Before imaging techniques became widely available, chemical manipulation was the safest bet to study the human brain. Psychedelic substances such as Peyote, Ayahuasca, and Salvia divinorum are used all around the world to enhance religious rituals, meditation, and trance. The first and most famous scientific experiment aimed to establish causality in a controlled setting was the Good Friday experiment, conducted by Walter N. Pahnke at Harvard, under supervision of the psychedelic expert Timothy Leary (1962). During a three-hour Good Friday service in Boston's Marsh Chapel, two groups of theology graduate students received either a capsule of psilocybin or the active placebo niacin. The compounds were administered 1h before the 3h service. The day after, subjects were asked to write down their recollections. Nearly all of the psychedelic consumers reported profound religious experiences. For subject Huston Smith it was “the most powerful cosmic homecoming I have ever experienced.”

The finding that psilocybin can elicit mystical experiences in religiously predisposed individuals has been replicated in a lab setting by Roland R. Griffiths at Johns Hopkins in 2002. More recent studies used MRI to investigate how spiritual meditation can affect the brains of Buddhist Monks. It was discovered that different types of meditation have unique effects on the brain’s default network. This circuit is engaged during the absence of external stimuli and is impaired in Alzheimer’s disease, attention deficit hyperactivity disorder (ADHD), and autism. Hence, this study opened new doors to potential treatment strategies.

The purpose of scientific research on religious experience, practice and belief is not aimed at diminishing the validity of these, just as much as studying the brain does not take away from the miracle of conscience. Even though religious experience and science are deemed to be mutually exclusive by some, it is clear that science can enhance religious experience and religious experience can teach science. Whether you happen to work in the laboratory this Easter or not, whether you are Christian or not – use the opportunity to learn more about religious thinking and what it can teach you.

References:
1 Heaven and Hell, Chatto & Windus, 1956
5 https://en.wikipedia.org/wiki/Marsh_Chapel_Experiment
6 http://atpweb.org/jtparchive/trps-29-97-02-099.pdf
How do trees know what season it is?
By Laura Lecce

Many trees and plants are photoperiodic, meaning they can detect the hours of darkness in a 24 hour period. In this way, trees and plants can detect the lengthening of nights into winter or shortening of nights heading into summer. This is done through pigments within the leaves called phytochromes, which can trigger a cascade of specific hormones and growth factors that regulate growth, flowering, and changes in leaf color during autumn. Leaves produce chlorophyll throughout most of the year, a green pigment critical for photosynthesis which allows trees and plants to absorb energy from light. Chlorophyll masks other pigments present within the leaf such as carotenes and xanthophyll, which are responsible for orange and yellow coloring, respectively. As the length of the night increases during autumn, it triggers a cork-like membrane to form around the base of the leaf stalk called an abscission, which slowly cuts off the supply of nutrients to the leaf. This limits the production of chlorophyll and allows the orange and yellow colors to be visible. Anthocyanin is also produced in autumn, which gives leaves a red and purple coloring. Eventually nutrients to the leaves are completely halted causing the leaves to fall off. After accumulating a certain amount of time in the cold which is referred to as the number of chill hours, trees can then respond to increasingly warmer temperatures and shorter nights. During this time there is an upregulation of genes responsible for producing antioxidants and vitamin C to rid the tree of hydrogen peroxide which has built up during the winter dormancy. Trees are now able to produce the hormones and growth factors necessary to begin flowering. Happy Spring Everyone!!!

The Mount Sinai Postdoc Periodical

Co-Chair Corner

Greetings fellow postdocs,

Happy Spring! Spring is a great time to clean out closets, update your lab notebook, get back into your exercise routine, and socialize with colleagues. The Postdoc Executive Committee (PEC) would like to help guide you into the upcoming postdoc Town Hall on April 15th at 5PM in the Hatch Auditorium. During this event, we will re-cap the wide variety of professional development programs available to ISMMS postdocs. For instance, did you know that we offer a teaching training program that provides $500 honoraria to participants in addition to a comprehensive course and applied teaching opportunities? Never heard of it? Come and find out about this and other exciting programs available to you! Learn how to get involved in our very active social, outreach, and advocacy groups. We will present the results from our annual survey, and provide a forum for discussion regarding the state of post-doctoral training at ISMMS. The PEC uses your feedback on the annual survey and events like the Town Hall to craft our programing for future years. Make your voice count. Come for the discussion, stay for the food and camaraderie. We hope to see you there!

