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Top Ten Darwin and Design Science News Stories for 2010

1. **New Research Reveals Optimal Design of the Eye.** Scientists have created a light-guiding model of the retina, which reveals that the glial (or Müller) cells provide low-scattering passage of light from the retinal surface to the photoreceptor cells, thus acting as optical fibers (*Physical Review Letters*, April 2010). Researchers concluded that the "retina is revealed as an optimal structure designed for improving the sharpness of images." The glial cells do this in two ways: filtering out stray light and reducing color dispersion, thus improving the signal-to-noise ratio as light passes through them. According to a report in *New Scientist*, these findings open up potentially fruitful areas for biomimetic research. "The new understanding of the role of Müller cells might find applications in more successful eye transplants and better camera designs," says Ribak. The human eye, which is already a remarkable example of functional engineering, continues to yield more evidence of exquisite design. All the more surprising, then, that Darwinians are persisting in their view that the eye should be listed among evolution's biggest "mistakes".

2. **Second Genetic Code Discovered**. In May *Nature News* reported that scientists are just beginning to understand the complexity of the processes that create proteins in our cells. The article reports that the distinction we normally see in human technology between hardware and software breaks down in biology, where molecules like RNA can both carry messages and help process those messages -- a "second genetic code," or the "splicing code." From the article summary: "One of the most beautiful aspects of the genetic code is its simplicity: three letters of DNA combine in 64 different ways, easily spelled out in a handy table, to encode the 20 standard amino acids that combine to form a protein. But between DNA and proteins comes RNA, and an expanding realm of complexity. RNA is a shape-shifter, sometimes carrying genetic messages and sometimes regulating them, adopting a multitude of structures that can affect its function. In a paper published in this issue, a team of researchers led by Benjamin Blencowe and Brendan Frey of the University of Toronto in Ontario, Canada, reports the first attempt to define a second genetic code: one that predicts how segments of messenger RNA transcribed from a given gene can be mixed and matched to yield multiple products in different tissues, a process called alternative splicing. This time there is no simple table—in its place are algorithms that combine more than 200 different features of DNA with predictions of RNA structure." The article seems to miss the obvious implication that more codes and algorithms imply more design.

3. **Biomimetics Gold Rush.** There is a gold rush on: a rush to copy living technology. This is a growing field known as biomimetics, in which researchers seek to mimic biological designs. While dozens of articles appeared in the scientific literature on the topic this year we refer here to biomimetic summaries one, two and three that report on over 30 recent articles in the scientific literature including: 1) Caltech scientists who are studying jellyfish in order to build a better aquatic pump; 2) German engineers who are building a robotic arm inspired by the design of the elephant trunk; 3) a European team that is building a robotic arm with inspiration from an octopus's limb; 4) swimsuits and ship hulls that are being patterned after shark skin; 5) students at the University of Texas, Dallas that are trying to harness the

chemical sensing capability of bacteria to build synthetic sensors for toxins; 6) researchers at the University of Queensland are inventing navigation systems that can perform complex maneuvers by imitating the optical flow of honeybee eyes; 7) researchers are pursuing new lightweight and high performance materials based on a new spider species found in Madagascar that spins silk twice as strong and twice as elastic as any previously studied. This "toughest biomaterial ever seen" is 10 times stronger than Kevlar. See the summaries for many more biomimetic reports and links to the original science publications. As we mention every year on this topic, in order to reverse engineer a system, it had to be engineered in the first place.

4. **Shape-Shifting Protein in Bacterial Flagellum Controls Spin Direction.** The bacterial flagellum, the poster boy for ID, just got more complex. It has long been known that the bacterial flagellum can spin in one direction at hundreds of revolutions per second and then quickly reverse itself and spin in the opposite direction at a similar rate. An article in the August 19, 2010 issue of *Nature* reports that the FliG protein can undergo rapid changes to its shape while the flagellum is spinning. In one conformation, the "open" shape, the driveshaft of the flagellum turns in a clockwise direction. In its "closed" conformation, the shape of FliG causes the proton motor force to spin the driveshaft in the opposite, counter-clockwise direction. A supplemental movie available free online from *Nature* shows this process in motion. Much like water ballet dancers, FliG proteins change their conformations synchronously to mediate the spin direction of the flagellum. The task of explaining how these complex, synchronized biomechanical structures evolved by chance processes just got exceedingly more difficult.

5. **Convergent Genetic Evolution Points to Design**. An article in the September 2010 issue of *Trends in Genetics* describes how widespread convergent evolution is. The paper defines convergence as the "independent appearance of the same trait in different lineages." Thus, genetic convergence is the independent appearance of the same genetic trait in different lineages. Examples include the multiple appearances of eyes, echolocation in bats and dolphins, pigmentation modifications in vertebrates, and multiple independent evolution of particular protein properties. The problem is Neo-Darwinian evolution isn't supposed to be goal-directed, but some force is causing the same sequences—at the genetic level—to appear independently over and over again. In an un-designed world, this is extremely unlikely. Perhaps the design paradigm better explains the growing trend of convergent evolution.

