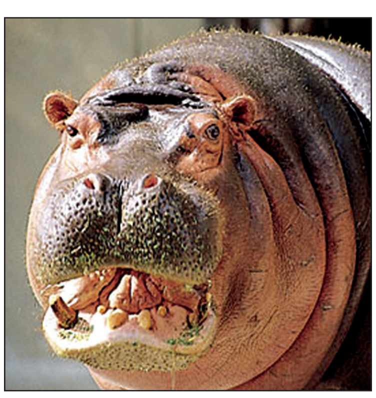
SCIENCE BRIEFS

Origami space travel

On August 9th, Japanese scientists launched two solar sails into space. The two sails were launched from inside a rocket and successfully unfolded 122 and 169 km from the earth. The first sail unfolded into a clover shape and the second became a pleated fan, showing that the Japanese skill at folding has only improved through the centuries. The sails evaporated when they sank back into earth's atmosphere. Solar sails are extremely light and thin materials used to propel spaceships without engines; the ones recently launched were ten times thinner than ordinary paper. They rely on solar energy to propel them. While a truly functioning solar sail is still years away from being launched, this experiment examined different ways of folding the sails—important when packing the sail into a small rocket.

–ELAINE WONG

Source: *Nature*



The secrets of hippo sweat

Japanese scientists have just cracked some of the mysteries of hippo sweat. Hippos don't secrete a clear fluid like your average mammal, their sweat comes out red, and then changes to brown. The researchers identified the two pigments responsible for this colour change, and found them to be "unexpectedly acidic, and have antibiotic as well as sunscreen activity." So far the biologists have found that the red pigment inhibits the growth of at least two types of pathogenic bacteria.

–ZOE CORMIER

Source: *The Guardian*

Stem cells combat baldness

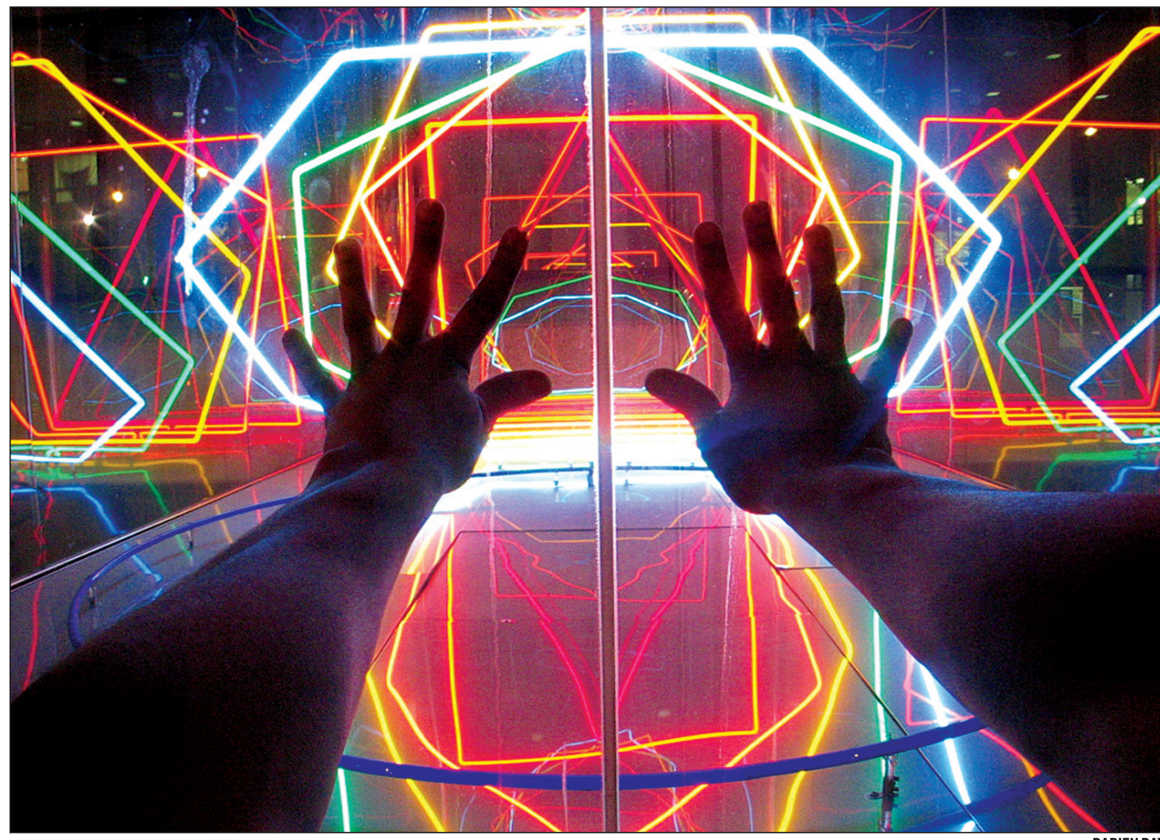
Researchers have discovered stem cells in the skin of adult mice that can be grown into skin and hair. This is the first time that stem cells— "blank" cells that can be grown into virtually any type of tissue—have been proven to reside in skin. The biologists took single cells, and then grew them into thousands of copies. They then transplanted the clumps of cells into a wound on the back of a hairless mouse. The cells grew into a tuft of hair, complete with oil-secreting glands. The discovery may lead to treatments for burns and baldness.

