



Newsletter of Science Society
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二零一五年二月號

Why all-nighters don't work: How sleep, memory go hand-in-hand

Scientists have long known that sleep, memory and learning are deeply connected. Most animals, from flies to humans, have trouble remembering when sleep deprived, and studies have shown that sleep is critical in converting short-term into long-term memory, a process known as memory consolidation.

But just how that process works has remained a mystery.

The question is, does the mechanism that promotes sleep also consolidate memory, or do two distinct processes work together? In other words, is memory consolidated during sleep because the brain is quiet, allowing memory neurons to go to work, or are memory neurons actually putting us to sleep?

In a recent paper in the journal *eLife*, graduate students Paula Haynes and Bethany Christmann in the Griffith Lab make a case for the latter.

Haynes and Christmann focused their research on dorsal paired medial (DPM) neurons, well-known memory consolidators in *Drosophila*. They observed, for the first time, that when DPM neurons are activated, the flies slept more; when deactivated, the flies kept buzzing.

These memory consolidators inhibit wakefulness as they start converting short-term to long-term memory. All this takes place in a section of the *Drosophila* brain called the mushroom body, similar to the hippocampus (海馬體), where our memories are stored. As it turns out, the parts of the mushroom body responsible for memory and learning also help keep the *Drosophila* awake.

"It's almost as if that section of the mushroom body were saying 'hey, stay awake and learn this,'" says Christmann. "Then, after a while, the DPM neurons start signaling to suppress that section, as if to say 'you're going to need sleep if you want to remember this later.'"

Understanding how sleep and memory are connected in a simple system, like *Drosophila*, can help scientists unravel the secrets of the human brain.

"Knowing that sleep and memory overlap in the fly brain can allow researchers to narrow their search in humans," Christmann says. "Eventually, it could help us figure out how sleep or memory is affected when things go wrong, as in the case of insomnia or memory disorders."

嚼口香糖助清潔！研究：10分鐘可清1億隻細菌

優活健康網 – 2015年1月26日 上午8:30

嚼口香糖，不僅有助於去除口中氣味、消除緊張感外，日前在荷蘭更有項最新研究指出，只要嚼口香糖10分鐘，就可以除掉口腔內，多達1億萬隻的細菌，只不過，一旦咀嚼時間過久，反而就會出現反效果。

嚼口香糖不得超過十分鐘 才能達到清潔效果

該研究主要是由格羅寧根大學，針對兩種品牌的無糖口香糖要受測者進行咀嚼，10分鐘後再用掃描式電子顯微鏡觀察，結果發現，每片口香糖上都沾滿了1億萬隻細菌，等同於口腔中10%微生物含量，而清潔效果，幾乎就跟牙線一樣好。

只不過，效果僅限於無糖口香糖，另研究人員表示，口香糖的咀嚼只有前30秒效果最好，但如果咀嚼時間太長，細菌則可能會再度回到口腔，而目前此研究刊登於《公共科學圖書館期刊》。

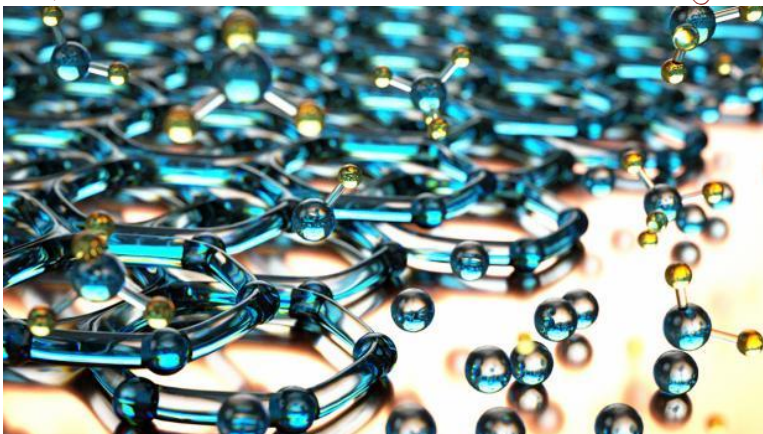
補過牙的人過度咀嚼 恐會危害身體健康

除了以上好處外，在瑞典也曾有項研究指出，對於補過牙的人而言，如果嚼太多口香糖，就會可能會容易引起牙中填充物「汞」的分解，導致血液和尿液中汞含量超標，危害身體健康。

Graphene: Bringing Futuristic Super Tech In 2016

What Is It?

Graphene was first created ten years ago by Andre Geim and Konstantin Novoselov of the University of Manchester. They won the Nobel Prize in Physics in 2010 for their work. Graphene is actually made from graphite--the stuff you find in pencils. Only graphene is spread so thin it's only a few atoms thick--that's one million times thinner than a sheet of paper. Graphene is so thin it was actually classified as two dimensional and it is virtually invisible to the naked eye.



What Benefits Does It Have?

