Sound of Science
(理聲)

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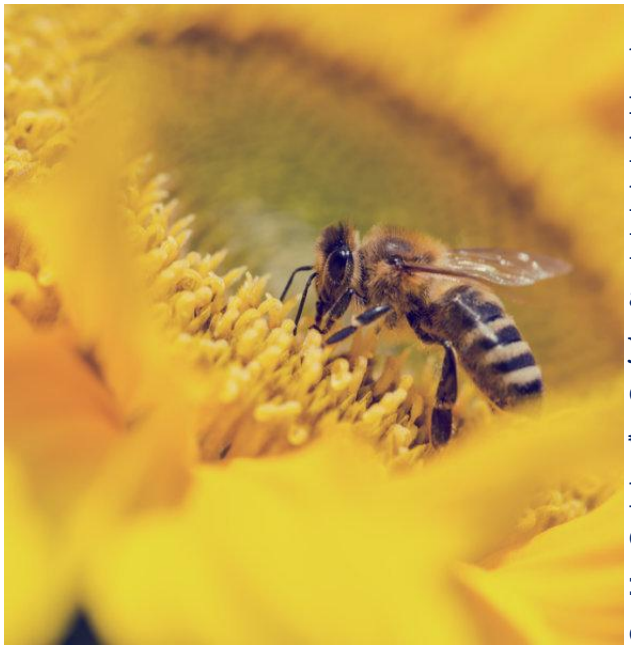
Are bees 'hooked' on nectar containing pesticides?

Bees are attracted to nectar containing common pesticides, scientists at Newcastle University and Trinity College Dublin have discovered. This could increase their chances of **exposure** to high levels of pesticides.

Previous studies have suggested that exposure of this kind can affect bees' **fitness**. The research, published in *Nature*, discovered that buff-tailed bumblebees and honeybees could not taste the three most commonly used **neonicotinoid** pesticides and so did not avoid them. In fact, the bees showed a preference for food which contained pesticides: when the bees were given a choice between sugar solution, and sugar solution containing neonicotinoids, they chose the neonicotinoid-laced food.



The lab-based study also showed that the **bumblebees** ate more of the food containing pesticides than the honeybees, and so were exposed to higher doses of **toxins**.

Bees and other pollinating insects are important for increasing crop yields -- their value has been estimated to be worth at least €153billion per year globally. When pollinating crops, they can be exposed to pesticides in **floral nectar** and pollen. Several controversial studies have shown that neonicotinoids have negative effects on bee **foraging** and colony fitness. As a result, public concern has grown over the impact of neonicotinoids on bees and other pollinators. In April 2013, the EU introduced a temporary ban on the use of neonicotinoid pesticides on flowering crops, while further scientific and technical evidence was gathered.

Professor Geraldine Wright, lead scientist on the study at the Institute of Neuroscience at Newcastle University, said: "Bees can't taste neonicotinoids in their food and therefore do not avoid these pesticides. This is putting them at risk of poisoning when they eat contaminated nectar.

"Even worse, we now have evidence that bees prefer to eat pesticide-contaminated food. Neonicotinoids target the same mechanisms in the bee brain that are affected by **nicotine** in the human brain. The fact that bees show a preference for food containing neonicotinoids is concerning as it suggests that like nicotine, neonicotinoids may act like a drug to make foods containing these substances more rewarding. "If foraging bees prefer to collect nectar containing neonicotinoids, this could have a knock-on negative impact on whole colonies and on bee populations."

利用太陽能的海水淡化系統

一個來自麻省理工學院的團隊發明出可攜式水淡化系統，利用低成本太陽能將鹹水轉變為飲用水，並榮獲 2015 Desal Prize－由美國國際發展機構（USAID）所發起，鼓勵研究發展中國家缺水問題解決方法的獎項。

為了贏得價值十四萬美金的獎項，參賽隊伍必須證明他們的發明不僅功能良好，也符合經濟效益成本、環境永續性且節省能源。麻省理工學院的研究團隊與一家美國製造公司合作，成功抱回了這個獎。

這項發明利用太陽能板對電池充電，再輸出電力給電透析機（electrodialysis machine）將鹹水中的鹽分分離而生產出飲用水， David L. Chandler 在 MIT News 解釋說：

「電透析讓水通過兩個帶相反電荷的電極。因為溶解在水中的鹽分具有正、負離子，因此電極會將離子從水中被拉出，讓乾淨的水留在水流的中心。一整排的薄膜則會讓乾淨的水與逐漸變鹹的水隔開。」

