

[ I ] 次の文章を読んで設問に答えなさい。[\*印のついた語句は注を参照しなさい。](69点)

Insects are a nutritious food source that can be produced more sustainably than conventional livestock. While eating insects is common in many world regions, in western cultures it is more likely met with disgust.

The consumption<sup>(a)</sup> of insects has slowly increased as the benefits become widely discussed. More than 2,000 edible species have been identified. But would incorporating insects into our diets really reduce the environmental footprint<sup>(ア)</sup> of food production, and can this be achieved? Insects are high in fat, protein and nutrients. This varies between species and lifecycle stage; however, the protein content of insects is frequently 40% to 60%. Insects also provide all of the essential amino acids\* required for human nutrition. Adult crickets are 65% protein by weight, which is higher than both beef (23%) and tofu (8%). Insects are also high in minerals such as copper, iron and magnesium. It is ( X ) of no surprise that insects are consumed by humans in many world regions today.

Insects are far more efficient at converting their feed into energy than conventional livestock. Adult crickets and mealworm larvae\* need 5-10 times less feed than cattle to produce the same weight gain. Insects are also cold-blooded, so do not use their metabolism\* to heat or cool themselves, further reducing energy and food use. A larger proportion of the animal can also be eaten compared with conventional livestock. Only 45% of the cattle and 55% of a chicken is consumed on average. For insects, the whole larva and 80% of an adult cricket can be eaten. Insects also reproduce<sup>(b)</sup> more rapidly than vertebrates\*, with many generations possible in a year. To provide the same nutritional value, insect cultivation therefore uses a fraction of the land<sup>(イ)</sup>, energy and water used for

conventional livestock farming. To produce a kilogram of protein, mealworm larvae emit 14kg of CO<sub>2</sub>eq\*, far less than the 500kg of CO<sub>2</sub>eq emitted on average in beef production. To produce the same amount of protein, mealworm larvae cultivation uses 70 times less agricultural land than beef. All food production has environmental costs. However, there is substantial variation within this. Beef, for example, produces 100 times more greenhouse gas emissions than pea production. Insect cultivation typically falls between these extremes. ( あ ) it can be ( い ) environmentally damaging than the production of ( う ), it has ( え ) ( お )( か ) than most plant-based foods. Per kilogram of protein, pea production emits only 4kg of CO<sub>2</sub>eq, while tofu requires roughly half the agricultural land needed for insect cultivation. ( Y ) insects are a climate-friendly (or -friendlier) food will depend on what the insect protein replaces. If insect-based foods are used to substitute conventional meat, <sup>(c)</sup> this could provide important gains. However, large gains could also be achieved if plant-based alternatives are adopted.

Dietary changes can radically alter the environmental footprint of consumers. The average diet in the US uses more than 10 times more land per person than the average Indian diet, primarily <sup>(d)</sup> due to the types of food consumed.

1.3 billion tons of food produced for human consumption is wasted each year. Another area in which insects could prove valuable is in the production of food or animal feed from food by-products or food waste. Black soldier flies\* reared on by-products such as almond hulls\* can be converted into feed for livestock or farmed seafood.

( Z ), feeding insects organic by-products requires careful management to avoid risks of chemical and microbial contamination\*. Several insect species are able to digest certain contaminants\*, but there is potential for harmful bioaccumulation. Manure\* and catering waste are <sup>(7)</sup>

therefore prohibited as a feed for farmed insects in Europe.

The market for edible insects in Europe and America is growing. Despite only 10.3% of Europeans stating they would be willing to replace meat with insects, the edible insect market is projected to reach US\$4.63 billion (£3.36 billion) by 2027. The acceptability of foods can change over time. Tomatoes were regarded as poisonous in Britain and dismissed for over 200 years. Lobsters, now an expensive delicacy, were formerly so abundant in the US that they were served to workers and prisoners and were commonly used as fertilizer and fish bait. Lobster only became fashionable to eat after the mid-18th century. Since then its popularity has surged, with the global lobster market expected to reach US\$11.1 billion (£9.7 billion) by 2027.

Insect consumption in Europe may also become normalized. Western consumers are showing an increasing willingness to consume processed insect-based foods. Incorporating insects into familiar food items such as flour represents one way of improving their acceptance. Edible insects are not the sole solution to achieve a more sustainable food system. However, they do provide a nutritious and more sustainable substitute to conventional meat. Their production, flexibility and diversity means they are likely to play an increasing part in a more circular food system.

