Reading Test 12

Traditional Maori medicines

A. The Maori are the indigenous people of the islands of New Zealand. Their traditional medicine, which is believed to date back as far as the 13th century, was a system of healing that was passed down through the generations orally. It comprised diverse practices and placed an emphasis on the spiritual dimension of health. Its practice included remedies made from herbs, and physical therapies such as massage to relieve discomfort in the muscles and bones.

B. Maori systems for treating illness were well developed before European arrived in New Zealand in the late 1700s: they had quite detailed knowledge of anatomy and recognition of the healing properties of various plants. When Europeans first visited New Zealand, the average age of death for Maori adults was around 30. However, apart from this, the people were fit and healthy, and troubled by few diseases.

C. Illness was often seen as spiritually based. Maori saw themselves as guardians of the earth, and the focus of their existence was to remain at one with the natural and supernatural world. Rather than a medical problem, sickness was often viewed as a symptom of disharmony with natures.

D. In Maori culture, illnesses were divided into diseases of the gods (mate atua) and physical diseases (mate tangata). Diseases sent by the gods were often attributed to attacks by evil spirits, because the person had broken a religious rule. For instance, for Maori, places where people had died, or places where their ancestors were buried were sacred, so if someone took food from a river where someone had died, or took a stick form a tree that had held their ancestor's bones and placed it on a cooking fire, it was believed that the gods could punish them for their disrespectful acts by making them sick.

E. More than 200 plants were used medicinally by Maori. The leaves of the flax plant were used to treat skin infections and food poisoning, and the hard part of the leaf was also used as a splint or brace for broken bones and injured backs. Flax fibers were used along with a sharpened stick to sew up bad cuts. The bark and leaves of the pepper tree were used to heal cuts, wounds and stomach pain. People who had toothache were instructed to chew the leaves of this same tree, and this was found to be of considerable benefit. The pepper tree was also used in vapor baths to treat people with painful joints.

F. Colonization by European in the 1800s had a significant effect on traditional Maori healing. Europeans brought many new diseases with them which Maori healers had limited ability to combat. Though Western medicine was also relatively ineffectual at the time, this failure still strongly affected Maori confidence in their healers. Some western missionaries attributed the spread of disease to the fact the Maori did not believe in Christianity, and as Maori healers appeared powerless, many Maori accepted this explanation and turned to Christianity. Over time the schools of higher learning which had trained healers started to close and the tradition of the Maori healer declined.

G. From the late 20th century, there was renewed Maori interest in their traditional medicine. This was due to several factors. There was a resurgence of all aspects of Maori culture in New Zealand. Furthermore, people started to be less trusting of Western medicine-statistics from the 1970s came out revealing that Maori health continued to be poorer than that of other New Zealanders. There were also problems with access to health care for Maori. Additionally, there was and still a today a perceived lack of a spiritual dimension in Western health services.

H. Although Maori today largely accepted Western concepts of health and illness, and use the mainstream health system, there is significant demand for traditional medicine. This is true for unusual illnesses, or those that fail to respond to standard medical treatment, but also for common ailments such as the cold and influenza.

I. Today's healers differ significantly from those of old times. Training is highly variable, usually informal, and often less tribally bound than the rigorous education of the traditional houses of higher learning. Many modern healers work in urban clinics, some alongside mainstream health professionals. They experiment, incorporating knowledge from Western and other medical systems. As a result, their modern day work has no standard system of diagnosis or widespread agreement about treatments. Despite this, many healers are recognized as having knowledge and ability that has been passed down from their ancestors. The Maori language is also seen as important by many of those receiving treatment.

Questions 1-6

Do the following statements agree with the information given in the Reading Passage?

In boxes 1-6 on your answer sheet, write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

1 Early Maori healers learned their skills through studying written texts.

2 The first Europeans in New Zealand were surprised by how long the Maori lived.

3 Diseases of the gods were believed to be more serious than physical diseases.

4 The leaves of the pepper tree were used to treat toothache.

5 Western religion was one reason why traditional Maori medicine became less popular.

6 Modern day Maori healers often reach the same conclusion about the type of treatment which is best.

Questions 7-13

Complete the notes below.

Choose **ONE WORD ONLY** from the passage for each answer.

Write your answers in boxes 7-13 on your answer sheet.