以太陽能當作海水淡化的能量來源並不是太新奇，像智利、加州等缺水的地區都積極投入研究，但現存的科技有個致命的缺點，就是過於昂貴，因此發展中國家難以採用現存的設計。而 MIT 設計獲獎的關鍵在於電透析的過程，Chandler 與團隊中的一位機械工程師 Amos Winter 交談時，Winter 說：

「電透析與逆滲透都需要使用薄膜，但電透析系統處於較低的滲透壓，因此能透過簡單的店及性轉換就能夠清理堆積的鹽分。這意味著昂貴的薄膜，可以使用更久也不需要經常維修。」

Chandler 說 MIT 的系統可以將 90%的鹹水轉變成飲用水，比起只能達到 40%至 60%的逆滲透技術，真的非常驚人！

這個團隊從 2014 年開始已經在印度不同村莊測試，並在美國的一家國家地下水淡化研究機構（Brackish Groundwater National Desalination Research Facility）24 小時地測試並分析效率與維護成本。根據在 Popular Science 的 Mary Beth Griggs 說，經過 24 小時，他們的系統已經淡化了 2100 加侖（7950 公升）的水。

他們希望能擴展測試的區域到發展中國家的鄉村，並在小型農場建立灌溉系統。這項技術不只能用在鄉村，這樣自成一體的系統也能運用在救災和在偏遠地區給軍隊使用。

並沒有參與這項計畫，加州柏克萊大學的環境與土木工程師 Susan Amrose 告訴 MIT News 說：「這個解決方案可以加倍使用環境中的可再生水，因此在這個水日益珍貴的時代將具有巨大的影響力。」

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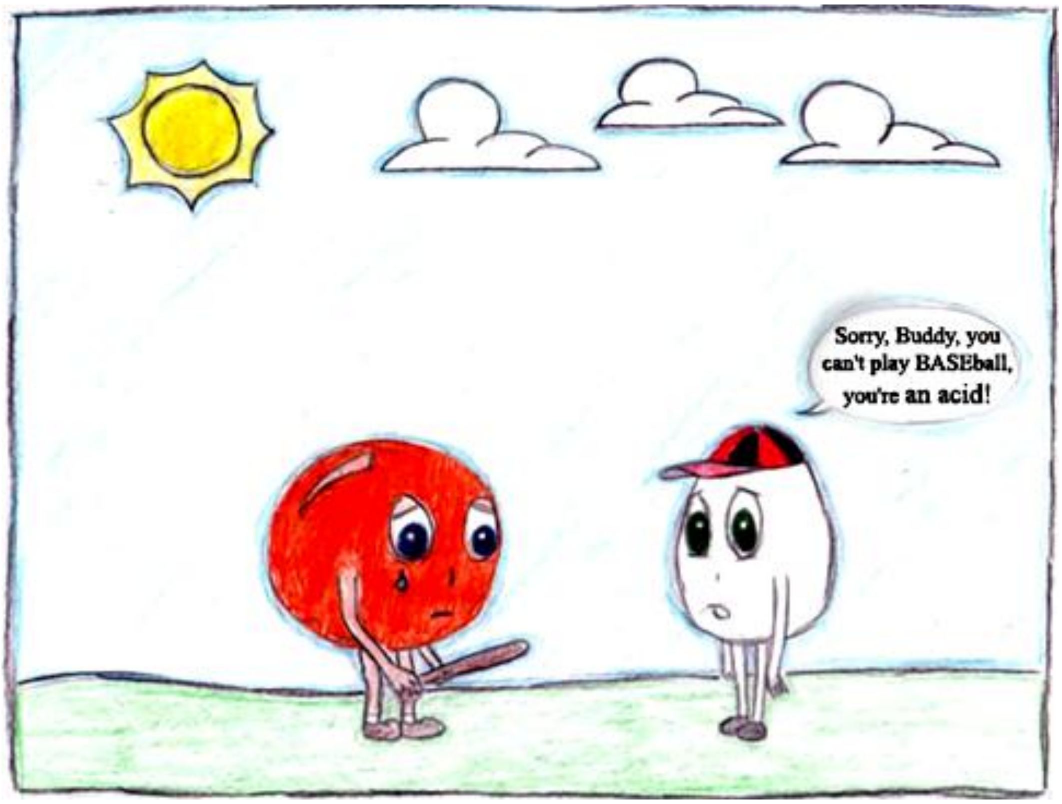
~Relaxing time~

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

Comic Corner



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Answer

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