(By Peter Alexander, writing for *The Conversation*, September 12, 2022)

- [注] amino acids アミノ酸  
mealworm larvae ミールワームの幼虫（食用昆虫の一つ）  
metabolism 新陳代謝  
vertebrates 脊椎動物  
CO<sub>2</sub>eq = CO<sub>2</sub>equivalent 温室効果ガスの排出量に地球温暖化係数を乗じて  
CO<sub>2</sub> 相当量に換算した値に付される単位  
Black soldier flies アメリカミズアブ（食用昆虫の一つ）  
almond hulls アーモンドの皮  
microbial contamination 微生物汚染  
contaminants 汚染物質  
Manure 肥料

I - A 空所(X)～(Z)に入るもっとも適切なものを次の1～4の中からそれぞれ一つ  
選び、その番号を解答欄に記入しなさい。

- |     |   |                |   |                 |
|-----|---|----------------|---|-----------------|
| (X) | 1 | coincidentally | 2 | nevertheless    |
|     | 3 | therefore      | 4 | unfortunately   |
| (Y) | 1 | Although       | 2 | Regretfully     |
|     | 3 | Typically      | 4 | Whether         |
| (Z) | 1 | At long last   | 2 | Fortunately     |
|     | 3 | However        | 4 | On the contrary |



I - C 波線部 (ア)~(エ) の意味・内容をもっとも的確に示すものを次の 1 ~ 4 の中からそれぞれ一つ選び、その番号を解答欄に記入しなさい。

(ア) the environmental footprint

- 1 the effect that a human activity has on the eco-system
- 2 the effect of a political decision that restricts freedom
- 3 the loss of energy due to human activity
- 4 the profit that economic activities bring about

(イ) a fraction of the land

- 1 a large part of the land
- 2 an underdeveloped part of the land
- 3 a tiny part of the land
- 4 an overdeveloped part of the land

(ウ) bioaccumulation

- 1 changes to the structure of a gene
- 2 collection of different types of animals or plants
- 3 energy produced by a biological process
- 4 gradual buildup of chemical substances in an organism

(エ) circular food system

- 1 a sustainable food system with less waste
- 2 a rotational system for food distribution
- 3 a system that recycles everything into consumer products
- 4 a system in which everyone acquires food equally

I - D 二重下線部の空所(あ)～(か)に次の1～7から選んだ語を入れて文を完成させたとき、(あ)と(う)と(お)に入る語の番号を解答欄に記入しなさい。同じ語を二度使ってはいけません。選択肢の中には使われないものが一つ含まれています。選択肢は文頭に入るものも含め、すべて小文字にしてあります。

( あ ) it can be ( い ) environmentally damaging than the production of ( う ), it has ( え )( お )( か ) than most plant-based foods.

- |         |             |          |        |
|---------|-------------|----------|--------|
| 1 less  | 2 footprint | 3 higher | 4 meat |
| 5 while | 6 ever      | 7 a      |        |

I - E 本文の意味・内容に合致するものを次の1～8の中から三つ選び、その番号を解答欄に記入しなさい。

- 1 Although it is possible for us to eat more than 2,000 species of insects, most of them are not economically beneficial.
- 2 Adult crickets have more protein and minerals than beef or tofu by weight, but their ability to convert their food into energy is very poor.
- 3 Typically, about half of the livestock's body mass can be eaten, but we can only consume a much smaller percentage of an insect's body.
- 4 In terms of limiting CO<sub>2</sub>eq emissions, insects are far more effective than livestock and a little more effective than peas.
- 5 If we take most of our protein from tofu, it is more eco-friendly than eating insects.
- 6 Some insects could be grown by using food by-products, in which case they could then be utilized as a nutrition source for producing seafood.
- 7 Nowadays more and more people in Europe are adjusting to the idea of eating insects, but the market is not growing for unknown reasons.
- 8 By integrating insects into various kinds of familiar food, it is expected that more people will come to accept eating them as a part of daily life.



〔Ⅱ〕 次の文章を読んで設問に答えなさい。[\*印のついた語句は注を参照しなさい。](81点)

### Get the Rest You Need

Sometimes, the pace of modern life barely gives you time to stop and rest. It can make getting a good night's sleep on a regular basis seem like a dream. But sleep is as important for good health as diet and exercise. Good sleep improves your brain performance, mood, and health. Not getting enough quality sleep regularly raises the risk of many diseases and disorders. These range from heart disease and stroke to obesity\* and dementia\*.

There's more to good sleep than just the hours spent in bed, says Dr. Marishka Brown, a sleep expert at NIH\*. "Healthy sleep encompasses <sup>(a)</sup> three major things," she explains. "One is how much sleep you get. Another is sleep quality — that you get uninterrupted and refreshing sleep. The last is a consistent sleep schedule." People who work the night shift or irregular schedules may find getting quality sleep extra challenging. And times of great stress — like the current pandemic — can disrupt our normal sleep routines. But there are many things you can do to improve your sleep.

