

The True Beauty Behind Music

Jonathan Liu



Graphic by Katherine Saccucci

Remember the last song you listened to that was so good it gave you the “chills”? Or the Christmas carol that gives you nostalgic memories of hiding from your parents to try and take a peek at your gifts? Musician or non-musician, either way, music has many effects on our lives.

Over the past fifty years, scientists have been researching the relationship between music and brain activity. Preliminary studies revealed that no musical centre exists in the cerebrum. Maurice Ravel, a French composer, suffered from cerebral degeneration but prior to his death, he

could still remember his compositions and the sound of particular scales. Musical interpretation requires years of training because of all the different cerebral areas it draws information from. Scientists initially hypothesized that specific frequencies picked up by hair cells in our ears were relayed, by the auditory nerve, to fixed areas in the cerebrum. A study at the University of California in the late 1980s revealed that specific arrangements of tones – known as a melody – belong to fixed areas of the brain, however, specific tones or frequencies themselves do not.

On the other hand, one’s ability to feel emotions while listening to music has proven to be irrelevant to our interpretation. A patient with bilateral damage in the temporal cortex was unable to distinguish the difference between musical pieces but still felt emotions. Emotions are often measured by physiological changes such as heart rate, blood pressure, and respiration.

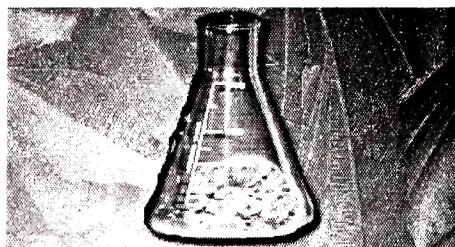
Music education and consistent practice have shown significant effects on an individual. In the 1990s, the University of California discovered neuron re-arrangement in response to repeated or “important” sounds. Just recently, Antoine Shahin, Larry Roberts and Laurel Train from McMaster University found that children, typically under the age of five, experience more auditory brain activity while playing the piano or violin. Studies around the world have confirmed the benefits of music which include hyper development in frequently stimulated structures of the brain and higher neuroplasticity.

Next time you flip on that radio in your car, remember that you’re not only trying to keep awake in the traffic jam, you’re also enhancing the capabilities of your brain!

[Weinberger, N.M. (2004). Music and the brain. Retrieved November 11, 2004 from <http://www.sciam.com/article.cfm?chanID=sa006&colID=1&articleID=0007D716-71A1-1179-AF8683414B7F0000>]

Immune System in a Bottle

Brent Mollon



Graphic by Katherine Saccucci

Scientists recently announced a novel way to cultivate cells, in hopes that this new method can one day be used to grow an immune system in a bottle. This in-vitro grown immune system could make it possible to produce flu vaccines faster and more easily. As well, this new technology can aid in the development of vaccines targeting viruses with a high rate of mutation by helping

the body target highly conserved viral regions.

The technology relies on honeycomb shaped cell-incubators, known as scaffolds, which can serve as a medium on which to grow live cells. One of the benefits of the scaffolds is they allow scientists to grow three-dimensional colonies, with all cells being exposed to the same conditions. Such an approach is more like what occurs inside the human body when compared to the traditional two-dimensional method of cell cultivation.

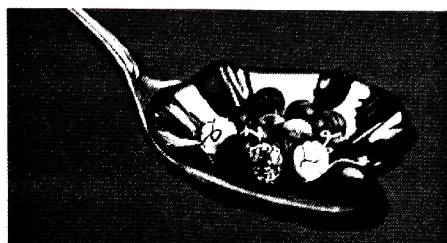
Chemically, the scaffolds are composed of inverted colloidal crystals, which are also known as photonic crystals. These crystals, which form lattices ranging from

nanometers to micrometers, offer an environment that is flexible enough to help control the life cycle and differentiation of cells. To form the growth medium, a sol gel is poured into the photonic crystals and left to dry. Once hardened, heat is used to burn away the crystals, leaving only the three-dimensional mold used for cell growth.