6. **Polish Tetrapod Tracks Overturn Fish-to-Tetrapod Evolution Story**. Fossil tracks in Poland made an amphibious assault on Darwin's theory earlier this year. A year ago *Nature* published an educational booklet with the title *15 Evolutionary Gems*. The number 2 gem is *Tiktaalik*, a well-preserved fish that has been widely acclaimed as documenting the evolutionary transition from fish to tetrapods (vertebrates with limbs rather than paired fins). In the *Nature* booklet, and many other venues, the Darwin lobby has claimed that *Tiktaalik's* placement in the fossil record between the appearance of tetrapods and their supposed fish ancestors confirms a "prediction" of evolution. But these new tertrapod tracks from Poland, reported in the January 7 issue of *Nature*, predate *Tiktaalik* by 10 million years. This sends evolutionists back to the drawing board to find actual transitional intermediates between fish and tetrapods, resulting in another failed evolutionary prediction.

7. **Scientist Claimed to Have Created Life—But Only Mimic It**. Craig Venter and team claimed to have created "synthetic" life (*Science Express*, 20 May 2010). It took 20 skilled people working for a decade, and an estimated $40 million of funding. Venter's feat is described as "a defining moment in the history of biology and biotechnology" by Mark Bedau, editor of the journal *Artificial Life*. It seems obvious that the research team should be congratulated, but what exactly is it that they are being congratulated for? Mae-Wan Ho summarizes the situation: "Clearly the scientists have *not* created life or the bacterial cell. There is a yawning chasm in the physics and chemistry of the living state that the team hasn't even begun to address, let alone bridge. They did not create the genome that was used to transform the bacteria cell, only copied it from another species of the genus, adding a 'water mark' for identification, and no doubt, for staking their claim to the synthetic genome. This synthetic genome was not even made from scratch, but cobbled together from pieces found in a catalog, and then 'transplanted' into cells of the recipient bacterium species (a close relative of the donor) using an antibiotic to select for cells that have accepted the artificial chromosome and allow them to grow." Boston University bioengineer James Collins called Venter's work "an important advance in our ability to re-engineer organisms, not make new life from scratch. Frankly, scientists don't know enough about biology to create life." CalTech biologist and Nobel laureate David Baltimore said that Venter has "overplayed the

importance" of his results, which represent "a technical tour de force" rather than a scientific breakthrough. Venter "has not created life, only mimicked it," Baltimore said.

8. **One Man's Junk is Another Man's Treasure**. Genome sequencing has allowed families of genes to be mapped across the phyla, and it is presumed that the presence of a specific gene in different animal groups signifies a shared common ancestor. Over the years, it has become apparent that many significant genes are widely shared in the animal kingdom. Recent work has traced the *Pax* genes, which code for vision back to the jellyfish. Likewise the *BOULE* gene, which is linked to sperm production in humans, has also been found in mice, chickens, snails and sea urchins. One of the great surprises of the genome projects that is rarely discussed is that both the number and range of protein-coding genes have remained largely the same over time. A simple worm with only 1,000 cells has approximately 20,000 protein-coding genes, which is the same as a human that has 30-100 trillion cells and a far more complex body plan. There are many implications from this. Since the protein-coding DNA has not changed much over time, we should consider whether the non-coding DNA is the key to understanding animal complexity—which Darwinists refer to as "Junk-DNA" (non-functioning gibberish that is a mere relic or vestige of our trial-and-error evolutionary past). The Darwinian Junk DNA paradigm continued to collapse in 2010 with the discovery of: 1) coding-independent functions for pseudogene mRNAs; 2) encoding function of Junk RNA in fruit flies, 3) encoding functions of microRNAs; 4) host functions of the ERV-9 LTR retrotransposons distributed across the human chromosomes; and 5) a requirement for the long non-coding RNAs in activation of gene expression.

9. **A New Explanation for Biodiversity.** Research was published in *Biology Letters* 27 Jan 2010 revealing that major features of Darwin's theory just don't fit the data. Researcher Sarda Sahney focused on the aspect of Darwin's theory that attributed biodiversity to competition among species. In her blog Sahney summarizes the take-home message of this research: "[T]he rich biodiversity we see on Earth today has grown out of expansion, not competition. Darwin cited competition among animals, coined 'survival of the fittest', as a driver of evolution in his book, *On the Origin of Species*; since then competition has been considered key to having grown Earth's biodiversity. But while competition has been observed on a small scale, (e.g. between species), there is little evidence of competition guiding large-scale shifts in biodiversity, such as the dominance of mammals and birds over reptiles and amphibians in today's world. Our new research supports the idea that animals diversified by expanding into empty ecological roles rather than by direct competition with each other." It is lack of competition and natural selection that appears necessary for major evolutionary change. How many nails are required in the neo-Darwinian coffin before the theory is declared dead? Rumors of its health and well-being have been greatly exaggerated.

