

## Life Science in the News

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### **Fingerprint Finds da Vinci Did It!**

Reported in USA Today and The Mercury News, October 14, 2009.

A portrait made from chalk, ink, and pencil may be “the first major work by da Vinci to be identified in 100 years”. The unsigned painting was initially thought to have been created by a 19<sup>th</sup> century German artist. It was sold at auction two years ago for \$19,000 to art collector Peter Silverman who purchased it on behalf a Swiss friend and art collector. The Swiss art collector didn’t think the drawing looked like it was from the 19<sup>th</sup> century, and Silverman looked into researching it further.

Art experts who saw the painting found technical and stylistic elements that made it look like it had been done by Leonardo da Vinci. Material composition of the drawing also indicated it could have been created by da Vinci. More definitive evidence came from forensic art expert Peter Paul Biro who found a fingerprint and palm print on the canvas. The fingerprint, of either an index or middle finger, matched a fingerprint found on da Vinci’s “St. Jerome” located in the Vatican. According to Biro, “Leonardo used his hands liberally and frequently as part of his painting technique. His fingerprints are found on many of his works.”

One art dealer estimates the drawing could be worth more than \$150 million. Silverman says his friend, the Swiss art collector who now owns the work, has promised to buy him “lunch and dinner and caviar for the rest of my life if it ever does get sold”.



### **Soybeans Designed to Boost Omega-3**

Reported in PhysOrg.com, November 16, 2009; US News and World Report, November 17, 2009.

Long chain omega-3 fatty acids such as EPA and DHA are recognized for health benefits such as reduced risk of heart disease. Increased intake of these through the consumption of fish and fish oil, however, is seen as a limited solution due to availability, cost, potential contaminants, and people just not liking the taste of fish. Plants such as soybeans and flax contain the shorter-chain omega-3 fatty acid ALA which the body can convert to stearidonic acid (SDA) and then EPA, but the rate of conversion is .2-7%, so it’s not very efficient.

Researchers at the Sanford School of Medicine at the University of South Dakota have now produced soybeans through genetic modification that provide “oils rich in stearidonic acid” that can be directly converted by the body into EPA. When oil from the modified soybeans was given to a group of volunteers, EPA levels in their red blood cells increased 17.7%. Red blood cell EPA levels correspond to EPA levels in one’s cardiac tissue. William Harris, professor of medicine and chief of cardiovascular health research at Sanford Research/USD, says, “We know that giving pure EPA to people reduces their risk for heart disease. Presumably, if you gave this special soybean oil to people, you’d do the same thing—reduce heart attacks.”

The soybean could be commercially available within the next five years. Because soybeans and soybean oil are currently used in many food products, the researchers also plan to do a study on EPA levels using food products made with SDA-enriched soybeans. According to Harris, “This oil could make a major contribution to our national omega-3 intake. The supply could be virtually endless and it would provide omega-3s without putting additional pressure on fish stocks. What’s more, it will be free of contamination from mercury, PCBs, or dioxins, the harmful things that can get into some types of fish.”



### **Bacteria Found to Fight Food-Borne Illness**

Reported in The Washington Post, October 31, 2009.

Salmonella bacteria reportedly cause “about 1.4 million cases of food-borne illnesses and more than 500 deaths a year in the United States”. While most people recover from salmonella exposure on their own, the very young, elderly, and those with compromised immune systems can develop severe symptoms. Salmonella on fruits and vegetables is a particularly challenging issue because produce is often eaten raw, with no cooking involved to kill unwanted bacteria.

A team of scientists collected and identified over 300 species of bacteria from “plants, water, and soil” in tomato-growing regions of Virginia, and found five kinds of bacteria that appear able to attack and eliminate bacteria that cause food-borne illness. Calling his bacterial mix “highly efficient weaponry”, Microbiologist Eric Brown from the Food and Drug Administration’s Center for Food Safety and Applied Nutrition, says, “The beauty is that we take something alive and organic and put it back into the field, and by itself, it will kill other bacteria.” Testing the bacteria on tomatoes, the bacteria were able to eliminate not only salmonella, but also “several other pathogens blamed for food-borne illnesses, including listeria and *E.coli* 015:H7”.

