平成28年度一般入試前期日程

英語問題紙

注意事項

1. 試験開始の合図があるまで，この問題紙を開いてはいけません。
2. 英語の問題紙は，11ページあります。
3. 解答用紙は4枚あります。
4. 受験番号は，監督者の指示に従って，全ての解答用紙の指定された箇所に必ず記入しなさい。
5. 受験番号および解答以外のことを解答用紙に書いてはいけません。
6. 解答はすべて解答用紙の指定された欄に書くこと。裏面に書かないこと。
7. 解答用紙のみを提出しなさい。問題紙は持ち帰りなさい。

問題 1 以下の英文を読み，問いに日本語で答えなさい。

Bees have been entwined with our history since the appearance of the earliest humans, but bees were here long before us. (1)The first bees evolved from wasps about 125 million years ago, shifting from predators to gatherers of nectar and pollen from flowers.

These early bees were solitary, nesting in hollow twigs or in soil, and were notable for branched hairs that trapped pollen grains when a bee visited a flower. From these hairs the pollen was (and still is) transferred to other flowers on subsequent visits, thereby pollinating (fertilizing) the plant's seed.

Flowers secrete nectar and/or excess pollen as a food reward to interest the bees, the nectar providing carbohydrates and the pollen protein. This evolutionary innovation led to an explosion in the diversity and abundance of advanced plants, (2)coinciding with that of bees, and eventually to the biosphere we know today.

More than twenty thousand known species of bees currently live on every continent except Antarctica, displaying a breathtaking array of lifestyles. Some are solitary; others live in loose communal groups or form highly complex societies. They nest in sandy soil, hard dirt, abandoned rodent nests, and hollow twigs, stems, and tree trunks. Their flower-visiting habits range from omnivorous, taking nectar and pollen from a wide range of flowers, to (3)obligate relationships, in which a plant species can be pollinated by only one bee species, which in turn visits only that plant's flowers.

These diverse species are vitally important to human economies and to the world's welfare because of their pollinating role in both agricultural and natural ecosystems. Their global economic value for agriculture was estimated at US$217 billion in 2008, with about one-third of all crops benefiting from or dependent on insect pollination, mostly by bees. Without bees we would have a vastly diminished grocery, missing most of the fruits, vegetables, berries, and nuts that we depend on for a healthy, balanced diet.

Bees' value to natural ecosystems as pollinators is incalculable. We can price the pollination services that nature provides for crop production, but it's more challenging to monetize the full range of services provided by the rich palette of plants that depend on bees. The dependency of other organisms on bee-pollinated plants is broad, including food and shelter for innumerable feral animals, the conversion of carbon dioxide into oxygen, which maintains the earth's life-supporting atmosphere, the role of plants in stabilizing soil and preventing erosion, and many other functions.

Perhaps one way to assess the worth of bees for nature is to consider the extent to which advanced plants (angiosperms) depend on them for pollination. At the University of Northampton, Jeff Ollerton, who studies ecosystem valuation, reports that 20 percent of all angiosperms can be pollinated only by bees, while another 45 percent are pollinated by bees as well as by the wind or other animals, mostly beetles, moths, butterflies, birds, and bats. That is, 65 percent, or 229,000 of the 352,000 species currently known, require or benefit from bee pollination.

Clearly, any significant drop in bee populations will have repercussions that go far beyond the loss of bees. (4)A world without bees would be almost impossible to contemplate and likely one in which we would never have evolved in the first place.

The array of wild bees is staggering, with lifestyles and habits that fascinate any lover of natural history. Among my personal favorites are (5)the giant orchid bees, huge metallic bees that make a deafening buzzing noise as they wend their way through tropical jungles seeking the specific orchid flowers that each species pollinates. One of their most interesting habits is scent collection from flowers by the males, which then use these scents to attract females.

At the other end of the earth's climate zones are the bumblebees, common in temperate latitudes, found high up in alpine zones and within six hundred miles of the North Pole, at the northernmost points of land adjoining the Arctic Ocean. These bees have superbly adapted to cold climates, surviving freezing temperatures and even snow by disconnecting their wings and heating up their flight muscles to high temperatures by shivering. They nest in colonies with a queen and a few hundred to a few thousand workers. Each colony dies every fall; new queens, which are produced in late summer, leave the nest, find protected cavities in which to overwinter as solitary individuals, and then found their own colonies in the spring.

