids.

Lima beans, cucumbers, and mites

The two-spotted spider mite (*Tetranychus urticae*) herbivore can damage many different plants. It feeds on more than 180 plant species in outdoor and greenhouse environments. The mite (Figure 2) employs its mouth parts to penetrate certain plant tissue. The contents of plant cells are then sucked upward through the mouth parts, providing nutrition for the herbivore.

When lima beans (*Phaseolus lunatus*) are attacked by the two-spotted spider mite, the plants release, de novo, a complex mixture of volatiles — several terpenoids, two terpenes, and methyl salicylate (Dicke et al., 1999) — to attract a predatory mite, *Phytoseiulus persimilis*. The release of defensive volatiles occurs throughout the entire plant, not just from the herbivore-damaged leaves. When only mechanical damage occurs to plant leaves, only minute quantities of volatiles are released compared to herbivore-damaged plants.

The predator, *P. persimilis*, is only about 0.5 mm (0.02 inches) in length, yet it is larger than its prey. It is orange to reddish orange in color and moves rapidly (Hoffman and Frodsham, 1993). Under certain conditions it can completely eliminate its prey on various crops.

Cucumber plants (*Cucumis sativus*), upon attack by the two-spotted spider mite,

Figure 2. Two-spotted spider mite life cycle — adults, larvae, and eggs are seen in this image. Photographer, Whitney Cranshaw, Colorado State University. Image no. 1325020.

respond by releasing gases which are different from those of lima bean plants. Two terpenoids, three oximes, and three nitriles attract *P. persimilis*. Terpenoids are considered major predator attractants, but each plant species appears to emit a specific mixture and composition of volatiles. Various plant species, and possibly different cultivars of the same species, release varied mixtures and compositions of volatiles to attract predators (Takabayashi et al., 1994).

Figure 3. Colorado potato beetle larvae. Photographer, David Riley, University of Georgia. Image no. 2511028.

The same species of plant may release specific mixtures to attract specific predators. The plant appears to avoid attracting predators that do not feed on the particular herbivore pest that is damaging its leaves. Obviously, this suggests that a well-coordinated defense system is operating in plants. It is likely also that predators are well-tuned to detect, locate, and attack a desirable prey. There is no reason to believe that control systems like these arose by evolution.

Potato plants

One of the serious enemies of potato plants is the Colorado potato beetle (*Leptinotarsa decemlineata*). Infestations of this beetle can ruin potato (*Solanum tuberosum*) crops. Leaves of the potato plant are eaten by adult and larva (Jacques and Fasulo, 2005; Kuhar et al., 2005) (Figures 3 and 4) which also eat other members of the nightshade family (eggplant, tomato, and pepper plants, to name a few). The preferred host of the beetle, however, is the potato. The beetles reproduce rapidly, often presenting potato farmers with a taxing problem.

A predator of the Colorado potato beetle is the two-spotted stink bug (Figure 5). We discussed the Southern green stink bug as a "bad guy" in Part 3 of this series (Williams and Howe, 2006), whereas the two-spotted stink bug (*Perillus bioculatus*) is a "good guy." It will consume both larvae and eggs of the potato beetle herbivore. Potato plants under beetle attack emit volatiles to attract the two-spotted stink bug. A large variety of compounds is released, including green leaf volatiles (six-carbon hexenols and hexenals; Gatehouse, 2002), terpenes, terpenoids, alcohols, and aldehydes.

Terpenoids are the major group in the mixture (Weissbecker et al., 2000). The predators of herbivores may respond to a large number of blended components from various plants. Mechanical damage can cause potato plants to release only small amounts of volatiles for only a short period of time (~1 hour), whereas herbivore damage results in large amounts of gases being emitted over a sustained time period.

Unfortunately, if a large number of Colorado potato beetles appear in a season, the natural defenses of the plant are overwhelmed (Kuhar et al., 2005) in what we call a "revenge of the herbivores." There may be a lack of predator population to effectively control the beetle "outbreak." Similar epidemic circumstances may develop in herbivore populations involving other plants.

Conclusions

Much of the reported information on this subject should be treated as tentative, and readers are cautioned that concepts in this field can change over time and following more experimentation. Researchers often disagree over each others' work. Some conclusions may be based on only limited experimentation. All agree, however, that the plant-carnivore-herbivore relationship is extremely complex.

Such an amazing interacting process asks much of natural selection and/or random events. Suppose the herbivore of a plant, evolutionarily speaking, developed before the plant-carnivore interaction. Is it not likely that the plant could have become extinct before the needed defenses were produced millions of years later?

