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Top Ten Darwin and Design Science News Stories for 2009

1. **Intelligent Input Required for Life**. In a significant peer-reviewed article in the September 2009 journal *IEEE Transactions on Systems, Man and Cybernetics* authors William A. Dembski and Robert J. Marks II use computer simulations and information theory to challenge the ability of Darwinian processes to create new functional genetic information. This paper is in many ways a validation of Dembski's core ideas in his 2001 book, *No Free Lunch: Why Specified Complexity Cannot Be Purchased without Intelligence*, which argued that some intelligent input is required to produce novel complex and specified information.

2. **Signature in the Cell.** Stephen Meyer forcefully outlined the positive case for design and refuted arguments that ID isn't science in his seminal book, *Signature in the Cell*, published by HarperCollins in June of this year. Dan Peterson, in a review of the book in the September 2009 issue of *The American Spectator*, says "*Signature in the Cell* is a defining work in the discussion of life's origins and the question of whether life is a product of unthinking matter or of an intelligent mind" and "this book is an engaging, eye-opening, and often eye-popping read". In a series of university lectures and debates in the second half of the year Meyer defended his thesis that the information content in DNA and the biological machinery that processes that information is positive evidence for intelligent design. A companion three-minute animated video, *Journey Inside the Cell* was released providing a stunning visual illustration of Meyer's points.

3. **The Collectivist Revolution in Biology.** An essay by Mark Buchanan in the August issue of *Nature Physics* announced the breaking with "many of the presuppositions of traditional evolutionary thinking." He highlighted its message with these words: "A coming revolution may go so far as to unseat Darwinian evolution as the key explanatory process in biology." The essay is a contribution to cross-disciplinary thinking starting with an awareness of collective phenomena in modern physics. Thinking has moved away from reductionism and is adopting a holistic interactionism. Buchanan sees a parallel between physics and biology. The tools of physics and engineering are already being used to understand interacting networks within biological systems. Why does this take us beyond Darwinism? It is because the mechanisms of Darwinian evolution are inherently reductionistic, with individual life forms struggling for survival in competition with other individuals. Within Darwinian theory the environment acts as a filter, allowing the fit to live on. The emerging understanding of biological functions, such as horizontal gene transfer (HGT), moves away from individuals and towards breeding populations, and the environment becomes a driver of genetic change rather than a passive filter. The tree of life now looks like an unstructured bush. Darwinism is inherently reductionistic, and it can devise ways of framing HGT to fit into its own mental models. But what it cannot easily do is adopt the holistic perspectives that are emerging everywhere. This is why an increasing number of scientists find a framework of design to be compelling. Design provides a coherent context for systems biology, for biomimetics, and for many other contemporary areas of research.

4. **The Modern Synthesis is Gone**. In February of this year Eugene Koonin published a masterly analysis of the impact of genomics on evolutionary thinking ("Darwinian evolution in the light of genomics", *Nucleic Acids Research*, 2009, 37(4), 1011-1034). Koonin notes that the 1959 *Origins* centennial was "marked by the consolidation of the modern synthesis" but subsequent years have witnessed great changes which have undermined its credibility. The modern synthesis was formulated in the 1930's and 1940's to draw together seemingly conflicting evidence from natural selection, population genetics, cytology, systematics, botany, morphology, ecology and paleontology into one modern theory of neo-Darwinian evolution. Three distinct revolutions have occurred over the past half-century to bring down the modern synthesis theory: the molecular, the microbiological and the genomic revolutions. Koonin tentatively identifies two candidates to fill the vacuum left by the discarded modern synthesis. The first appears to emphasize the role of chance; the second appears to emphasize the role of law. While many in the scientific community will continue to cling to the modern synthesis for years to come, it is significant that articles are now appearing in the peer-reviewed scientific literature declaring the theory needs to be abandoned because it no longer fits the molecular, microbiological and genomic data.

5. **The Edge of Evolution Confirmed**. *Nature* published an interesting paper in the September 24, 2009 issue that discusses severe limits on Darwinian evolution. The manuscript, from the laboratory of Joseph Thornton at the University of Oregon, is titled "An epistatic ratchet constrains the direction of glucocorticoid receptor evolution." Although the work is interpreted by its authors within a standard Darwinian framework, it also confirms the primary thesis of Michael Behe's recent book, *The Edge of Evolution: The Search for the Limits of Darwinism*, demonstrating the looming brick wall which confronts unguided evolution in at least one system. It points strongly to the conclusion that such walls are common throughout all of biology. In a series of blog exchanges Behe successfully defends his position against Thornton.