The stingless bees are another unusual group, five hundred or so tropical and subtropical species that, over evolutionary time, have lost their stings. These social bees build large nests in hollow tree trunks or underground cavities, where they store nectar and pollen and rear their young in egg-shaped pots constructed from wax they produce in special glands. Although they cannot sting, (6)they are hardly defenseless, having evolved jaws and associated venom sacs that deliver bites at least as painful as the stings of other bee species.

Less heralded but ecologically crucial are myriad solitary bees, generally small and unobserved but providing the blue-collar pollination work required for ecosystems to thrive. Only the keenest observers will see these minute bees darting from flower to flower, returning to provision a few eggs with a paste of nectar and pollen before sealing the nests to let their young mature, hidden from predators and parasites.

But when we think of "bee," it's usually honeybees that come to mind since they are certainly the bees with which we have had (7)the most interactions. They are gloriously social, producers of honey, source of much art and story, and deeply ingrained in many aspects of human economy and lore. We are intimately connected; our and their prosperity is closely linked to each other's well being.

(Adapted from *Bee Time: Lessons from the Hive* by Mark L. Winston)

問 1　下線部(1)に伴って生じた変化を述べなさい。

問 2　下線部(2)の内容を本文に即して述べなさい。

問 3　下線部(3)の内容を本文に即して述べなさい。

問 4　下線部(4)を和訳しなさい。

問 5　下線部(5)の繁殖に関する習性を，本文に即して述べなさい。

問 6　下線部(6)の根拠を本文に即して述べなさい。

問 7　下線部(7)の内容を本文に即して述べなさい。

問題 2　Read the following text and answer the questions <u>in English</u>.

The Tongue Map

Early in his psychology career, Edwin Garrigues Boring often used himself as a guinea pig. As a graduate student at Cornell University in 1914, he swallowed feeding tubes to measure how his esophagus and stomach responded to different foods, and sliced a nerve in his own forearm in order to document its gradual regrowth. In 1922, just before Boring was to start a teaching job at Harvard, he was struck by a car on a rainy night. He lay in a hospital bed for six weeks with a fractured skull and short-term memory loss, forgetting his conversations with visitors within a few minutes. After he recovered, Boring used this experience to analyze the nature of awareness, pondering whether someone living in an eternal present was truly conscious.

This hands-on sensibility helped make Boring one of the twentieth century's most influential psychologists. It wasn't by virtue of any single theory or discovery. (Though he did popularize a minor curiosity, the "Boring figure," an optical illusion in which a slight shift in perspective flips the image of an old woman's face, as perceived by the eye and the mind, to that of a young woman's head.) Instead, Boring made his mark by changing the popular conception of psychology itself. When his career began, the field was a hodgepodge of disciplines, equal parts philosophy, therapy, and lab experimentation, each with its own approach and terminology. From his influential perch at Harvard, Boring pushed to make it more consistent and rigorous, to have it hew more closely to the scientific method. He believed a scientist was obligated to relentlessly scrutinize and measure his own sensations, grounding all findings in direct observation — a tenet of the philosophy known as positivism. This was the closest science could possibly get to the truths about reality it aspired to capture.

But there was a point in his career when putting these beliefs into practice could have averted a major scientific misunderstanding, and Boring failed spectacularly. The mishap involved the nature of taste. By the 1940s, Boring had become an accomplished historian, chronicling the emergence and evolution of modern psychology. His 1942 volume, *Sensation and Perception in the History of Experimental Psychology*, is still considered a magisterial survey of the science of the human senses stretching back to Sir Isaac Newton's seventeenth-century studies of light and color.

Boring covered taste and smell in a relatively brief chapter in the book, twenty-five pages out of seven hundred. Midway through it, he reviewed an experiment done in 1901 by David P. Hänig, a German scientist. Hänig had brushed sweet, salty, bitter, and sour solutions — representing the four basic tastes, important components of flavor — on different areas of the tongues of volunteers, and then asked them to rate their relative strength. He found the threshold for detecting each taste varied around the edge of the tongue. The tip, for example, was more sensitive to sweetness and to salt than was the base.