The interaction of plant, herbivore, predator, and/or parasitoid is a well-timed process of biochemical chain reactions. This dilemma is solved evolutionarily by proposing of coevolution of the interactions. It is postulated that the herbivore-predator, and possibly the plant-herbivore-predator system evolved simultaneously! This belief that design and intelligent planning occur by natural selection is not natural at all. It is as if nature, itself, looked ahead and produced the proper relationships. The odds against such cooperation's originating by random events are quite large, perhaps large enough to preclude its occurring in the real world.

We think the Creator knows the end from the beginning and that He planned, designed, and sustains these complex systems. This is the only reasonable origins position, even though the supernatural has been ruled out by materialists. Voiding this possible and reasonable explanation, such scientists prefer self-invented schemes, man-made idols, in preference to the most sensible solution—Creation.

Glossary

Cole plants: various plants of the genus Brassica

Green leaf volatiles: generally comprising six-carbon aldehydes, alcohols, and esters emitted by plants

Methyl salicylate: oil of wintergreen

Nitriles: class of compounds with the general formula RC≡N

Oxime: any compound containing the group C=NOH

Terpenes: compounds consisting of five-carbon isoprene units joined together in a regular pattern, usually head-to-tail

Figure 4. Colorado potato beetle adult. Photographer, Clemson University — USDA Cooperative Extension Slide Series. Image no. 1435024.

Terpenoids: similar to terpenes, assembled and modified in many ways; well-known terpenoids include menthol and camphor

Figure 5. Two-spotted stink bug adult. Photographer, Louis Tedders, USDA Agricultural Research Service. Image no. 1223096.

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Speaking of Science

Commentaries on recent news from science

Editor's note: All 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: www.creationsafaris.com/crevnews.htm. Unless otherwise noted, emphasis is added in all quotes.

A Second Code Controls the DNA Code

More has been discovered about the histone or nucleosome code, a second genetic code independent of the DNA genetic sequence that directs the formation of proteins. *The New York Times* (Wade, 2006) reported on work by scientists at Northwestern University who found that the wrapping of DNA around nucleosomes (made of proteins, called histones, with varying "tails" of atoms) follows a pattern that regulates how genes are expressed. These patterns determine where transcription factors bind to the DNA:

> The **pattern** is a **combination of sequences** that makes it **easier for the DNA to bend itself and wrap tightly** around a nucleosome. But the pattern requires only some of the sequences to be present in each nucleosome binding site, so it is not obvious. The looseness of its requirements is presumably **the reason it does not conflict with the genetic code**, which also has a little bit of **redundancy or wiggle room built into it.** (emphasis added)

The transcription factors are prevented from binding to the wrong genes when they are wrapped around parts of the nucleosome that make them inaccessible. The news story states that this code is highly conserved (i.e., unevolved) in all living organisms:

> The nucleosome is made up of proteins known as histones, which are **among the most highly conserved in evolution**, meaning that they **change very little from one species to another**. A histone of **peas** and **cows** differs in **just 2 of its 102 amino acid units**. The conservation is usually attributed to the **precise fit required** between the histones and the DNA wound around them. But **another reason**, Dr. Segal suggested, could be that **any change would interfere** with the nucleosomes' **ability to find their assigned positions** on the DNA. (emphasis added)

Yet the phenomenon might just as well be interpreted as intelligent design instead of evolution. In fact, Wade uses the "D word" at the end of the article, when describing how this new code explains a mystery about DNA; viz., why there is redundancy in the number of codons that code for a given amino acid:

> Biologists have long speculated that the redundancy may have been **designed** so as to coexist with some other kind of code … And this, Dr. Segal said, could be the nucleosome code. (emphasis added)

The work is done by specialists in "computational biology" — a field of study more appropriate for design-thinking than for evolutionary-speculating. If Darwinists started computing the probability of evolution, they would get discouraged real fast.

Wade, N. 2006. Scientists Say They've found a code beyond genetics in DNA. *The New York Times, nytimes.com*, posted July 25. www.nytimes.com/2006/07/25/science/25dna.html?ex=1154059200&en=3c74802e232270b0&ei=5087%0A

SETI: Shut Up and Keep Looking

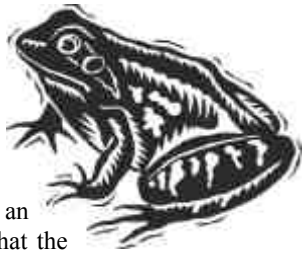
On *Space.com*, Seth Shostak of the SETI Institute answered the critics who think they're "barking up the wrong tree." Well-meaning people send him emails explaining why there is "still no confirmed chitter from the cosmos" after 46 years of looking. The top four include: (1) aliens use more advanced technology, (2) the Fermi Paradox means nobody's there, (3) the aliens aren't interested in us warlike primitives, and (4) the real aliens are in the Zeta Reticuli system.