10. **Fruit Flies Weigh In on Darwin's Theory**. Fruit flies have joined biodiversity data in speaking out against Darwin's theory. *Drosophila melanogaster* is a model organism for the study of genetics. Some laboratory populations have been bred for different life-history traits over the course of 30 years. Professor Michael Rose, of UC Irvine, began breeding flies with accelerated development in 1991 (600 generations ago). Doctoral student Molly Burke (*Nature* 30 Sep 2010) compared the experimental flies with a control group on a genome-wide basis. This is significant because it is the first time such a study of a sexually reproducing species has been done. Burke examined specific genes and also obtained "whole-genome resequencing data from *Drosophila* populations that have undergone 600 generations of laboratory selection for accelerated development." For decades, most researchers have assumed that sexual species evolve the same way single-cell bacteria do: A genetic mutation sweeps through a population and quickly becomes "fixed" on a particular portion of DNA. But the UCI work shows that when sex is involved, it's far more complicated. "This research really upends the dominant paradigm about how species evolve," said ecology and evolutionary biology professor Anthony Long, the primary investigator. This empirical work is worth noting on two counts. First, we are here considering a mechanism that is central to Darwinian evolution. Positive natural selection of heritable variation is the key (we are informed) to understanding how descent with modification occurs. However, the first set of empirical data relating to a sexually reproducing species does not confirm that modification works this way. Many scientists have long suspected that Darwinian mechanisms are inadequate to account for large-scale transformation—these research findings provide empirical support for such doubts.

Honorable Mention

No More Soup for You! In what sounds like the Soup Nazi episode from Seinfeld, William Martin and colleagues have presented a strong case for retiring the 81-year old theory of "Primordial Soup" as the explanation for the origin of life (*Bioessays* 27 Jan 2010, *ScienceDaily* 3 Feb 2010). David Tyler summarizes the situation: two reasons are provided in the paper. The first is that a soup of organic chemicals will be in thermodynamic equilibrium. The reaction products are already present and there is no obvious source of energy to drive polymerisation or any other significant change. "Ionizing UV radiation inherently destroys as much as it creates." The second reason concerns fermentation as the primordial mechanism of energy generation in a world without oxygen. They go on to propose alkaline hydrothermal vents as the primordial source of energy for life. Their paper is exploratory, not plotting out any details of what the Last Universal Common Ancestor (LUCA) looked like, but considers how chemiosmosis might have worked in the setting of alkaline hydrothermal vents. Further discussion of this is needed, of course, but it's refreshing to see the challenge these authors present to origin of life researchers generally and to textbook authors/educators who continue to promote the dead "Primordial Soup" theory.

Recent Genetic Research Shows Chimps More Distant from Humans. A popular argument for evolution is that human and chimp DNA only differs by 1% thus proving that we share a same common ancestor. A paper in the January 28, 2010 issue of *Nature* shot holes in that argument. One of the scientists behind the study was quoted in a *Nature* news article stating, "It looks like there's been a dramatic renovation or reinvention of the Y chromosome in the chimpanzee and human lineages." The news article states that "many of the stark changes between the chimp and human Y chromosomes are due to gene loss in the chimp and gene gain in the human" since "the chimp Y chromosome has only two-thirds as many distinct genes or gene families as the human Y chromosome and only 47% as many protein-coding elements as humans." According to the news piece, "Even more striking than the gene loss is the rearrangement of large portions of the chromosome. More than 30% of the chimp Y chromosome lacks an alignable counterpart on the human Y chromosome, and vice versa, whereas this is true for less than 2% of the remainder of the genome." The *Nature* paper itself stated that the Y chromosomes in humans and chimps "differ radically in sequence structure and gene content," showing "extraordinary divergence" where "wholesale renovation is the paramount theme."