〈 A 〉

Why do we need to sleep? People often think that sleep is just "down time," when a tired brain gets to rest, says Dr. Maiken Nedergaard, who studies sleep at the University of Rochester. "But that's wrong," she says. While you sleep, your brain is working. For example, sleep helps prepare your brain to learn, remember, and create. Nedergaard and her colleagues discovered that the brain has a drainage system that removes toxins\* during sleep. "When we sleep, the brain totally changes function,"

she explains. “It becomes almost like a kidney, removing waste from the system.”

Her team found in mice that the drainage system removes some of the proteins linked with Alzheimer’s disease\*. These toxins were removed twice as fast from the brain during sleep. Everything from blood vessels to the immune system <sup>(7)</sup> uses sleep as a time for repair, says Dr. Kenneth Wright, Jr., a sleep researcher at the University of Colorado. “There are certain repair processes that occur in the body mostly, or most effectively, <sup>(b)</sup> during sleep,” he explains. “If you don’t get enough sleep, those processes are going to be disturbed.”

< B >

How much sleep you need changes with age. Experts recommend school-age children get at least nine hours a night and teens get between eight and 10. Most adults need at ( あ )( い )( う ) or ( え ) ( お )( か ) each night. There are many misunderstandings about sleep. One is that adults need less sleep as they get older. This isn’t true. Older adults still need the same amount. But sleep quality can get worse as you age. Older adults are also more likely to take medications that <sup>(1)</sup>interfere ( W ) sleep.

Another sleep myth is that you can “catch up” on your days off. Researchers are finding that this largely isn’t the case. “If you have one bad night’s sleep and take a nap, or sleep longer the next night, that can benefit you,” says Wright. “But if you have a week’s worth <sup>(c)</sup> of getting too little sleep, the weekend isn’t sufficient for you to catch up. <sup>(7)</sup> That’s not a healthy behavior.”

In a recent study, Wright and his team looked at people with consistently deficient <sup>(d)</sup> sleep. They compared them to sleep-deprived people who got to sleep in on the weekend. Both groups of people gained weight

with lack of sleep. Their bodies' ability to control blood sugar levels also got worse. The weekend catch-up sleep didn't help. On the flip side, more sleep isn't always better, says Brown. For adults, <sup>(x)</sup> "if you're sleeping more than nine hours a night and you still don't feel refreshed, there may be some underlying medical issue," she explains.  
(e)

< C >

Some people have conditions that prevent them ( X ) getting enough quality sleep, no matter how hard they try. These problems are called sleep disorders. The most common sleep disorder is insomnia. "Insomnia is when you have repeated difficulty getting to sleep and/or staying asleep," says Brown. This happens despite ( Y ) the time to sleep and a proper sleep environment. It can make you feel tired or unrested during the day. Insomnia can be short-term, where people struggle to sleep for a few weeks or months. <sup>(x)</sup> "Quite a few more people have been experiencing this during the pandemic," Brown says. Long-term insomnia lasts for three months or longer.

Sleep apnea is another common sleep disorder. In sleep apnea, the upper airway\* becomes blocked during sleep. This reduces or stops airflow\*, which wakes people up during the night. The condition can be dangerous. If ( Z ), it may lead to other health problems. If you regularly have problems sleeping, talk with your health care provider. They may have you keep a sleep diary to track your sleep for several weeks. They can also run tests, including sleep studies. <sup>(f)</sup> These look for sleep disorders.

< D >

If you're having trouble sleeping, hearing how important it is may be frustrating. But simple things can improve your odds of a good night's sleep. (中略) Treatments are available for many common sleep disorders.

Cognitive behavioral therapy can help many people with insomnia get better sleep. Medications can also help some people. Many people with sleep apnea benefit from using a device called a CPAP machine. These machines keep the airway open so that you can breathe. Other treatments can include special mouthguards\* and lifestyle changes. For everyone, “as best you can, try to make sleep a priority,” Brown says. “Sleep is not a throwaway thing — it’s a biological necessity.”  
(g)

(From *NIH News in Health*, April, 2021)

[注] obesity 肥満

dementia 認知症

NIH (National Institutes of Health) アメリカ国立衛生研究所

toxins 毒素

Alzheimer’s disease アルツハイマー病

the upper airway 上気道

airflow 気流

mouthguards マウスピース

II – A 空所(W)～(Z)に入るもっとも適切なものを次の1～4の中からそれぞれ一つ選び、その番号を解答欄に記入しなさい。

(W) 1 by                      2 from                      3 to                      4 with