–Z.C.

Source: *Science*

Lasers lead way to new nerves

by ZOE CORMIER
VARSITY STAFF



DARIEN DAVIS

U of T researchers have seen the light, when it comes to tissue regeneration. Professor Molly Stoichet of the Institute for Biomaterials and Biomedical Engineering (IBBME) and her former Ph.D. student Ying Luo have found a way to get nerve cells to grow using

laser beams. Their work appears in the prestigious journal *Nature Materials*.

Stoichet and Luo are working towards repairing severed nerves, both in the spinal cord and in the rest of the body. By getting two severed ends to grow and reconnect, nerves could once again flow with information, and somebody paralysed by a stabbing wound to the spine may not have to face a lifetime in a wheelchair.

Theirs is not the first method of regrowing damaged nervous tissue, but it is far more elegant than older methods. The "goldstandard" for dealing with an injury to the nervous system has always been an autograph - the removal of tissue from another, less crucial part of the body and placing it in the injured site, as is commonly done for burn victims with undamaged skin from, say, the buttocks. "This whole field of tissue engineering, or regenerative medicine, part of the excitement is, 'well, what if you didn't have to do that?' because when you autograph you create a secondary injury, so the idea is to come up with a synthetic replacement," says Stoichet.

But not to create synthetic tissue that would remain in the body permanently, but to create a kind of temporary scaffolding for somebody's own tissue to use to grow properly.

Several kinds of temporary synthetics are already available—dissolvable stitches have been used in dental surgery for several years now, and there are similar materials used to repair skin and cartilage. Stoichet herself has developed a synthetic scaffolding for bone tissue to grow in, Osteofoam, which dissolves after new bone has grown through the porous material. Although not on the market yet, there is good reason to believe that Osteofoam will find practical use in the very near future.

Tissue regeneration is a huge area of research, and a large number of scientists are now trying to come up with ways to repair severed spinal cords and peripheral nerves. But regrowing nervous tissue is considerably more difficult than growing other types of tissue. "The bar is much higher," says Stoichet. Nerve cells not only need to grow, they need to grow in precisely the right way in order for signals from the brain to reach their proper targets, and likewise for sensations from the body to reach the right part of the brain. The highways of the nervous system need to be connected in a particular pattern, otherwise a signal intended to move the foot might simply cause a twitch in the knee.

So how do you get a nerve cell to grow in the direction you want it to?