It wasn't clear what this meant — if anything — and the differences were very small. But Boring found this notion interesting and went to some lengths to illustrate it. He borrowed the data from Hänig's study and turned it into a graph. The graph was just a visual aid; it had no units, and its curves were impressionistic. But the result was that — perhaps to dramatize the point, or perhaps inadvertently — Boring made small differences in perception appear huge.

The wayward chart became the basis for a famous diagram of the tongue, divided into zones for each taste: The tip is labeled sweet and the back bitter. Along each side, salty is close to the front, and sour is behind it. The center is blank. Linda Bartoshuk, a professor of psychology who has studied this map's origins, believes it came about through a game of "telephone": First, Boring exaggerated Hänig's findings. Then researchers and textbook editors misinterpreted Boring's graph, using the peaks of its curves to label specific areas on the tongue. A final round of confusion produced a diagram with taste boundaries clearer than those on a world map.

The tongue map offered a simple explanation for how the tongue processed tastes, a phenomenon everyone knew intimately. Teachers embraced it. Generations of elementary school students sipped and swished water spiked with either sugar, salt, lemon juice, or tonic water in a classroom experiment designed to dramatize the tongue map. Like air raid drills or dodgeball, the tongue map became a feature of postwar American schooling and lodged itself in the popular imagination.

However, these demonstrations no doubt confused more children than they enlightened, as many found they couldn't detect the supposedly dramatic taste gradients. Even as the tongue map took on the mantle of conventional wisdom, research revealed that it wasn't merely an exaggeration or misinterpretation but totally wrong. In 1973, Virginia Collings of the University of Pittsburgh repeated Hänig's original tests. Like him, she found very limited variation in the tongue's taste geography. In the 2000s, more advanced tests showed that all five tastes ("umami," or savoriness, was recognized as a fifth in 2001) can be detected all over the tongue. Every taste bud is studded with five different receptor proteins, each tailored to detect molecules of one of the basic tastes.

Had Boring done some taste testing himself instead of interpreting Hänig's forty-year-old data, he might have noticed the problem with his graph. Instead, he launched one of the more widely disseminated bits of scientific misinformation in history.

The old diagram has lost much of its cachet in recent years. But it still lingers in some areas of the culinary world, including coffee and wine tasting, which value tradition and continuity as much as science. Claus Riedel, the Austrian glassware designer, used it to create wineglasses whose unique curvature is intended to deliver each sip to the right place on the tongue to release the full flavor. (Riedel died in 2004; since then, his son and successor Georg Riedel has acknowledged that science undermines the tongue map, but maintains the glass designs work.) Boring died in 1968, before the map had been discredited. That he made a fundamental error about the nature of one of the senses, which he considered the building blocks for understanding both the mind and the universe, is an irony that he would doubtless have found mortifying. It was no mere miscalculation, but a basic error about a universal human experience. Everyone knows the gratifying "Mmm" of sweetness and the stark taste difference between a pinch of salt and a fistful. Cheesecake makes the brain explode with pleasure. The complex tastes in coffee are a global obsession. Recipes distill entire cultures down to a single sensation. Flavor is one of a very few things that make day-to-day existence not just survivable but consistently enjoyable.

(Adapted from *Tasty: The Art and Science of What We Eat* by John McQuaid)

Question 1. Describe Boring's short-term memory loss.

Question 2. What does a game of "telephone" mean in the case of the tongue map?

Question 3. What should Boring have done before completing the tongue map?

Question 4. Read the following statements, and mark **T** for true or **F** for false according to the text.

A. Boring cut a nerve in his own forearm, so he could start his job at Harvard University.

B. Boring's beliefs about scientists were similar to the belief in philosophy known as positivism.

C. Boring developed a novel theory concerning human perception of light, color, and taste, which was based on Newton's findings.

D. Boring completed the famous tongue map without repeating the experiment conducted by Hänig in 1901.

E. Boring's experiments about taste constituted a basis for the later tongue map.

F. People, especially teachers, noticed and worried about the inaccuracies of the tongue map used in textbooks right after the war.

G. It took forty years for Boring to notice the problem with his graph.

H. The tongue map maintains importance in some areas of the culinary world such as wine tasting.

I. Boring passed away before the tongue map lost its validity.

問題 3 Some hospitals have fast-food restaurants. Critics argue that such food makes people sick and shouldn't be served in hospitals. What is your opinion? What type of restaurant (if any) should be allowed in hospitals? Write an essay **in English**.