On another note, the PEC would like to thank outgoing co-chair Ryan J. Cummings for his outstanding dedication, initiative, and service to ISMMS postdocs. Ryan has been a tremendous asset and leader for our community. In addition to his productive research, he has organized the 6th Annual Postdoc Symposium, the 1st Annual Town Hall event (coming up April 15th!), founded the Mount Sinai Science Policy group, and is co-director of the Future Leaders in Science Education and Communication Training program (a teaching training program for postdocs). If you see Ryan around, please shake his hand and buy him a refreshment for a job well done. Best of luck to you Ryan as you transition to the next stage in your career.

Don’t forget to join us for the next postdoc social on April 15th at 5PM, immediately following the Postdoc Town Hall in the Hatch Auditorium Lobby (Annenberg building).

Stay classy,
Alison P. Sanders and Ryan J. Cummings are your PEC co-chairs
Scientists from the University of Melbourne (Australia) have recently published a paper in Nature Biotechnology\(^1\) describing a new device that can hopefully help paralyzed people control their limbs with the power of their thoughts. Intracranial electrode arrays have already been used in the field to record and stimulate brain activity and to “transform” thoughts into real movements. In 2014, a young paraplegic man, Julio Pinto, was able to give the first kick at the FIFA World Cup in Brazil using a mind-controlled robotic suit that included a cap fitted with electrodes (watch the YouTube video here: [https://www.youtube.com/watch?v=VPPWYH3eGtI](https://www.youtube.com/watch?v=VPPWYH3eGtI)). Although these technologies have achieved promising results, they are invasive, may cause trauma to the brain during insertion, and often lead to chronic inflammation.

The new device described in the paper is called a stentrode (stent electrode) and it is just 3 cm long and a few millimeters wide. It was implanted into freely moving sheep via catheter angiography into a superficial cortical vein overlying the motor cortex, allowing recordings for up to 190 days. The recordings were comparable to those obtained with electrode arrays implanted via craniotomy. The idea is to test this new device in three patients at the Royal Melbourne Hospital in Victoria next year. Doctors will make a small cut in the neck of the patients and feed the catheter containing the stentrode up through the blood vessels leading into the brain until it rests over the motor cortex. The catheter will then be removed leaving the “bionic spine” behind. Signals detected from the cortex will be sent to a small device implanted in the patient’s shoulder in order to translate them into movement-related commands.

Although this technique has limitations, mainly due to the limited durability and the high density of electrodes inside the stentrode, this device opens new possibilities for the treatment of several neurological disorders, including obsessive compulsive disorder and Parkinson’s disease.

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**UPCOMING EVENTS**

- **POSTDOC TOWN HALL FRIDAY, APRIL 15:** Come and find out what the Postdoc Executive Committee and Office of Postdoctoral Affairs have to offer you! We will use this time to explore the 2015 survey data and field any questions you may have about the postdoctoral experience at Mount Sinai. Hatch Auditorium (up the stairs in Guggenheim lobby) from 5-6pm with the Postdoc social to follow (Hatch lobby).

- **Postdoc Social:** Friday, April 15 (6pm) in the Hatch lobby (note change of date and location)

- The Office of Career Services and Strategy presents “**Interviewing: Tips and Insights**”. This is a comprehensive practical guide for interview preparation - from phone to Skype to individual/group interviews. Emphasis is on interviewing for jobs outside of academia, although academic interviewing is also briefly discussed. Thursday, March 17 from 12-1pm in Annenberg 210 A/B. RSVP: [https://www.surveymonkey.com/r/YDWB6FG](https://www.surveymonkey.com/r/YDWB6FG).