"The idea was, 'let's start with something nonadhesive, agarose [a gel-like substance], and let's try and create volumes that are adhesive,' so we would have adhesive molecules separated by nonadhesive molecules to guide the growth of the nerves." Nerve cells would be attracted to the adhesive areas at the same time as repelled by the nonadhesive areas, and hopefully would grow in just the right direction.

So Stoichet and her former Ph.D. student Ying Luo used a modified agarose gel that, if light were shined on it, would change chemically.

When photons of light strike the agarose, some chemicals are released from the agarose molecules, creating new molecules that adhere to growing nerve cells. By striking the agarose gel with lasers they were then able to create channels in the gel - not true physical channels, just adhesive areas in the gel.

"So we're not zapping holes," says Stoichet, "we're just changing the chemistry between here and here," she says, pointing on at the origin and destination of the nerve cell on a diagram.

One further reason that Stoichet's research is of particular interest, is that it does not require the use of new cells. It is the body's own severed nerves that could be reconnected. There is no need to use stem cells, bringing in all the controversy along with them. Stoichet's method, although with no clear practical applications in the foreseeable future, could lead to a method of "guided regeneration," helping the body's own nerve cells to reconnect.

"I think it's really exciting research," she said.

Prof awarded for enlightening photonics research

by SIOBHAN DIXON
SCARBOROUGH BUREAU CHIEF

A U of T chemistry professor has helped put Canadian universities on the map with his receipt of a prestigious science award.

The Alfred P. Sloan Foundation of New York awarded Dr. Gregory Scholes with a Sloan Fellowship for his work in chemistry. Scholes' research and findings promise to "have a huge impact" on the electronics industry by making devices such as televisions and telephone lines smaller, lighter and more flexible.

Scholes, 36, earned a B.Sc. and Ph.D. at the University of Melbourne in Australia, his country of origin. He worked as a research associate at Imperial College in London, England, then as a postdoctoral research fellow at Berkeley. In July 2000 he began working for U of T as a physical chemist, specializing in photonics: the study of how materials respond to light.

Through intricate experiments involving lasers, Scholes looked at the fundamental reasons why materials that generate light or affect light work the way they do.

"What's fascinating, I find, is the relationship between structures you can make and the properties we see them have in real life," he said. "You have the control to be able to do that as a chemist."

Sloan Fellowships are assigned annually in seven fields of science: chemistry, computational and evolutionary molecular biology, computer science, economics, mathematics, neuroscience, and physics. Although scientists from across North America are eligible for the award, the majority of the 116 winners come from highly regarded US universities including Harvard, Princeton and Berkeley. Scholes is one of only four researchers at a Canadian university to win the Sloan Fellowship in 2004.

"[The award] is good for the university and it's a good sign that Canadian universities are competing with US universities," Scholes said.

Scott A. Mabury, associate professor of environmental chemistry and chair of the department of chemistry at U of T, nominated Scholes for the Sloan Fellowship. Mabury foresees a great future for his colleague.

"He is an outstanding chemist," Mabury said. "The work he's doing now is going to have a huge impact on the world of science."

In addition to the prestige associated with the fellowship, a designation Scholes will have for two years, he will also receive $40,000, to be used towards research-related activities, such as equipment and trainee support. Scholes says he has yet to think of a specific plan of how he will spend the money, but a large fraction will go towards enhancing current laser experiments.

"The money's a nice bonus," Scholes said. "What I'm most excited about is that this is the kind of award that puts you on the map in a sense."

He hopes his work will induce technological advancements that will make our lives more convenient. Projects in progress include solar-cell type devices that work in very low light conditions, which Scholes believes could be put to use in refrigerators powered by small solar strips attached to food packaging. He admits that some of his ideas may seem far-fetched, but he explains that the inspiration for such an idea comes from nature.

"Nature already does this. It's been done for a few million years by green sulphur bacteria," Scholes said. "If nature does this, there's no reason why we can't do it."

Truth is Stranger Than Fiction

There are more possible chess games than atoms in the universe.