[Kotov, N.A., Liu, Y., Wang, S., Cumming, C., Eghtedari, M., Vargas, G., Motamedi, M., Nichols, J., Cortiella, J. (2004). Inverted colloidal crystals as three-dimensional cell scaffolds. *Langmuir*, 2004, 20, 7887-7892]

Sweet News for Those With a Sweet Tooth

Jonathan Liu



Graphic by Katherine Saccucci

For those with a flu or cold this season, here is a new idea. Drop those drowsy cough suppressants and have some chocolate as a joint study in England has suggested.

Uncontrollable coughing is a common symptom of colds, allergic reactions or chronic obstructive pulmonary disease. In the past, narcotic agents – such as codeine – have been used in managing severe cases of uncontrollable coughing. The side effects of narcotics, however, limit its frequency of use. One of the biggest issues emerging from a recent International Cough Symposium involved finding a better way to manage coughing.

Recent research has revealed that theobromine, a compound found

in cocoa, is effective in suppressing coughs by inhibiting a sympathetic nerve – the vagus nerve. Sympathetic nerves are involved in the body's response to stimulus, thus by inhibiting the stimulus or “depolarization” in this nerve, coughing can be stopped.

The study involved comparing the cough-suppressing effects between theobromine and codeine. The results showed a reduction in coughing as a result of both drugs; the effects (suppressing duration) of the two drugs were also similar, although higher concentrations of theobromine had to be applied. With theobromine present, scientists found reduced stimulation with citric acid and capsaicin-induced coughing.

Although the results are promising, researchers believe more studies are still necessary. For the test trials, only women were asked to participate since previous studies have proven that they show greater reactivity to capsaicin induced coughing. In addition, high concentrations of theobromine yielded inhibitory effects on particular sensory nerves. This minor side effect, however, would still

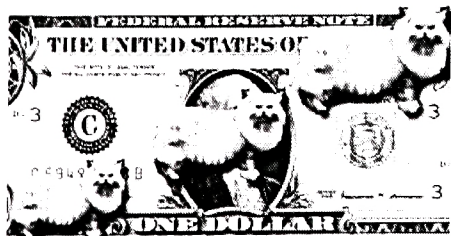
make theobromine more practical and accessible than codeine; in fact, small amounts of theobromine are available in supermarkets!

With the continuation of research on theobromine, those with a sweet tooth will at least have something to look forward to next time they fall ill!

[Usmani, O.S., Belvisi, M.G., Patel, H.J., Crispino, N., Birrell, M.A., Korbonits, M., Korbonits, D., Barners, P.J. (2004). Theobromine inhibits sensory nerve activation and cough. Retrieved November 18, 2004 from <http://www.fasebj.org/cgi/reprint/04-1990fjev1>]

First American ‘Cloned-to-Order’ Pet

Brent Mollon



Graphic by Katherine Saccucci

A Texas woman recently became the first person in the United States to purchase a ‘cloned-to-order’ pet. This individual, who recently suffered the loss of her 17 year old cat Nicky, paid \$50 000 US to have the dead animal cloned. The cloning procedure was completed by Sausalito-based Genetic Savings and

Clone. Using cat ovaries purchased from spay clinics across the USA, Genetic Savings and Clone combined the DNA from the deceased Nicky with the eggs extracted from the purchased ovaries to produce the cloned pet.

To date, scientists have managed to clone mice, rabbits, goats, pigs, and horses. Genetic Savings and Clone hopes to be the first organization to clone a dog by May of this year.

The news of Nicky's cloning has once again sparked an ethical debate over cloning technology. As mentioned in the press-release, cloning is currently viewed as an ‘inexact’ science. It often takes many tries to

obtain a successful clone, with failures resulting in gruesome developmental defects. Moreover, while the cloned animals may look the same, the clone will have a different personality due to different life experiences. This fact might disappoint potential investors who desire an exact duplicate of their deceased animal. However, Nicky's story illustrates that there is still a market for cloned animals, regardless of the ethical concerns of cloning.

[Elias, P. (2004). California company sells cloned cat, generating new ethics debate. Retrieved January 3, 2005 from <http://www.canada.com/search/story.html?id=c446c9a1-65b9-4bb1-8923-1b7b35f8f71c>]