令和６年度入学者選抜学力検査問題

（前期日程）

# 英　　語

（注　意）

1　問題紙は指示があるまで開いてはいけません。

2　問題紙は本文９ページです。答案用紙は３枚あります。

3　答えはすべて答案用紙の指定のところに記入してください。

4　問題紙と下書き用紙は持ち帰ってください。

I Read the following passage from *Scientific American* and answer the questions.

## The Secrets of Thirst

SERIOUS QUESTION: How much water does the average adult need to drink every day? You've probably heard the usual answer: eight 8-ounce[1] glasses, sometimes stated as 8 × 8. But there is not much science behind this ubiquitous (A) recommendation. A 2002 research review found essentially no reliable studies.

We do need water every day, but the average person gets it from many sources: tea or coffee, soft drinks, and food. "We typically get about 20 percent of our fluid requirements from solid foods and about 80 percent from beverages," says Brenda M. Davy, professor of human nutrition at Virginia Polytechnic Institute and State University. To maintain a healthy balance of water, minerals, and salts, health authorities say adults should drink about a liter (34 ounces) of liquid for every 1,000 kilocalories consumed. That works out to be a little over eight cups for someone who takes in 2,000 daily calories — a possible source of the 8 × 8 notion. But most Americans achieve this level of hydration[2] from a variety of foods and drinks, with about a third coming from plain water, according to a 2013 study of nearly 16,000 U.S. adults.

Natural thirst mechanisms are the reason that most of us do not need to be overly concerned about hydration. The adult body is roughly 60 percent water — closer to 80 percent in the lungs and kidneys[3] — and it carefully controls the concentration of water. We are all familiar with the sensory aspect of this regulation: the dry throat and urgent alert of thirst. But recently neuroscientists have gained other remarkable insights (B) into how thirst is monitored in the body and controlled in the brain.

Researchers have known since the 1950s that a pea-size structure in the brain's hypothalamus[4] controls thirst. In a series of experiments in which he infused (C) salt into the brains of goats, Swedish physiologist Bengt Andersson showed that a region called the subfornical organ (SFO for short) monitors the concentration of water and salts in blood and triggers the urge to drink. The SFO plays the same role in people.

But Andersson's ideas failed to fully explain how humans experience thirst. For instance, when we gulp a drink, we feel almost instantly satisfied, yet it takes 10 to 15 minutes for a liquid to make it from our mouth through the digestive tract[5] and into the bloodstream. "Something in the brain is saying that your blood may not have changed conditions yet but that you drank enough water so you can stop feeling thirsty," explains neuroscientist Christopher Zimmerman of Princeton University.

In a series of elegant experiments with mice, Zimmerman and his associates measured the activity of neurons in the SFO. "We saw that their activity changed very fast when the mouse drank water or drank salt water and when it ate food," Zimmerman says. The researchers showed that signals converged[6] on the SFO from several places. "You get a signal from the blood that tells your current state of hydration, a signal from the mouth that tells you how much fluid you drank, and a signal from the gut[7] that tells you what was consumed — was it water? Was it something else?" The SFO neurons, he explains, "add these signals together" and then transmit the urge to drink or stop drinking.

The big takeaway (D) of Zimmerman's work is that for the most part you can trust your thirst system to tell you when you need to drink. But there are exceptions. Because the system's sensitivity may decline with age, older adults may need to set reminders to drink — the 2013 study found that, on average, people older than 70 failed to get adequate hydration. People with certain conditions, including kidney stones and diarrhea[8], also need extra water. And research by Davy and others indicates that middle-aged and older people who are trying to lose weight or maintain weight loss consume fewer calories if they fill up with 16 ounces of water before meals.