His basic answer (in our words): we've only begun the search. Unless you can come up with better strategy that works, pitch in and help. We've got a lot of stars to go.

Maybe there's a bright side to this SETI business. It keeps a lot of pesky Darwinists occupied and out of trouble. This is fine as long as their acronym S.E.T.I. employs another: O.P.M. (other people's money).

Shostak, S. 2006. Is SETI barking up the wrong tree? *Space.com*, posted 20 July. www.space.com/searchforlife/seti_thursday_060720.html

Is This Frog Marrow Really 10 Million Years Old?



LiveScience reported the finding of intact bone marrow from fossils of frogs and salamanders. Without blinking an eye, reporter Ker Than (2006) croaked that the marrow is ten million years old. Compare this discovery with the intact soft tissue and blood cells found in a *T. rex* specimen last year, he said:

> The discovery **raises hopes for finding soft tissue in other regions and from other animals,** including mammals, [Maria] McNamara [University College, Dublin] says, because the amphibian bone marrow was discovered in **an environment vastly different** form the one in which the *T. rex* soft tissue was found. (emphasis added)

The article also surmises that many more examples of soft tissue and marrow may lie undetected in museum specimens. See also the report by *National Geographic News*, which says the marrow is organically preserved and even maintains the original color.

Never question what the scientists say; that's how symbiosis between the media and the Gurus of Knowledge is maintained. It helps preserve the social order. Imagine the chaos that might ensue if unbelievers started finding soft tissue in fossils from different environments all over the world. It might throw the whole evolutionary dating scheme into a cocked hat and start a revolution. Enforced conformity may subvert freedom of thought, but it keeps the peace.

Than, K. 2006. Rare discovery: Fossilized bone marrow is 10 million years old. *LiveScience.com*, posted 24 July. www.livescience.com/animalworld/060724_fossil_bonemarrow.html

Lovett, R.A. 2006. Fossils yield 10-million-year-old bone marrow — A first. *National Geographic News*, posted July 25. http://news.nationalgeographic.com/news/2006/07/060725-fossil-bone.html

Bear-Tooth DNA Yields New Date Record: 400,000 Years

According to a story posted on Yahoo News, Swedish scientists found intact DNA in a bear tooth claimed to be 400,000 years old. The team leader remarked:

> It is usually hard to find DNA that is older than 100,000 years, and work on fossilized DNA mostly focuses on material that is a few tens of thousands of years old, at most.

Is it credible to believe these fragile molecules could survive for more than a few thousand years, let alone half a million? If and when they find DNA in dinosaur soft tissue, one might think that evolutionary dating is going to be stretched to the snapping point. But we've already seen that evolutionary dating is as flexible as a cartoon superhero.

Anonymous. 2006. 400,000-year-old DNA found in bear tooth. *Yahoo News*, posted July 14. http://news.yahoo.com/s/afp/20060714/sc_afp/swedenspainscience_060714171218

Likely, Evolution May Be a Fact, Presumably

When reading evolutionary science papers, one gets the feeling there are more than the usual number of words indicating conjecture, doubt and uncertainty. We decided to check this out in the July 11 issue of *Current Biology*. Scans for the words *perhaps, probably, might, possibly, likely, may, apparently, seem*, and *presumably*,and their derivatives, were conducted on four papers — two papers dealing with evolutionary research, and two papers of similar length that did not concern evolution. On average, the two evolutionary papers had 3.7 times as many conjecture words than did the non-evolutionary ones.

Here are some quotes as examples (emphasis added):

- The phylogenetic distribution of some of these mutations indicates that they **probably** occurred before the divergence of the two groups of whales.
- Trichromatic colour vision in monkeys **probably** evolved from an ancestral dichromacy present within the arboreal environment of early primates, where the driving force was the ability to distinguish the redness of ripe fruits or reddish young leaves from a green background of foliage of highly variable luminance.
- ...this is therefore a **possible** explanation for the evolution of colour vision so early in vertebrate evolution.
- The intriguing **possibility** is, therefore, that in marked contrast to placental mammals, the RH2 opsin gene has been retained and is expressed in these marsupials.
- Animals have evolved their visual sensitivity to match aspects of their photic environment, and it is **likely** that the primary adaptive selective pressure is the spectral range and intensity of daylight.
- Why these losses have occurred is **not immediately apparent.** Superficially, as these animals are all nocturnal, it **could be concluded** that colour vision is of little functional significance and that the loss of the SWS1 cones is therefore of little consequence. However, many of these species have close relatives that are also nocturnal but retain both cone types and **presumably** exhibit dichromacy.