6. **Cambrian Explosion Continues to Challenge Materialistic Theories**. A paper in the July 2009 issue of *BioEssays*, admits the lack of a "materialistic basis" -- that is, a plausible materialistic explanation -- of the Cambrian explosion. As the article states: "Thus, elucidating the materialistic basis of the Cambrian explosion has become more elusive, not less, the more we know about the event itself, and cannot be explained away by coupling extinction of intermediates with long stretches of geologic time, despite the contrary claims of some modern neo-Darwinists." The rest of the article focuses on explaining the overall loss of phyla and body plans since the Cambrian, rather than the gradual emergence of new body plans as predicted by Darwin's theory. The impact of this story was amplified by the June 2009 release of the Illustra Media documentary *Darwin's Dilemma: The Mystery of the Cambrian Fossil Record*. The documentary used stunning computer generated animations to bring to life the Cambrian creatures and clearly illustrated for the scientist and non-scientist alike why the Cambrian Explosion of life defies neo-Darwinian theory.

7. **The Ida Hype and Bust.** The launch of the Ida fossil lemur, alias *Darwinius masillae*, in May this year was unprecedented. It raised eyebrows across the whole range of media-savvy people. While scientists have learned how to capture the interest of the media and promote their work, this particular indulgence was a shock, and it was quickly recognized as hype. No doubt the Ida scientists were hoping to capitalize on the Darwin Bicentennial with a sensational "missing link" media fanfare, but instead they created another black eye for Darwin, as evidenced by the article "Much Hype and Many Errors" by Richard Kay that appeared in the August issue of *Science*. Researchers may yet find that this superbly preserved fossil lemur is within the range of variation observed in living and fossil lemurs and is more suited to provide evidence of stasis within the lemur basic type.

8. **The Ardi Hype and Bust.** The first fossils of the species, *Ardipithecus ramidus ("Ardi")*, were unearthed in 1994 and were first described in a series of papers in the journal *Science* in October 2009. The very poor condition of the ancient bones is one reason that it took researchers 15 years to excavate and analyze them. The *Science* editors declared Ardi to be the "central character in the story of human evolution" and named the fossil the science breakthrough of 2009. Evidently the *Science* editors have not been reading any of the other published opinions on Ardi. These articles reveal that Ardi is an "Irish stew" fossil that has undergone extensive reconstruction in order to become part of a PR campaign to make bold claims of ancestral status to the human line, even though at base its qualities are very similar to previously known fossils**.**

9. **Peppered Moths Oscillates Back to Gray**. The “peppered moth” became famous after textbooks started using it as an iconic example of evolution. While the peppered moth is still employed in some current textbooks, debates have raged over whether moths really do rest on tree trunks where they are predated on by birds, whether birds are the main cause of changes in the relative proportion of dark and light moths in populations, and how much the colors really changed. All that aside, an article in the June 19 edition of the *London Daily Telegraph* reported a new chapter in this story, as moth populations are now reverting from black back to gray-white: "We have seen these moths making a big swing back to their original colour," said Richard Fox, project manager of Moths Count. "It has been happening for decades as air pollution is cleaned up and with the demise of heavy industry in the big cities.” So what does this mean for the origins debate? If you’re an evolutionist, this is now becoming at best a case of oscillating selection, much like what has been observed in the oscillating sizes of beaks of the Galapagos finches, which grow slightly larger during a drought but revert back to their original size when the drought is over.

10. **Reverse Engineering Biological Designs.** As technology continues to advance, an increasing number of scientists and engineers are realizing that the living world is like a treasure trove packed full of engineering marvels. The agenda of biomimetics is to actively research the potential of applications inspired by biological designs found in humans, animals and plants. The human body supplied one of these design ideas this year with the inner ear, or cochlea. The June 2009 issue of *IEEE Journal of Solid-State Circuits* reports that scientists at MIT intentionally modeled their radio-frequency (RF) device after the design of the cochlea. "The human ear is a very good spectrum analyzer," said Rahul Sarpeshkar, a professor at MIT who co-authored the paper. "We copied some of the tricks the ear does, and mapped those onto electronics." In order to detect electromagnetic waves instead of pressure waves, the MIT scientists used circuits in place of cilia. On the outside edge of the 1.5-mm by 3-mm-chip are tiny squares, each one corresponding to a different size radio wave. As they spiral into the center, the squares become larger and larger. The outer spiral detects the highest energy, shortest frequency waves, while the center circuits detect less energetic, longer frequency waves. “The cochlea quickly gets the big picture of what’s going on in the sound spectrum,” said Sarpeshkar. “The more I started to look at the ear, the more I realized it’s like a super radio with 3,500 parallel channels.” Their “RF cochlea” may soon be part of the next generation of cell phones and other wireless devices. Other reverse engineering marvels documented this year include a biomimetic tactile sensor whose dimensions match those of the human fingertip, as discussed in the January 30 and March 13 editions of *Science*, and the discovery that butterfly wings have scales that act as tiny solar collectors. This has led scientists in China and Japan to design a more efficient solar cell that could be used for powering homes, businesses, and other applications in the future (*Science Daily*).