A short history of Maori healing
Pre-European arrival
• Maori were using plant-based remedies, as well as treatment including massage
• Diseases sent from the gods were thought to be caused by disobeying a spiritual 7……
• Sickness could be attributed to eating food from a sacred 8……………………… or   burning sacredwood After European arrival 1800s
• The inability of Maori healers to cure new diseases meant the Maori people lost 9 ……………………… in them.
• Eventually the 10……………………… for Maori healing began shutting down 1970s.
• Published 11……………… showed that Maori were not as healthy as Europeans 2000s
• Maori healers can be seen working with Western doctors in 12……………………. in cities
• Many patients appreciate the fact that the Maoris 13………………… in used by healers

Life code: unlocked!

{A} On an airport shuttle bus to the Kavli Institute for Theoretical Physics in Santa Barbara, Calif., Chris Wiggins took a colleague's advice and opened a Microsoft Excel spreadsheet. It had nothing to do with the talk on biopolymer physics he was invited to give. Rather the columns and rows of numbers that stared back at him referred to the genetic activity of budding yeast. Specifically, the numbers represented the amount of messenger RNA (MRNA) expressed by all 6,200 genes of the yeast over the course of its reproductive cycle. "It was the first time I ever saw anything like this," Wiggins recalls of that spring day in 2002. "How to make sense of all this data?"

{B} Instead of shirking from this question, the 36-year-old applied mathematician and physicist at Columbia University embraced it-and now six years later he thinks he has an answer. By foraying into fields outside his own, Wiggins has drudged up tools from a branch of artificial intelligence called machine learning to model the collective protein-making activity of genes from real-world biological data. Engineers originally designed these tools in the late 1950s to predict output from input. Wiggins and his colleagues have now brought machine learning to the natural sciences and tweaked it so that it can also tell a story-one not only about input and output but also about what happens inside a model of gene regulation, the black box in between.

{C} The impetus for this work began in the late 1990s, when high-throughput techniques generated more mRNA expression profiles and DNA sequences than ever before, "opening up a completely different way of thinking about biological phenomena," Wiggins says. Key among these techniques were DNA microarrays, chips that provide a panoramic view of the activity of genes and their expression levels in any cell type, simultaneously and under myriad conditions. As noisy and incomplete as the data were, biologists could now query which genes turn on or off in different cells and determine the collection of proteins that give rise to a cell's characteristic features, healthy or diseased.

{D} Yet predicting such gene activity requires uncovering the fundamental rules that govern it. "Over time, these rules have been locked in by cells," says theoretical physicist Harmen Bussemaker, now an associate professor of biology at Columbia. "Evolution has kept the good stuff." To find these rules, scientists needed statistics to infer the interaction between genes and the proteins that regulate them and to then mathematically described this network's underlying structure-the dynamic pattern of gene and protein activity over time. But physicists who did not work with particles (or planets, for that matter) viewed statistics as nothing short of an anathema. "If your experiment requires statistics," British physicist Ernest Rutherford once said, "you ought to have done a better experiment."

{E} But in working with microarrays, "the experiment has been done without you," Wiggins explains. "And biology doesn't hand you a model to make sense of the data." Even more challenging, the building blocks that makeup DNA, RNA, and proteins are assembled in myriad ways; moreover, subtly different rules of interaction govern their activity, making it difficult, if not impossible, to reduce their patterns of interaction to fundamental laws. Some genes and proteins are not even known. "You are trying to find something compelling about the natural world in a context where you don't know very much," says William Bialek, a biophysicist at Princeton University. "You're forced to be agnostic." Wiggins believes that many machine-learning algorithms perform well under precisely these conditions. When working with so many unknown variables, "machine learning lets the data decide what's worth looking at," he says.

{F} At the Kavli Institute, Wiggins began building a model of a gene regulatory network in a yeast-the set of rules by which genes selectively orchestrate how vigorously DNA is transcribed into mRNA. As he worked with different algorithms, he started to attend discussions on gene regulation led by Christina Leslie, who ran the computational biology group at Columbia at the time. Leslie suggested using a specific machine-learning tool called a classifier. Say the algorithm must discriminate between pictures that have bicycles in them

and pictures that do not. A classifier sifts through labeled examples and measures everything it can about them, gradually learning the decision rules that govern the grouping. From these rules, the algorithm generates a model that can determine whether or not new pictures have bikes in them. In gene regulatory networks, the learning task becomes the problem of predicting whether genes increase or decrease their protein-making activity.