If graphene is 1/1,000,000th the thickness of a piece of paper you would naturally expect it to be very weak. However in reality it is just the opposite. Graphene is actually stronger than steel. Not only that, it is capable of being folded, crumbled, and rolled up without losing its strength or the ability to return to its original form.

More than that it also has amazing electricity conduction properties. It's better able to send electrical impulses than silicon--the current champ used in our computer chips--and can even deliver data over the Internet up to 100 times faster on your smartphone than current networking technologies. Oh yeah, and graphene used in batteries gives them the capabilities to be charged from zero to full in just 15 minutes and would also give a battery the size of the current iPhone one week of battery life.

Given all its fantastic properties, it's no wonder the world's three biggest tech companies are furiously working to bring graphene components to SMARTPHONES.

But How Could It Change The Smartphone?

Imagine a SMARTPHONE from the wildest science fiction movie. It would be one which is less than one millimeter thin and can be folded up and shoved in your shirt pocket. Its display is sharper and clearer than any Retina display is capable of today and it hardly ever needs to be recharged.

Graphene makes that science fiction smartphone a reality. The most obvious starter use of graphene is in a smartphone display. Since it conducts electricity so well it can make touch screens more responsive and also allow them to draw less power, increasing battery life. Given that graphene is only a few atoms thick, a graphene display can reduce the thickness of a current smartphone by 20% immediately--and that's before graphene is even used in the body of the device or its internal components.

But more than making the smartphone thinner, it could actually lead to the end of smartphones--that is devices between 4-6-inches in size--as we know them. Since graphene can be folded and rolled up without being damaged, smartphones of the future could have the capabilities to be folded out from a 5-inch (or even 1-inch) screen to a screen the size of the current iPad. We'll no longer have to decide what sized device we want to carry with us. We can have multiple screen sizes in one device.

But it's not just smartphones that will benefit from graphene. The material could fuel the wearable tech revolution. Displays--even batteries--could be built into everything from car windows to our t-shirts--and we wouldn't even notice. And forget Google Glass. We're talking Google Contact Lenses.

Seminar

15/2/2015

普及科學講座：「結合新科技與傳統智慧的耐鹽大豆」

講者：林漢明教授

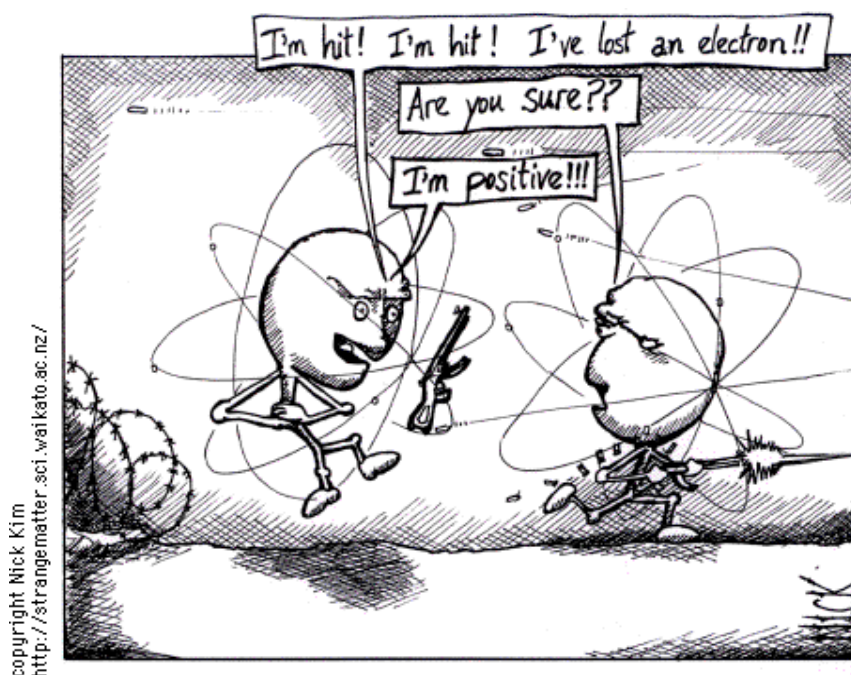
Venue: 香港科學館

Time: 14:30

~Relaxing time~

	2		9					6
1							9	
		8			7			
5						7		
		7	8			1		
		9	4					2
			2			4		
	6							3
3					5		8	

COMIC CORNER



ANOTHER CASUALTY IN THE WAR OF THE SODIUM ATOMS

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Answer

4	2	3	9	1	8	5	7	6
1	7	6	5	2	3	8	9	4
9	5	8	6	4	7	3	2	1
5	1	2	3	9	6	7	4	8
6	4	7	8	5	2	1	3	9
8	3	9	4	7	1	6	5	2
7	8	1	2	3	9	4	6	5
2	6	5	7	8	4	9	1	3
3	9	4	1	6	5	2	8	7