

Angka Giliran:

No. Tempat Duduk:

UNIVERSITI SAINS MALAYSIA

Peperiksaan Semester Kedua
Sidang Akademik 2007/2008

April 2008

LSP 402 – Bahasa Inggeris Saintifik dan Perubatan
(Scientific and Medical English)

Masa: 2 jam

INSTRUCTIONS TO CANDIDATES:

1. Please note that this question paper contains **3 (THREE)** questions on **15 (FIFTEEN)** printed pages. Check that the paper is complete.
2. Answer **ALL** questions in this booklet.

UNTUK KEGUNAAN PEMERIKSA SAHAJA		
SOALAN	MARKAH PENUH	MARKAH DIPEROLEH
1	50	
2	20	
3	30	
JUMLAH	100	

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QUESTION 1 (50 marks)

Read the passage below and answer all the questions that follow.

ALIENS AMONG US

Do we share our planet with alternative forms of life?

By Carl Zimmer

Every living thing on Earth shares a long, colourful history. Our planet was born into a maelstrom 4.5 billion years ago, and for the next 600 million years a steady **bombardment** of primordial debris made the surface uninhabitable. The blitz finally tapered off 3.8 billion years ago. Then within about 50 million years later – practically an instant in geologic time – life irrevocably established itself. Since 5 then, it has evolved into everything from bacteria to toadstools to mudskippers to humans. Outwardly these species vary wildly, but at the molecular level they are staggeringly uniform. They all use DNA to encode genetic information. They all use RNA molecules as messengers to transfer the information from DNA to cellular factories called ribosomes, which then build proteins, which in turn drive 10 our metabolisms and form the structures of our cells. In short, every species seems descended from a common ancestor whose attributes define what scientists means when they say 'life as we know it'.

But what about life as we don't know it? What if other, completely distinct forms of biology also took root in early Earth? After all, the swiftness with which 15 life appeared might mean that it could easily do so anytime, anywhere the conditions are right. If so, maybe life arose more than once at different locations on the early Earth. Those other organisms might have their own biochemistry and a separate evolutionary history. They might not even use DNA – they could be, in essence, alien beings that just happened to emerge on the same planet. Which 20 leads to the big question: What if one (or more) of those alternative life forms of life is still around?

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It could be right under our noses, or even in our noses,” says Paul Davies, the director of BEYOND: The Centre for Fundamental Concepts in Science at Arizona State University. 25

At first, the idea of alternative life on Earth may sound absurd. Even if life could have begun more than once, it is generally thought that our DNA-based ancestors drove any competitors to extinction, **handily** explaining away the absence of non-DNA life-forms in the catalogues of biological science.

That is probably why little research has been done in the area, yet Davies and 30 a few other scientists suspect a different reason for that absence: Their colleagues are just not looking hard enough. The common assumption is that DNA triumphed because “our form of life is seemingly so superior that we would have eaten” all other life-forms, says Steven Benner of the Foundation for Applied Molecular Evolution in Gainesville, Florida. “That’s the sum total of the argument. 35 But that’s just anthropocentric. These sorts of ‘we’re at the centre of the universe’ arguments have always failed.” When Davies first started quizzing other scientists about alternative life a few years ago, he remembers their eyes widening as they asked, “Why hadn’t we thought of this?”

Benner believes there may be some organisms hiding on Earth today that are 40 based not on DNA and proteins but on a more primitive type of biochemistry. A number of researchers now theorize that DNA-based life evolved from an RNA-based predecessor. RNA is an unusual molecule that can both store genetic information and act like an enzyme, cutting apart other molecules or putting them together. Benner is convinced that 4 billion years ago, Earth was home to simple 45 RNA-based organisms that could find food, grow, reproduce and even evolve. Over time, some of these developed the ability to build proteins and switched to double-stranded DNA to carry their genes.

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Much of the evidence for this so-called RNA world lies in our own cells. RNA still carries out many different tasks beyond carrying messages from DNA. Benner 50 and his colleagues are also trying to test their ideas by building artificial RNA-based organisms from scratch. The best evidence of the RNA world, though, would be finding natural RNA-based life that is still lurking on Earth today.

One way RNA-based life might have survived could have been to retreat to niches where DNA-based life could not compete. RNA-based organisms might 55 not make proteins, and so they could live where key ingredients for proteins, like sulphur, are absent. RNA-based organisms might also be far smaller than DNA-based life, allowing them to fit in fine rock pores where conventional microbes could not exist. Then again, these extreme environments may not be needed for RNA life to be flourishing today without us knowing it. Even if RNA life were living 60 out in the open, "the life detection tools that we have today would not find it," Benner says.

The reason why biology's standard tools would fail to detect an RNA-based organism is that they assume that all metabolisms must be similar to our own. For example, one popular way to look for microbial life is to scoop up some soil, 65 water, or even air, and extract all the DNA it contains. In this way, researchers can reconstruct genes and sometimes even entire genomes of species that are new to science. In March, genome pioneer Craig Venter and his colleagues published the sequences of 6 million new genes they had collected by trawling the world's oceans. As powerful as this technique is, however, it has a big 70 limitation: It can identify only DNA. Venter's samples could have been full of RNA-based life that would have **slipped through his net**.