The research team is testing the bacteria for its ability to not only prevent salmonella contamination, but also treat produce that is already contaminated. Their tests will move from the lab to tomatoes grown in research hothouses in the next few months. The research team has suggested these “good” bacteria might be used in the future in being sprayed onto tomatoes just before harvest.



### **Longer Toes and Faster Runners**

Reported in St. Louis Post-Dispatch, November 4, 2009; Scientific American, November 5, 2009; Montreal Gazette, November 12, 2009.

Scientists compared the feet and ankles of 12 sprinters to those of 12 “non-athletes of similar heights”. They discovered the Achilles tendon in the sprinters was significantly shorter, and the sprinters’ toes were significantly longer than the non-athletes. The shorter tendon means leg muscles don’t have as much leverage because they shorten less and more slowly, but then they can also produce greater force, which could translate to a greater burst of acceleration when needed. One article suggests longer toes could provide sprinters an advantage “by allowing them to maintain maximum contact with the ground as they push off the starting block”. Sabrina Lee, one of the authors of the study, says, “The findings are only one explanation for determining who might potentially be a good

sprinter. It's still unclear what effect training can have on influencing the shape of foot bones."



### **Gene Therapy Treats Vision Disorder**

Reported in The Wall Street Journal, October 26, 2009.

Leber's congenital amaurosis is a genetic condition in which a mutation in the RPE65 gene results in a missing enzyme that causes "degradation of the retina and disruption of vision processing in the brain". Symptoms start in infancy and progress slowly from a lack of peripheral vision, low sensitivity to light, and an inability to focus on specific objects to complete blindness by one's 30's or early 40's.

In a study involving 12 patients with Leber's congenital amaurosis, scientists inserted the RPE65 gene into an inactivated virus, and then injected the virus under the retina of one eye of each patient. All of the patients reported improvement in the treated eye. Half of the patients improved enough that they may no longer "meet criteria for being legally blind".

Four of the patients were children between the ages of 8 and 11 years old. According to Katherine A. High, co-lead author of the study, "The children were using Braille in school before they were treated with the gene therapy. Now they're reading books." One child, who liked to run in races at school, needed a teacher to run with him to keep him on the course, and always finished last. "After the gene therapy," High says, "he ran the course on his own and finished fifth."

Ethan Haas' son, Corey, was one of the patients in the study. In addition to watching Corey gain more independence and ability to do things like ride his bike and play soccer, Haas discovered something about his son's eyes he had never seen before. He noticed that Corey's pupils were constricting as they adjusted to light outside. Before treatment, his son's pupils were "so dilated they looked like an owl"; now Haas was able to see that his son's eyes were blue.

The vision improvement has lasted as long as two years after one injection with no apparent negative side effects. According to the article, all 12 patients from the study have asked for the treatment to be done in their other eye. The researchers say that will be more of a possibility as they "gain more confidence about the treatment's safety".

The scientists would eventually like to use the treatment for even younger patients.

Edwin Stone, a co-author of the study from University of Iowa in Iowa City says, "In the definitive form of this treatment, you would imagine being able to diagnose a child very early in life. Then you could give treatment so their visual pathways would develop normally."



### **Skin Bacteria—Not All Bad for You**

Reported in BBC News, November 23, 2009.

Scientists studying Staphylococci, a common bacteria, discovered how it helps skin heal through moderating skin cell inflammation. The bacteria make lipoteichoic acid, which acts on cells in the outer layer of skin, keeping the cells from having "overactive immune responses that can cause cuts and grazes to swell". Understanding how skin cells respond

to wounding, and how skin bacteria aid in the repair process, could lead to new ways to treat inflammatory skin diseases.

Because overactive immune responses are also the cause of allergy symptoms, the study also “provides a molecular basis to understand the ‘hygiene hypothesis’”, which suggests that exposure to germs in early childhood, rather than being overly sanitized, helps the body resist allergies. As allergy rates have increased significantly over the last decade, while some of that has been attributed to an improved ability to diagnose allergies, “many believe our obsession with cleanliness is to blame”. A spokeswoman for the group Allergy UK says, “Some of this might be that people are better informed. But a lot of it is genetic as well as down to our environment.”