Ironically, the same issue contained an editorial by Nigel Williams that began (emphasis added), "As creationists seek to increase their influence on the scientific agenda, the world's leading scientists urged schools and colleges last month **to stop denying the facts of evolution**." He then spoke out against public schools where "**scientific evidence, data, and testable theories** about the origins and evolution of life on Earth are being concealed, denied or confused with **theories not testable by science**."

There's the shell game. Evolutionists preach about science and criticize faith — but look at their research. This is why Colin Patterson, in a moment of frankness, asked his evolutionary colleagues if they could point to one thing about evolution that they knew was true. All he got was silence.

Four papers from one journal, of course, do not represent a statistical sample, but maybe this anecdotal evidence can interest someone in performing a larger study on the comparative numbers of conjecture words between evolutionary papers and research papers on observable, testable lab science.

Cell Untangles Its Own DNA

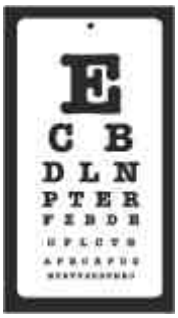
DNA is packed like spaghetti in a basketball, but must constantly be accessed by transcribers, duplicators, and other molecular machines. Scientists at the Karolinska Institute, according to *EurekAlert*, have found a complex of protein machines that know how to untangle DNA (Anonymous, 2006). Machines that can keep DNA from separating too early (cohesins) and keep DNA coils compact (condensins) have been studied extensively, but these scientists looked more at another mechanism. When they artificially perturbed DNA strands, the machines went to work fixing the damage:

> The research group has studied the third, less well understood, protein complex, known as the Smc5/6 complex. This protein complex was found to bind to locations on the DNA strand that the researchers had artificially damaged, suggesting that it is directly involved in the repair process. Moreover, the Smc5/6 complex also seems to be **required for the disentanglement of undamaged chromosomes before cell division**. If these tangles, which are a natural consequence of the DNA copying process, are left unresolved the chromosomes cannot be separated and sent to the two nascent daughter cells. Like in the repair process, the Smc5/6 complex **appears to resolve these intertwines by direct interaction** with the DNA molecules, but this process is differently regulated as compared to the function in repair. (emphasis added)

The press release starts with a "wow" factoid: "Every second, the cells constituting our bodies are replaced through cell division. An adult human consists of about 50,000 billion cells, 1% of which die and are replaced by cell division every day." Machines like the Smc5/6 complex are essential to maintaining our genomic integrity.

So, evolutionists, please tell us again about how this all worked out in the mythical RNA world when none of these repair and maintenance mechanisms had yet accidentally emerged.

Anonymous. 2006. A protein complex that untangles DNA. *EurekAlert*, posted 15 July. www.eurekalert.org/pub_releases/2006-07/ki-apc070306.php



Eye Can See Clearly Now

The cornea has no blood vessels. That's weird. But it's a good thing, or we would be looking through a network of threadlike strands all the time. According to *EurekAlert*, scientists at Scheppens Eye Institute decided to find out how the cornea stays clear. They found that it is heavily stocked with a special protein, VEGFR-3, that halts the normal progression of angiogenesis (blood vessel growth) that occurs in all other tissues of the body except cartilage.

If this were the only thing allowing us to see clearly, it would be amazing enough, but it's just the tip of the eyeball. For example, there is an enzyme that helps to degrade the organelles in the cells of the lens to maintain its transparency. In mice, failure of the enzyme results in cataracts (Seydel, 2003).

Anonymous. 2006. Scientists discover why cornea is transparent and free of blood vessels, allowing vision. *EurekAlert*, posted 17 July. www.eurekalert.org/pub_releases/2006-07/seri-sdw071406.php

Seydel, C. 2003. A clear look at cataracts. *ScienceNow*, posted 27 August. http://sciencenow.sciencemag.org/cgi/content/full/2003/827/4

Darwinists Foment Civil Disobedience against Questioning Darwinism

The new science standards in Kansas require students to learn more about evolution, including evidence for and against it (Anonymous, 2005). The standards specifically exclude the teaching of intelligent design theory. To some activist groups, however, this requirement is so intolerable, they want teachers to disobey it. According to Crowther (2006), there is a campaign of misinformation about the standards, especially from "Kansas Citizens for Science," including calls for teachers to disregard them.

