

Evolution seen in 'synthetic DNA'



Researchers have succeeded in mimicking (模仿) the chemistry of life in synthetic (綜合的) versions of DNA and RNA molecules.

The work shows that DNA and its chemical cousin RNA are not unique in their ability to encode information and to pass it on through heredity (遺傳).

The work, [reported in Science](#), is promising for future "synthetic biology" and biotechnology efforts.

It also hints at the idea that if life exists elsewhere, it could be bound by evolution but not by similar chemistry.

In fact, one reason to mimic the functions of DNA and RNA - which helps cells to manufacture proteins - is to determine how they came about at the dawn of life on Earth; many scientists believe that RNA arose first but was preceded by a simpler molecule that performed the same function.

However, it has remained unclear if any other molecule can participate in the same unzipping and copying processes that give DNA and RNA their ability to pass on the information they carry in the sequences of their nucleobases (核鹼基) - the five chemical group "letters" from which the the two molecules' genetic information is composed.

'No Goldilocks'

The classic double-helix (雙螺旋) structure of DNA is like a twisted ladder, where the steps are made from paired nucleobases (RNA is typically a single helix).

Philipp Holliger of the UK Medical Research Council's Laboratory of Molecular Biology and a team of colleagues created six different DNA- and RNA-like molecules - xeno-nucleic acids, or XNAs - by replacing not the nucleobases but the sugar groups that make up the sides of the ladder. "There's a lot of chemistry that seeks to build alternative nucleic acids, and people have been modifying the bases, the sugars and the backbone, but what we were focusing on was the type of nucleic acid or polymers that would retain the ability to communicate with the natural DNA," Dr Holliger explained in an interview for the Science podcast.

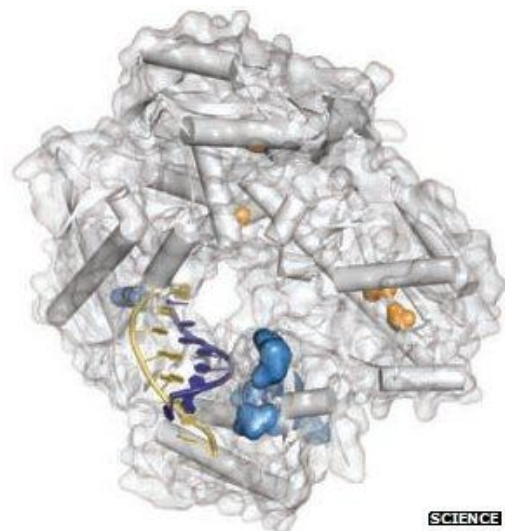
Because the nucleobases themselves were the same as those of DNA and RNA, the resulting molecules were able to join with their natural counterparts.

The effect is similar to work [recently published in Nature Chemistry](#), showing that another sugar-substituted DNA analogue could be made to pair up with DNA itself.

But the crucial point in creating a full "synthetic genetics" is a set of nucleic acids like DNA and RNA that can not only carry genetic information, but would also allow it to be changed and passed on - evolution and heredity.

That requires a set of helper molecules called polymerases, which, once DNA or RNA "unzip" and expose their genetic information, help create new DNA molecules from those instructions.

Dr Holliger and his colleagues have developed polymerases that efficiently transcribe the code of their synthetic DNA to natural DNA and then from that back to another synthetic DNA.



SCIENCE

科普講座

科普講座名稱	日期	時間	地點	講員
航天科技令世界更美好	5月12日 (六)	9:30- 11:00am	科學創意中心	香港航天學會 雷健泉先生
「疫苗與您邁進明天」	5月19日 (六)	2:00 - 3:30pm	香港科學館演講廳	陸衛光醫生 (澳洲皇家病理科醫學院榮授院士)及崔俊明藥劑師 (香港醫院藥劑師學會副會長)
機械人簡易軟件編程控制	5月26日 (六)	9:30- 11:00am	科學創意中心	香港大學計算機科學系 劉文建博士

Lunch Time Video Show: May 2012 奇案大破解 (12:20p.m.) @ Chem Lab Rm512

Date	Name of Program	Area
27/4 (Fri)	Solved: Written in blood 凶案大突破: 血跡遺言(Part I)	Forensics Science 鑑證科學
4/5 (Fri)	Solved: Written in blood 凶案大突破: 血跡遺言(Part II)	Forensics Science 鑑證科學
11/5 (Fri)	History's Secrets: The Hunt of Hitler 歷史奇案: 尋找希特勒 (Part I)	Archeology 考古學
18/5 (Fri)	History's Secrets: The Hunt of Hitler 歷史奇案: 尋找希特勒 (Part II)	Archeology 考古學

SCIENCE SOCIETY 2011-12

CHAIRPERSON: MAK SHUN KI 麥順淇 4E

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Sudoku! ^_^

Treasure the rest of the video show to broaden your horizon!

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

Previous Answer:

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

Here's the Science Quiz =p (1/5 - 31/5)

- Q1. RNA is the chemical cousin of DNA. (T/F)
 Q2. If life exists elsewhere, it could never be bound by evolution. (T/F)
 Q3. The function of DNA and RNA is to help cells to manufacture cellulose. (T/F)
 Q4. Dr. Holliger and a team of colleagues created six different DNA- and RNA- like molecules - xeno-nucleic acids or XNAs (T/F)
 Q5. What is the structure of DNA compared to?
 A. An apple B. A sponge C. A twisted-ladder D. A pair of shoes

Previous Answers(1/4 - 30/4):

- Q1. F Q2. T Q3. T Q4. F Q5. Brain- deprived neurotrophic

You can use the answer sheet on the right to answer the question. Collection box is put on the book shelf outside Staff Room. The students who answer all correct will be given a special gift. Everyone can submit one answer sheet only. Thanks for your participation!

Name: _____

Class: _____(____)

1. _____ 4. _____

2. _____ 5. _____

3. _____

Hope you can find out the answers and know more about Science!