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Yet even RNA-based organisms would still be distant cousins of our DNA-based selves. Davies has been contemplating the possibility that we share the planet with even more exotic beings. He is focusing on the idea that life might 75 have begun more than once on Earth, each time taking a very different form. "I've had this idea for a few years," he says. "Why did life have to happen only once on Earth? There's no real deep reason why." Davies and his colleague Charles H. Lineweaver of the Australian National University did a rough calculation based on the geologically short time between the end of the early bombardment of Earth 80 and the indications of the first signs of life. They estimate there is a 95 percent chance that life originated twice or more.

It is possible that the other form (or forms) was **snuffed out** by a giant impact in the early years of Earth. But Davies argues that we cannot rule out the possibility that it survived. It may have escaped disaster deep underground. Or 85 perhaps a microbe-bearing rock was hurled by an impact into space and landed on Venus or Mars, which may have been more hospitable to life billions of years ago. An impact on one of those planets could have sent the descendants of the microbial refugees back home to Earth – or even seeded Earth with other life-forms that arose there. 90

There's no reason in physics or chemistry why these different ways of building a life-form wouldn't work. If these alternative life-forms did emerge on Earth, though, they would have eventually had to compete with DNA-based life for living space. At least at the level of multicellular creatures – fungi, animals, plants, algae – scientists are pretty sure that DNA-based life-forms did beat out the competition 95 (just look around). But Davies **reiterates** the warning that we can't assume that DNA-based creatures automatically eradicated all other life-forms on the planet. After all, life as we know it is surprisingly diverse. Recent estimates put the number of microbes in the ocean at 360 octillion – that's 36 followed by 28 zeros. A typical scoop of water may have a few very common species living alongside 100 thousands of very rare ones. Alternative life-forms might find there is actually a lot of room to survive in such an ecosystem.

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Section A (10 marks)

For each of the following words / phrases, give another word or a short expression equivalent in meaning to that in the passage.

1. bombardment (line 3) _____
2. handily (line 28) _____
3. slipped through his net (line 72) _____
4. snuffed out (line 83) _____
5. reiterates (line 96) _____

Section B (10 marks)

State what the following words refer to in the passage.

1. it (line 6) _____
2. their (line 38) _____
3. these (line 47) _____
4. they (line 64) _____
5. there (line 90) _____

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Section C (20 marks)

Circle the letter corresponding to the best answer, e.g. **A**, if A is the answer.

1. Which of the following statements best reflects the view of the writer?
 - A. There are alien beings from other planets living secretly on Earth.
 - B. There might be organisms on our planet different from the ones that we know of.
 - C. We need to know about all the organisms that are living on this planet.
 - D. Research should be done to find other forms of life on other planets.

2. Which of the following statements is **FALSE**?
 - A. Some scientists believe that not all organisms use DNA to encode genetic information.
 - B. RNA molecules act as messengers to transfer information from DNA to cellular factories called ribosomes.
 - C. Our metabolisms are driven by proteins that are built by ribosomes.
 - D. Every species is descended from a common ancestor that appeared on Earth 3.8 billion years ago.

3. There has been little research done to find alternative life-forms on earth probably because
 - A. scientists are just not looking hard enough.
 - B. early DNA-based organisms are thought to have eliminated all other competitors.
 - C. these organisms may have different biochemistry and cannot be traced using standard laboratory methods.
 - D. no one knows where they might be found or where to look for them.

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4. RNA is a molecule that

- I stores genetic information.
- II cuts apart molecules and puts them together again.
- III builds proteins of various types.
- IV finds food, grows, reproduces and even evolves.

- A. I and II
- B. II and IV
- C. I, III and IV
- D. All of the above

5. According to the text, which one of the following statements best describes RNA-based life-forms? They

- A. could not have survived by avoiding competition with DNA-based life-forms.
- B. can be detected in soil, water or even air using advanced scientific technology.
- C. can only survive in extreme environments like in fine rock pores.
- D. may be undetectable wherever they may exist.

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Section D (10 marks)

1. Based on the text, give two possible explanations for the belief that other, completely different forms of biology might have taken root on early Earth.

i) _____

ii) _____

(4 marks)

2. Name 4 types of DNA-based life-forms that won the competition for space against RNA-based life-forms.

i) _____

ii) _____

iii) _____

iv) _____

(2 marks)

3. What does this sentence from lines 74 – 75 mean? "Davies has been contemplating the possibility that we share the planet with even more exotic beings."

(4 marks)

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QUESTION 2 (20 marks)

Read the text below and complete the diagram that follows.

BIRD FLU

Avian Influenza (Bird Flu) is an infectious disease of birds caused by Type A strains of the influenza virus. Fifteen subtypes of influenza virus are known to infect birds. To date, all outbreaks of the highly pathogenic form have been caused by influenza A viruses of subtypes H5 and H7.