In response, the Discovery Institute has launched a new website, *Stand Up for Science* (www.standupforscience.com/), trying to correct the misrepresentations with fact sheets and resources. It includes a petition for citizens to join forces in supporting the new standards. According to Discovery Institute (Anonymous, 2005), Kansas joins four other states (Ohio, Pennsylvania, New Mexico and Minnesota) and numerous local school boards requiring critical analysis of evolution.

What will the ACLU do now? They don't have a legal leg to stand on, since (unlike the Dover case) there is no requirement to teach any alternatives to Darwinism. This puts the Darwin Party in the untenable position of having to argue that a biological theory should be taught dogmatically. Science is supposed to be the opposite of dogmatism.

Anyone who thinks evolution is not controversial among parents, students and teachers and among scientists themselves hasn't been paying attention. When the evolution-as-fact-only crowd's only course of action is to lie and disobey, it tells you they have no legal grounds for opposing the standards, and — most of all — no evidential case for arguing that evolution is so obvious and factual that it is beyond scrutiny and therefore must be taught as dogma.

Anonymous. 2005. Kansas becomes fifth state to allow teaching of scientific criticism of evolution in public schools. *Discovery Institute News*, posted 7 November. www.discovery.org/scripts/viewDB/index.php?command=view&id=3010

Crowther, R. 2006. Darwinists waging war on Kansas over evolution, encouraging schools to disobey state education guidelines. *Evolution New & Views*, posted 7 July.

Nature Gives Top Blog Honors to Radical Atheists

P. Z. Myers (U of Minnesota) has been one of the most foul-mouthed critics of creation, intelligent design and religion in general. He has said that Abraham was worse than Hitler (Myers, 2005c). He has ridiculed the crucifixion of Christ (Myers, 2005d). His opinion on how to treat anti-evolutionists (Myers, 2005b):

> I say, screw the polite words and careful rhetoric. It's time for scientists to break out the steel-toed boots and brass knuckles, and get out there and hammer on the lunatics and idiots.

Yet this man's blog, *Pharyngula*, was given top honors by *Nature* in its list of the the five top science blogs on the Internet (Anonymous, 2006). Second with the silver medal was *Panda's Thumb*, another strongly anti-ID blog to which Myers also contributes. Once, he responded on *Panda's Thumb* about the stridency of his remarks (Myers, 2005a):

> Please don't try to tell me that you object to the tone of our complaints. Our only problem is that we aren't martial enough, or vigorous enough, or loud enough, or angry enough. The only appropriate responses should involve some form of righteous fury, much butt-kicking, and the public firing and humiliation of some teachers, many schoolboard [sic] members, and vast numbers of sleazy far-right politicians.

Now you know where *Nature*'s heart is. It has not changed much since it originated as Darwin's mouthpiece in 1867, except that before evolution gained absolute power, they had to talk nicer and pretend to be interested in truth. This does not disparage the many working scientists, who submit their papers faithfully for publication to as wide an audience as possible, when they have done good lab work in their specialty; but it shows you the mindset of the editorial board. If they endorse Myers' kind of attitude as the way to carry on scientific discussions of controversial issues, do they have a case?

Anonymous. 2006. Top five science blogs. *news@nature.com*, posted 5 July. www.nature.com/news/2006/060703/full/442009a.html

Myers, P.Z. 2005a. Comment #35130. *Panda's Thumb*, posted 14 June. www.pandasthumb.org/archives/2005/06/a_new_recruit.html#comment-35130

Myers, P.Z. 2005b. Perspective. *Pharyngula*, posted 4 August. http://pharyngula.org/index/weblog/comments/perspective/

Myers, P.Z. 2005c. So let's make sure it doesn't get that bad here. *Pharyngula*, posted 10 December. http://pharyngula.org/index/weblog/comments/so_lets_make_sure_it_doesnt_get_that_bad_here/

Myers, P.Z. 2005d. Benny was kind of passionate, I guess. *Pharyngula*, posted 11 December. http://pharyngula.org/index/weblog/comments/benny_was_kind_of_passionate_i_guess/

Creation Calendar

Note: Items in "Creation Calendar" are for information only; the listing of an event does not necessarily imply endorsement by the Creation Research Society.