{G} The algorithm that Wiggins and Leslie began building in the fall of 2002 was trained on the DNA sequences and mRNA levels of regulators expressed during a range of conditions in yeast-when the yeast was cold, hot, starved, and so on. Specifically, this algorithm-MEDUSA (for motif element discrimination using sequence agglomeration) -scans every possible pairing between a set of DNA promoter sequences, called motifs, and regulators. Then, much like a child might match a list of words with their definitions by drawing a line between the two, MEDUSA finds the pairing that best improves the fit between the model and the data it tries to emulate. (Wiggins refers to these pairings as edges.) Each time MEDUSA finds a pairing, it updates the model by adding a new rule to guide its search for the next pairing. It then determines the strength of each pairing by how well the rule improves the existing model. The hierarchy of numbers enables Wiggins and his colleagues to determine which pairings are more important than others and how they can collectively influence the activity of each of the yeast's 6,200 genes. By adding one pairing at a time, MEDUSA can predict which genes ratchet up their RNA production or clamp that production down, as well as reveal the collective mechanisms that orchestrate an organism's transcriptional logic.

Questions 14-19

The reading passage has seven paragraphs, A-G

Choose the correct heading for paragraphs A-G from the list below.

Write the correct number, i-x, in boxes 1-6 on your answer sheet.

List of Headings

(I) The search for the better-fit matching between the model and the gained figures to foresee the activities of the genes

(II) The definition of MEDUSA

(III) A flashback of commencement for a far-reaching breakthrough

(IV) A drawing of the gene map

(V) An algorithm used to construct a specific model to discern the appearance of something new by the joint effort of Wiggins and another scientist

(VI) An introduction of a background tracing back to the availability of mature techniques for detailed research on genes

(VII) A way out to face the challenge confronting the scientist on the deciding of researchable data.

(VIII) A failure to find out some specific genes controlling the production of certain proteins

(IX) The use of a means from another domain for reference

(X) A tough hurdle on the way to find the law governing the activities of the genes

Example: Paragraph A   III

14 Paragraph B

15 Paragraph C

16 Paragraph D

17 Paragraph E

18 Paragraph F

19 Paragraph G

Questions 20-22

Do the following statements agree with the information given in Reading Passage 1?
In boxes 7-9 on your answer sheet, write

TRUE if the statement is True

FALSE if the statement is False

NOT GIVEN if the information is not given in the passage

20 Wiggins is the first man to use DNA microarrays for the research on genes.

21 There is almost no possibility for the effort to decrease the patterns of interaction between DNA, RNA, and proteins.

22 Wiggins holds a very positive attitude on the future of genetic research.

Questions 23-26

*Complete the following summary of the paragraphs of Reading Passage, using **NO MORE THAN THREE WORDS** from the Reading Passage for each answer.*

Wiggins states that the astoundingly rapid development of techniques concerning the components of genes aroused the researchers to look at **23** ………….. from a totally new way. **24**………. is the heart and soul of these techniques and no matter what the **25**……….. were, at the same time they can offer a whole picture of the genes' activities as well as **26**……………. in all types of cells. With these techniques, scientists could locate the exact gene which was on or off to manipulate the production of the proteins.

THE MPEMBA EFFECT

A In 300 BC, the famous philosopher Aristotle wrote about a strange phenomenon that he had observed: "Many people, when they want to cool water quickly, begin by putting it in the sun." Other philosophers over the ages noted the same result but were unable to explain it.

B In 1963, a young Tanzanian student named Erasto Mpemba noticed that the ice cream he was making froze faster if the mix was placed in the freezer while warm than if it were at room temperature. He persisted in questioning why this occurred, and eventually physicist Denis Osborne began a serious investigation into what is now known as the Mpemba Effect. He and Mpemba co-authored a paper in New Scientist in 1969, which produced scientific descriptions of some of the many factors at work in freezing water.

C It was initially hypothesised that the warm bowl melted itself in a place in the ice on the freezer shelf, thus embedding its base in a 'nest' of ice, which would accelerate freezing. The hypothesis was tested by comparing the result when bowls of warm water were placed on ice and on a dry wire shelf; this demonstrated that the ice nest actually had little effect. A second suggestion was that the warmer water would be evaporating at its surface, thus reducing the volume needing to be frozen, but this idea was also shown to be insignificant.

D Thermometers placed in the water showed that the cooler water dropped to freezing temperature well before the warmer bowlful, and yet the latter always froze solid first. Experiments at different temperatures showed that water at 5oC took the longest to freeze in a conventional freezer, while water initially at 35oC was quickest. On further examination, an explanation for this paradox began to emerge. Losing heat from the water occurs at the points where it is in touch with the colder atmosphere of the freezer, namely the sides of the bowl and the water surface.