(Adapted and modified from Claudia Wallis, "The Secrets of Thirst," *Scientific American*, Special Edition, 32, 2, Spring, 2023)

ounce[1]: a unit for weight, equal to 28.35 grams

hydration[2]: the process of making your body absorb water

kidneys[3]: the two organs in the body that remove waste products from the blood

hypothalamus[4]: an area in the central lower part of the brain that controls body temperature, hunger, and the release of hormones

digestive tract[5]: a system of connected tissues for the digestion of food

converge[6]: to move towards each other and meet at a point

gut[7]: the tube in the body through which food passes when it leaves the stomach

diarrhea[8]: an illness in which waste matter is emptied from the bowels much more frequently than normal, and in liquid form.

**Question 1:** Which of the following is closest to the meaning of the words (A) to (D) in the text?

(A) "ubiquitous"

1) questioned by experts
2) mentioned everywhere
3) highly reasonable
4) abandoned a while ago

(B) "insights"

1) sudden surprise
2) experimental tools
3) historical backgrounds
4) deep understandings

(C) "infused"

1) put
2) consumed
3) drank
4) stopped

(D) "takeaway"

1) lost item
2) aftereffect
3) finding
4) change

**Question 2:** Based on the passage, answer questions (E) to (H) in one English sentence or clause. Your answers should not be more than 15 words.

(E) What are the sources of water for the average person?
(F) Why don't we need to be overly concerned about hydration?
(G) Why may older adults need to set reminders to drink?
(H) According to the research by Davy and others, how can middle-aged and older people consume fewer calories?

**Question 3:** Explain what is different between Andersson's and Zimmerman's explanation of the SFO. Answer in English in 30 to 40 words.

Ⅱ Read the following passage from *Science* and answer the questions.

## Oldest Human Remains from Puerto Rico Contradict Idea of Simple Island Nomads

Over 2 days in 2019, William Pestle drove a truck containing 35 carefully packed boxes from Virginia to Florida. At night, the University of Miami bio-archaeologist brought the boxes inside his hotel room for safekeeping. This was no ordinary cargo: Inside were the oldest human remains yet found in Puerto Rico.

A new analysis of the bones — some dating back about 3,800 years — sheds light on the lives and rituals of Puerto Rico's early inhabitants. Although typically thought of as roaming, nomadic fishers, the study, published today in *PLOS ONE*, suggests these people buried multiple generations of their dead in a single place and ate a more varied diet than previously believed.

It's commendable[1] work, says Reniel Rodríguez Ramos, an archaeologist at the University of Puerto Rico at Utuado who was not involved with the study. The age of the remains, combined with the island's harsh climate, can make such analyses challenging. "With what they had, they definitely did wonders."

Puerto Rico's first inhabitants are believed to have come from South and Central America into the Antilles archipelago[2] around 2500 B.C.E. But very little is known about these earliest Caribbean settlers. The island's hot, humid conditions mean human and animal bones deteriorate relatively quickly. Only a handful of sites, and fewer than 20 human burials, have been found from this period. Based on the limited archaeological record, researchers generally thought these early settlers lived nomadic lives, constantly moving around the island without establishing complex social systems or building permanent settlements.

But the newly studied remains put those beliefs to the test. In 1993, an archaeological excavation[3] was carried out on behalf of a construction company in an area in southwestern Puerto Rico known today as Cabo Rojo. The dig yielded the

remains of five individuals, along with food remains and artifacts such as stone tools and pendants. When the construction company went out of business, however, the excavated remains stayed sealed up in boxes. At first, they were kept in Puerto Rico. Later, they were kept in Virginia by Daniel Koski-Karell, a private contractor who directed the excavation.

Three decades later, Koski-Karell teamed up with Pestle, whom he knew through a mutual friend. With support from the Puerto Rican government and the Institute of Puerto Rican Culture, the duo set out to see what could be learned from the remains.

Radiocarbon dating[4] revealed the five individuals lived between approximately 1900 B.C.E. and 800 B.C.E. The earliest remains represent the oldest human remains yet found in Puerto Rico. Pestle's group also studied the composition of carbon and nitrogen isotopes in the bones, which can provide clues to the diets of the individuals, such as whether they ate more seafood or terrestrial food, and what types of plants they consumed. They found the islanders regularly dined on both seafood and land-based animals; they also ate a lot of plants high in carbon-4 — such as maize — suggesting they may have been experimenting with plant domestication. Compared with people analyzed from other ancient Puerto Rican burial sites, the Cabo Rojo individuals appear to have enjoyed a particularly diverse diet.