Honorable Mention

11. **Early Large Galaxies Stun Cosmologists**. Cosmology has a kind of Cambrian Explosion of its own to grapple with. Contrary to expectations, some of the earliest galaxies appear as large as current ones, if not larger. Astronomers, using the Subaru telescope in Hawaii, examined five galaxy clusters with ages estimated at 5 billion years after the Big Bang. Statements in a report on this study in the April 1, 2009 issue of *Nature News* make it sound revolutionary: 1) The findings could overturn existing models for the formation and development of galaxies that predict their slow and steady growth through mergers; 2) They calculated the mass of the biggest galaxy in each of the clusters and found, to their surprise, that the ancient galaxies were roughly as big as the biggest galaxies in equivalent clusters in today’s Universe; 3) The ancient galaxies should have been much smaller, at only a fifth of today’s mass, based on galaxy-formation models that predict slow, protracted growth; 4) “That was the reason for the surprise – that it disagrees so radically with what the predictions told us we should be seeing,” says Chris Collins of Liverpool John Moores University in Birkenhead, UK.; 5) “We have a whole different story now about how galaxies form,” says Avishai Dekel of the Hebrew University in Israel and first author of the earlier paper; 6) For years, astronomers have relied on a hierarchical model of galaxy formation....the models predicted that, to reach the massive galaxy sizes seen today, galaxies would have to steal their stars through mergers – a slow process – rather than growing their own; 7) It’s not yet certain how much of a readjustment the hierarchical model will need if the observations hold up....But Collins says the underlying models of dark-matter mergers could have problems. “I think the problem could be more general than just needing a tweaking.”

12. **Failed Assault on Irreducible Complexity**. In August 2009 a paper appeared in the online journal *Proceedings of the National Academy of Sciences*, entitled "The reducible complexity of a mitochondrial molecular machine." The Darwinian guardians appear anxious to debunk irreducible complexity, one of the key scientific concepts for intelligent design. This was evidenced by the editor's refusal to print a letter to the editor exposing the basic problems with the article by Michael Behe. Casey Luskin later posted a detailed response documenting how the claims made in the paper far surpassed the data, and how distinctions between such basic ideas as "reducible" versus "irreducible" and "Darwinian" versus "non-Darwinian" were essentially ignored.

13. **Walking White Blood Cells**. How do white blood cells – immune system 'soldiers' – get to the site of infection or injury? To do so, they must crawl swiftly along the lining of the blood vessel – gripping it tightly to avoid being swept away in the blood flow – all the while searching for temporary 'road signs' made of special adhesion molecules that let them know where to cross the blood vessel barrier so they can get to the damaged tissue. This amazing story was reported in the May 4, 2009 edition of *Science Daily* based on a press release from the Weizmann Institute of Science in Rehovot, Israel (see Wiezmann Wonder Wander). An animation of this can be found at Harvard BioVisions. Click on the media file labeled "Extravasation". The press release went on to say that these legs don't just walk. They act as probes as they press into the epithelial tissue lining the vessels. The force of blood actually causes them to embed their little legs into the tissue as a way to sense the location of the damaged tissue and make their way to it. "The scientists believe that the tiny legs are trifunctional:," the article said: "Used for gripping, moving and sensing distress signals from the damaged tissue."

14. **Cell Motors Work in Concert**. If one molecular machine by itself is a design wonder, what about groups of them operating in concert? Recent papers and news articles are claiming that's what happens in living cells: molecular motors coordinate their efforts. The February 25, 2009 issue of *Science Daily* led off a story on this by saying, "Even within cells, the left hand knows what the right hand is doing." Researchers at the University of Virginia said they "found that molecular motors operate in an amazingly coordinated manner" when "simple" algae named *Chlamydominas* need to move with flagella. This contradicts earlier models that pictured the motors competing with each other like in a tug-o'war. "The new U.Va. study provides strong evidence that the motors are indeed working in coordination, all pulling in one direction, as if under command, or in the opposite direction – again, as if under strict instruction."

15. **Cells Use Cloud Computing**. Cloud computing is the up-and-coming trend in information technology. It allows processes to run in parallel on multiple networked processors with more robustness, because other processors can pick up the slack if a major server fails. Scientists are finding that cells have been using this technology all along. *Science Daily* (June 17, 2009) reported on work by biologists in Spain and Israel working with Carnegie Mellon University. "Gene regulatory networks in cell nuclei are similar to cloud computing networks, such as Google or Yahoo!, researchers report today in the online journal Molecular Systems Biology," the article began. "The similarity is that each system keeps working despite the failure of individual components, whether they are master genes or computer processors." Cells have master control genes that turn on other genes. Researchers have been puzzled by experiments in which de-activating these genes one at a time did not interrupt the cell. It turns out that parallel copies, called paralogs, are able to step in. Paralogs have more or less sequence similarity to the master genes. The more similar they are, the more they can fill in for the master gene. The article explained, "if one of these genes is lost, other 'parallel' master genes with similar sequences, called paralogs, often can replace it by turning on the same set of genes." Scientists estimate that 5 to 10 percent of genes are in this master-gene category.

These stories and many more about the Darwin and Design debate can be found at Access Research Network (www.arn.org), Creation-Evolution Headlines (www.crev.info), and Evolution News and Reviews (www.evolutionnews.org).

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