E A warm surface will lose heat faster than a cold one because of the contrast between the temperatures; but of course there is more heat to be lost from one bowl than the other! If the surface can be kept at a higher temperature, the higher rate of heat loss will continue. As long as the water remains liquid, the cooling portion on top will sink to the bottom of the bowl as the warmer water below rises to take its place. The early freezing that may occur on the sides and base of the container will amplify the effect.

F The bowl that is more uniformly cold will have far less temperature difference so the water flow will be minimal. Another inhibiting factor for this container is that ice will also form quite quickly on the surface. This not only acts as insulation but will virtually stop the helpful effects of the water circulating inside the bowl.

G Ultimately, the rate of cooling the core of this body of water becomes so slow that the other warmer one is always fully frozen first. While there are limitations to this comparison (for example, we would not see such a result if one quantity were at 1oCand another at 990C) this counter-intuitive result does hold true within the 5–35oC range of temperatures indicated previously.

H Since this paper was published, the validity of the research findings has been questioned by a number of reviewers. They point out that the initial experimental question was not clearly defined; for example, the researchers needed to decide on exactly what constituted freezing the water. They also state that the rate at which water freezes depends on a large number of variables.

I Container size is one of these; for the Mpemba Effect to be noticed, the container must be large enough to allow a free circulation of water to take place, yet small enough for the freezing areas of the side and base to be effective at extracting heat too. Secondly, research at a University in St Louis, Missouri, suggests that the Mpemba Effect may be affected by water purity, or by dissolved gas in the water.

J Distilled water is totally free of the particles that are common in normal drinking water or mineral water. When suspended in water, these particles may have a small effect on the speed of cooling, especially as ice molecules tend to expel them into the surrounding water, where they become more concentrated. Just as salt dissolved in water will raise the boiling point and lower the temperature at which it freezes, the researchers found that the final portion of ordinary water needed extra cooling, below zero, before all was frozen solid.

K One more factor that can distort the effect is observed if the bowls are not placed simultaneously into the same freezer. In this case, the freezer thermostat is more likely to register the presence of a hotter bowl than a colder one, and therefore the change in internal temperature causes a boost of freezing power as the motor is activated.

L The Mpemba Effect is still not fully understood, and researchers continue to delve into its underlying physics. Physicists cannot reach consensus. Some suggest that supercooling1 is involved; others that the molecular bonds in the water molecules affect the rate of cooling and freezing of water. A 2013 competition to explain the phenomenon run by the Royal Society of Chemistry attracted more than 22,000 entries, with the winning one suggesting supercooling as an important factor so it seems the question and its underlying explanation continue to fascinate.

Questions 27-33

Write the correct letter, A-P, in boxes 1-7 on your answer sheet.

For more than 2000 years people have wondered why raising the **27**............................of coldwater before cooling it results in more rapid cooling. At first researchers thought that a warmcontainer created its own icy **28** ....which made the water freeze faster, but comparisons with containers resting on a dry **29**...................indicated that this wasinaccurate. Evaporation of water proved not to be a **30** .... Temperaturemeasurements showed that, although the water in the cooler container reached 0oC beforethe warmer one, it took longer to actually solidify. The water temperature drops the most atthe top and sides of the container. Provided there is a temperature **31**......................, the water willcontinue to circulate and to cool down. Cooler water will have less water **32** .... and , thus a slower rate of freezing. If ice forms on the top of the water, this will further slow the **33** .... of freezing, but if it forms on the bottom and the sides of the container, thiswill increase the rate of cooling.

A.	melt	J.	circulation
B.	element	K.	limit
C.	process	L.	significance
D.	centre	M.	theory
E.	acceleration	N.	difference
F.	surface	O.	result
G.	factor	P.	temperature
H.	hollow		
I.	matter		

Questions 34-39

Do the following statements agree with the information given in Reading Passage

TRUE	if the statement agrees with the information
FALSE	if the statement contradicts the information
NOT GIVEN	if there is no information on this

34. The Mpemba Effect cannot be seen when comparing liquids with an extreme temperature difference.

35. Osborne and Mpemba's results are still widely accepted today.

36. The size of the container does not alter the Mpemba Effect.

37. Osborne and Mpemba experimented on both pure and impure water.

38. One variable is the timing of containers in a freezer.

39. Physicists now agree that supercooling accounts for the Mpemba Effect.

Question 40

Choose the correct letter, A, B, C or D.

The Mpemba Effect is best summed up as the observation that

A ice cream freezes at different temperatures.

B different sources of heat result in water cooling at different rates.

C salt water freezes at a lower temperature than ordinary water.

D warmer water can freeze faster than colder water.