- **Postdoc St. Patrick’s Day meet-up at Merrion Square (95 street and 2nd Ave) on Thursday, March 17 from 6-9pm.**

- Office of Postdoctoral Affairs presents two seminars: “**Smooth Transitions Top 10 List: Things Scientists Ask About Moving To A Career Outside Academia**” and “**How To Choose A Lab Or Workplace: Practical Tips For Work Satisfaction**” by Joanne Kamens, PhD (Executive Director of Addgene). March 22 from 12-5pm (lunch at 1:30pm) in Annenberg 25-51. Please email Theresa Scarabino to RSVP.
From idea to product: Mount Sinai students' vision becomes a reality
By Ana B. Gorini da Veiga

Maybe you haven't heard about NovoCount… yet. Recently awarded the Quod Erat Demonstrandum (QED) Award – one of the 2015 Mount Sinai Innovations Awards – NovoCount has its origins in the Design Technology and Entrepreneurship Graduate Training Program (DTE) at the Icahn School of Medicine at Mount Sinai. Before becoming co-founders of NovoCount, Susana Bardina, Thomas Gardner, Kathryn Harper, Priya Luthra, and Bridget Matikainen-Ankney took the QED course in 2013, during which they learned about the process of identifying unmet needs in healthcare and creating innovative solutions to address these shortfalls.

The first step of the QED course required them to identify an existing practical/technical problem people face everyday – preferably related to health – and devise a potential solution for such a problem. After much brainstorming and research, they learned that patients that suffer from diseases that cause neutropenia struggle to have their neutrophil count monitored. They must frequently go to the hospital for blood withdrawal and because their immune system is compromised, they are very susceptible to nosocomial infections. Therefore, having a portable microfluidic device that enables the patient to have his/her neutrophil levels monitored at home would be a great solution. The second step of the course was to do a market analysis, where they needed to make sure that such a device did not yet exist and find out if there would be people interested in acquiring it. After interviewing over 150 people, including clinicians, researchers, patients, and analysts from pharmaceutical companies, they found that a portable neutrophil counter does not exist. However, they also found out that doctors usually request full blood tests for patients that suffer from diseases that cause neutropenia – cancer, autoimmune diseases such as Lupus and Crohn's, and some infectious diseases like tuberculosis and dengue fever – so a neutrophil counting device would have limited utility. Additional market research identified a more suitable target demographic: patients who take drugs to treat psychiatric disorders and epilepsy often experience neutropenia as a side effect, which discourages psychiatrists from prescribing them. Thus these patients stand to benefit significantly from a device that would allow them to closely and conveniently monitor their neutrophil levels.

The team designed a prototype for the portable neutrophil-monitoring device, wrote a business plan, and gave a pitch to a panel of industry professionals at the end of the QED course. After great feedback from the evaluators, they decided to enter in a venture competition through Columbia University where they gave their pitch to an audience of top-level NYC venture capitalists and entrepreneurs. They won $15,000 after placing 2nd out of 60 teams at the competition. With that, they went on and founded NovoCount, LLC. While their initial brain child involved the development of a device for management of neutropenia, the young company has additional plans for future endeavors. As their company slogan puts it, “NovoCount aims to solve big problems with small solutions, and focuses on the development of microfluidic technologies to better meet the need for at-home health testing”.

Recently, the NovoCount co-founders were selected for the New York City Innovation Corps program, which prepares scientists and engineers for business, innovation, and entrepreneurship. Their group was recognized as the top team for their efforts in identifying a promising consumer market for their product. When asked about what the SINAInnovations Award means to them, Susana Bardina and Thomas Gardner said that it is a great acknowledgment of the team's hard work, and that recognition of their entrepreneurial efforts motivates other students and scientists to transform their research into products or to pursue non-traditional careers in science and health care. Furthermore it embodies the spirit of innovation and entrepreneurship that ISMMS strives to create with its translational research.

For more information: www.novocount.com

The Mount Sinai Postdoc Periodical, March 2016