A Bit of Neanderthal in Us All. An April 20, 2010 report in *Nature News* takes us genetically much closer to Neanderthals. Titled, "Neanderthals may have interbred with humans," the article explains that "A genetic analysis of nearly 2,000 people from around the world indicates that such extinct species interbred with the ancestors of modern humans twice, leaving their genes within the DNA of people today." According to this new article: [I]t may help explain the fate of the Neanderthals, who vanished from the fossil record about 30,000 years ago. "It means Neanderthals didn't completely disappear," says Jeffrey Long, a genetic anthropologist at the University of New Mexico, whose group conducted the analysis. There is a little bit of Neanderthal leftover in almost all humans, he says. Given the high degree of skeletal similarity between humans and Neanderthals, the notion that we interbred is nothing new. They have been called a possible "race" of our own species, as studies have found their body shape is highly similar to that of modern human variation. Indeed, the discovery of "morphological mosaics" indicates that they likely interbred with modern humans. The finding of a modern-humanlike hyoid bone in a Neanderthal implies that they may have had language capabilities. Textbooks often depict Neanderthals as primitive, bungling brutes with a vaguely human-like form--an attempt to instill the ape-to-human icon in students. But as *Time* magazine reported in 1999, there's increasing evidence showing that this evolutionary interpretation was wrong, and Neanderthals were essentially "all just people": "The real message, a Washington University paleoanthropologist Erik Trinkaus believes, is that to people living in the Stone Age, Neanderthals were just another tribe. 'They may have had heavier brows or broader noses or stockier builds, but behaviorally, socially and reproductively they were all just people.'"

Hawking's Grand Design—But Is It Science? Stephen Hawking made news this year with his new book, *The Grand Design,* which generated headlines around the world that physics had finally made God redundant. According to Michael Turner, who wrote the *Nature* review, these authors: "offer a brief but thrilling account of some of the boldest ideas in physics—including M-theory and the multiverse—and what these have to say about our existence and the nature of the Universe." Turner continues: "In searching for the holy grail, Hawking and others pinned their hopes first on super-gravity and then on string theory. Both are now seen as different regimes of a grander mathematical framework called M-theory, where M is yet to

be determined—is it master, miracle or mirage?" Many reviewers have pointed out that Hawking's theory is untestable and outside the realm of science. As a review in *The Economist* stated: "The main novelty in '*The Grand Design*' is the authors' application of a way of interpreting quantum mechanics, derived from the ideas of the late Richard Feynman, to the universe as a whole. According to this way of thinking, 'the universe does not have just a single existence or history, but rather every possible version of the universe exists simultaneously.' The authors also assert that the world's past did not unfold of its own accord, but that 'we create history by our observation, rather than history creating us.' They say that these surprising ideas have passed every experimental test to which they have been put, but that is misleading in a way that is unfortunately typical of the authors. It is the bare bones of quantum mechanics that have proved to be consistent with what is presently known of the subatomic world. The authors' interpretations and extrapolations of it have not been subjected to any decisive tests, and it is not clear that they ever could be." Paradoxically, scientific realism has been used to promote atheism against theism, but Hawking is now leading his band of atheists towards a virtual reality dream-world that is generated by the manipulation of mathematical models. With science developing independently of the empirical world, realism becoming localized and history becoming a construct of observation, post-modernist thinking reigns supreme. Now it is time for theistic realists to quote Sagan's words with conviction: "For me, it is far better to grasp the Universe as it really is than to persist in delusion, however satisfying and reassuring." (Carl Sagan, *The Demon-Haunted World* (1995) Chapter 1)

Automatic Turnstiles Found In the Cell. Cells have whole families of transporters that employ a variety of mechanisms to shuttle cargo through their membranes. The structure of one elusive "transporter" machines has finally been cracked and reported in *Nature* (21 Oct 2010). Although many questions remain, it appears to act as a rocking turnstile activated by a flow of cations (positive ions). This transporter, called NorM, a member of the MATE family (multidrug and toxic compound extrusion), exists in all domains of life, from simple bacteria to humans. The team's findings, using X-ray crystallography, show NorM to be made up of 12 intermembrane helices of amino acids, arranged in two groups of six to form a cup-shaped V pattern facing outward. Hendrick W. van Veen, commenting on this paper in *Nature*, said that this automated turnstile can pump anywhere from 14 to 1,500 molecules out per minute. Try to imagine this little cup flipping over up to 25 times per second, each time shuttling out its unwanted cargo (toxins). Even that, however, is slow compared to some other specialized transporter families that can pump 100,000 ions per minute, he said. The difference is that NorM and other MATE transporters have to shuttle a wide variety of larger molecules. The sodium ion gradient indicates that this little machine, what's more, runs on an electrical current. A number of questions still remain about how NorM achieves its mechanical effectiveness. Regarding how this mechanism came to be Hendrick van Veen said very little: "Over the past decade, crystallographic evidence has been obtained supporting the general concept of alternating access for a variety of membrane transporters, demonstrating that this mechanism has been evolutionarily conserved" (i.e., unchanged). Such a statement clearly begs the question of evolution. It also leaves unanswered the question of how the first primitive microbe could have avoided death by poison without the ability to actively and effectively pump toxins outside its protective walls.

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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