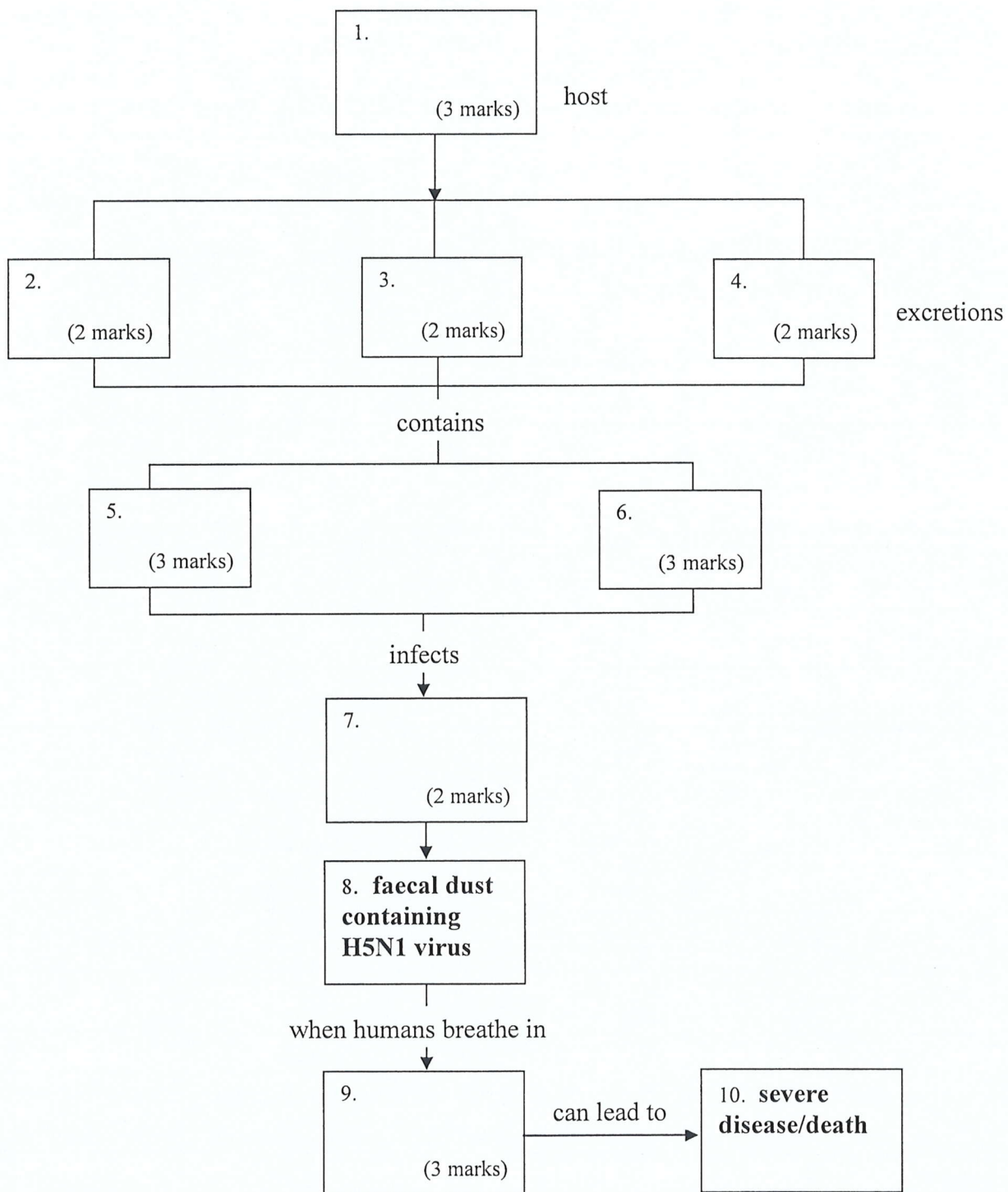
Bird flu viruses spread among birds when the animals come into contact with contaminated excretions, such as saliva, nasal discharge and faeces. Scientists believe most cases of human infection have resulted from infected chickens shedding the virus in their faeces and humans then breathing in the faecal dust. All known influenza A strains are derived from water fowl, primarily ducks. They can withstand avian flu – making them ideal carriers – but chickens have little resistance. Bird flu viruses do not usually infect humans.

But in 1997, the first instance of direct bird-to-human infection resulted in six deaths in Hong Kong. Particularly alarming was the detection of H5N1, a highly pathogenic strain, which jumped the species barrier, causing severe disease and in some cases death as in the 1997 incident. Currently available vaccines will not protect against disease caused by the H5N1 strain in humans.

Adapted from: *The Star* Friday 31 December 2004

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BIRD FLU

(20 marks)

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In about **350 words**, write an essay on **ONE** of the following:

- OR

2. Technology has enabled us to enjoy a higher standard of living but not necessarily a better quality of life. Discuss.

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