"They weren't ordering from the same menu as everybody else all the time," Pestle says.

The five burials span a period between 500 and 1,000 years, suggesting some people may have settled permanently at the Cabo Rojo site, despite their nomadic reputation. "This place meant something to them," Pestle says. Perhaps by burying their ancestors here, he adds, they were making a sort of territorial claim. Similar burials stretching over decades and even centuries have been found in early sites in Cuba, which may force researchers to rethink whether early inhabitants across the Caribbean were nomadic.

Combined with previous studies suggesting these early Puerto Rican inhabitants may have domesticated plants and built ceramics, the findings begin to tell of a more

complex society than was previously thought. It "vindicates[5] the history of populations that did not have the chance of telling their own story," says Yadira Chinique de Armas, a bio-archaeologist at the University of Winnipeg. She hopes the next step will be finding and sequencing the remains' ancient DNA, which will illuminate their ancestral connections.

Under the terms[6] set by the Puerto Rican government, once researchers have finished analyzing the remains, they will be returned to the island — "where they shouldn't have left in the first place," Pestle says.

Rodríguez Ramos hopes the new results push researchers to continue to look for the remains of other early inhabitants in Puerto Rico. He is tantalized[7] by the possibility of discovering remains at even older sites, such as Puerto Ferro in Vieques, a small island that is part of Puerto Rico, which has been dated to about 1900 B.C.E. "They are our most ancient ancestors who lived here the longest time and, unfortunately, those of which we know the least."

(Adapted and modified from Claudia López Lloreda, "Oldest Human Remains from Puerto Rico Contradict Idea of Simple Island Nomads," *Science*, April 26, 2023)

commendable[1]: deserving praise, admirable
archipelago[2]: a group of islands
excavation[3]: the activity of digging in the ground to look for old objects that have been buried for a long time
radiocarbon dating[4]: a method for determining the age of an object containing organic material
vindicate[5]: to justify by providing evidence, to defend against opposition
terms[6]: conditions
tantalized[7]: attracted to something unlikely to happen

**Question 1:** For statements (A) to (E), circle T if the statement is true according to the content of the passage. Circle F if the statement is false according to the content of the passage.

(A) William Pestle was excavating in Puerto Rico in 2019.

(B) Pestle got a research collaborator immediately after finding the remains.

(C) It is likely that early Puerto Rican inhabitants made daily tools out of clay and/or rock.

(D) Pestle collected DNA samples at the Cabo Rojo site.

(E) Puerto Rico has other archaeological sites comparable in age to Cabo Rojo.

**Question 2:** Based on the passage, answer questions (F) to (I) in one English sentence or clause.

(F) Why is it so difficult to study human remains in Puerto Rico?

(G) Why were the excavated remains left untouched in boxes following their discovery?

(H) What did the Cabo Rojo individuals eat based on a recent scientific study?

(I) What may the burials at Cabo Rojo prove false about the inhabitants' lifestyle?

**Question 3:** Pestle believes that the remains should be returned to Puerto Rico "where they shouldn't have left in the first place." Do you agree with Pestle's stance or not? Write your stance and reason(s) in 20-30 words in English.

Ⅲ Read the following sentence and answer the question.

Characteristics of diversity include gender identity, sexual orientation, physical or mental disability/ability, race, ethnicity, nationality, social class, religion, age, language, and educational background.

**Question:** How important do you think it is to promote equality and recognition of diversity in our society? Write your answer in a paragraph of 80 or more words in English. Your response should address one of the specific characteristics above, an example of its current situation, and any possible changes you would like to see.

出典に関する補遺

令和 6 年度金沢大学一般選抜（前期日程）「英語」の入学試験問題で引用した文章の出典は，次のとおりです。

【大問. 1 （出典）】