August 25–27
Grand Canyon 3-Day Rafting Trip
Canyon Ministries (Tom Vail) and Creation Safaris (David Coppedge)
Registration: $710 per person (call or email for details)
Contact: David Coppedge, (661)298-3685 bwana@creationsafaris.com

August 31–September 2
Grand Canyon Rafting Trip with guide Tom Vail
Arizona Origin Science Association, Inc.
Registration: $710 per person (call or email for details)
Contact: Joseph, (480)540-8953 www.azosa.org/

October 14
A Survey of Geology of Arizona and the Salt River Valley From a Biblical Perspective by Jim Clarke, MSE
Arizona Origin Science Association, Inc. New
3 PM Calvary Community Church
7 PM East Valley Bible Church
Contact: Roger Heyen, RHeyen@cox.net (623) 581-7586

October 31
►Deadline for submission of abstracts◄
Sixth International Conference on Creationism
Developing and Systematizing the Creation Model of Origins
[**to be held August 4–6, 2008**]
Contact: Dr. Andrew A. Snelling,
P.O. Box 1208, Springwood, Qld 4127 Australia
aasnelling@ozemail.com.au

November 4
Arizona Origin Science Association, Inc.
The Demise of Darwinism by Frank Sherwin, ICR New
3 PM Calvary Community Church
Evolution is Against The Law! by Frank Sherwin, ICR
7 PM Chandler Bible Church
Contact: Roger Heyen, RHeyen@cox.net (623) 581-7586

2007

June 7 - 9
Annual Meeting of Board of Directors
Creation Research Society
Prescott, AZ

2006 Board of Directors

Left to right: Danny Faulkner, Kevin Anderson*, Glen Wolfrom, Russ Humphreys, Mike Oard, Ted Aufdemberge, Mark Armitage, Gene Chaffin, Ron Samec, Dave Kaufmann, Gary Locklair, Dave Rodabaugh, Emmett Williams*, George Howe, and Don DeYoung.

Not present: John Reed

* Kevin Anderson (Director of the Van Andel Creation Research Center) is a professional staff member who is located at the VACRC, Chino Valley, AZ. Emmett Williams is a former board member.

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All by Design

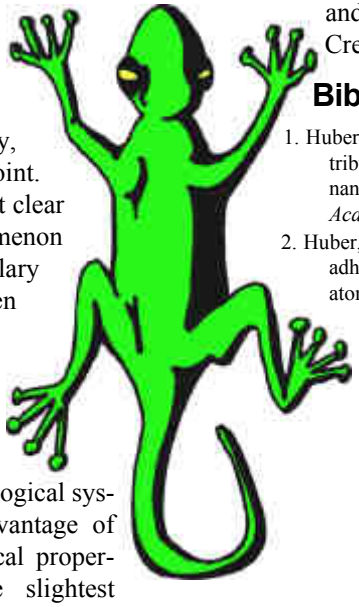
Defying Gravity

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

Geckos, a group of colorful, fat-bodied lizards, are the heaviest animals that can walk effortlessly, even upside-down, on the smoothest of surfaces. Researchers have identified a complex attachment system on the soles of gecko feet that makes this possible.

The sole of a gecko's foot contains roughly one billion microscopic hairs, called "spatulae," each about 200 nm in length and width. These are neatly arranged upon larger, finger-like projections called "setae," each about one-tenth the diameter of a human hair and 100 µm in length. These setae lie in organized rows that sit upon larger folds of tissue called "lamellae," visible to the naked eye as tiny folds on the sole of the gecko's foot.

What the gecko's feet do is take advantage of water, which is present as a very thin film on every terrestrial surface in what is called a "monolayer," even in dry climates. The "stickiness" of a gecko's feet increases with increasing humidity, up to a certain point. Though it is not yet clear whether this phenomenon is due to capillary forces and hydrogen bonding, or to van der Waals forces, or perhaps both, it is clear that this is a complicated, highly-ordered biological system that takes advantage of atomic and chemical properties of even the slightest amount of water in the environment.



As such, it could not have evolved in stages due to random chance, as evolutionists claim. Rather, this suggests a planned and intentional design by an intelligent Creator.

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1. Huber, G., et al. 2005. Evidence for capillary contributions to gecko adhesion from single spatula nanomechanical measurements. *Proc. Nat. Acad. Sci.* 102:16293–16296.
2. Huber, G., et al. 2005. Resolving the nanoscale adhesion of individual gecko spatulae by atomic force microscopy. *Biol. Lett.* 1:2–4.