(X) 1 against                      2 for                      3 from                      4 to

(Y) 1 have                      2 having  
3 you have                      4 you to have

(Z) 1 having treated                      2 having untreated  
3 treated                      4 untreated

II - B 下線部 (a)~(g) の意味・内容にもっとも近いものを次の 1 ~ 4 の中からそれぞれ一つ選び、その番号を解答欄に記入しなさい。

(a) encompasses

1 circulates      2 comprises      3 disregards      4 emphasizes

(b) effectively

1 excessively      2 naturally      3 sequentially      4 successfully

(c) worth

1 amount      2 purpose      3 quality      4 situation

(d) deficient

1 inadequate      2 pleasant      3 punctual      4 unplanned

(e) underlying

1 dominant      2 fundamental      3 incurable      4 obvious

(f) track

1 improve      2 justify      3 practice      4 record

(g) throwaway

1 disposable      2 fashionable      3 negotiable      4 renewable

II - C 波線部 (ア)~(オ) の意味・内容をもっとも的確に示すものを次の 1 ~ 4 の中からそれぞれ一つ選び、その番号を解答欄に記入しなさい。

(ア) Everything from blood vessels to the immune system

- 1 Everything from the heart to the network of organs that promote recovery for the body
- 2 Everything from veins to the network of organs that defends the body against infections
- 3 Everything from the heart to the network of organs that receives oxygen through blood
- 4 Everything from veins to the network of organs that provides nutrition to the body

(イ) Older adults are also more likely to take medications

- 1 Older adults are also more suitable for taking medications
- 2 Older adults are also more encouraged to take medications
- 3 Older adults also tend to be fond of taking medications
- 4 Older adults also have a greater chance of taking medications

(ウ) the weekend isn't sufficient for you to catch up

- 1 the weekend is not enough to make up for a lack of sleep
- 2 the weekend is not appropriate to get your work done
- 3 you need to avoid taking a nap during the day on weekends
- 4 you need to avoid going to bed earlier during the weekend

(エ) On the flip side

- 1 Given the unique characteristics
- 2 Given the positive characteristics
- 3 Contrary to medical results
- 4 Contrary to popular thinking

(オ) Quite a few more people

- |                        |                         |
|------------------------|-------------------------|
| 1 Somewhat more people | 2 A lot fewer people    |
| 3 Many more people     | 4 Slightly fewer people |

II - D 二重下線部の空所(あ)～(か)に次の1～8から語を入れて文を完成させたとき、(あ)と(え)と(か)に入る語の番号を解答欄に記入しなさい。同じ語を二度使ってはいけません。選択肢の中には使われないものが二つ含まれています。

Most adults need at ( あ )( い )( う ) or ( え )( お )  
( か ) each night.

- |         |         |        |         |
|---------|---------|--------|---------|
| 1 of    | 2 hours | 3 most | 4 more  |
| 5 seven | 6 sleep | 7 to   | 8 least |

II - E 空所〈A〉～〈D〉に入るもっとも適切な小見出しを次の1～5の中からそれぞれ選び、その番号を解答欄に記入しなさい。同じ選択肢を二度使ってはいけません。選択肢の中には使われないものが一つ含まれています。

- 1 **Sleep Myths and Truths**
- 2 **Sleep Disorders**
- 3 **Sleep Environment**
- 4 **Getting Better Sleep**
- 5 **Sleep for Repair**

II - F 本文の意味・内容に合致するものを次の1～6の中から二つ選び、その番号を解答欄に記入しなさい。

- 1 The important factors for people to have healthy sleep are appropriate quantity, quality and regularity.
- 2 Even while we are sleeping, our brain is working hard which results in the accumulation of toxic materials.
- 3 The self-healing functions with which our body is equipped are at work solely when we are awake and sleep helps the processes to work properly.
- 4 People's belief that older adults sleep more than young people does not reflect the reality.
- 5 Wright and his team tested whether catching up on sleep during the weekends is an effective method for overcoming sleep deprivation.
- 6 Insomnia is one of the most common sleep disorders that is usually the cause of sleep apnea.

II - G 本文中の太い下線部を日本語に訳しなさい。

People who work the night shift or irregular schedules may find getting quality sleep extra challenging.



〔Ⅲ〕 次の会話を読んで設問に答えなさい。(50点)

*(Riley is talking with a friend, Taylor.)*

*Riley:* Hey, Taylor. What time is it?

*Taylor:* Let me check .... It's about 8:40.

*Riley:* Oh, it's time to get ready for my Zoom meeting at 9:00. The others get angry if I'm late.

*Taylor:* I'm sure you won't be. What kind of meeting is it, by the way? Is it for work?

*Riley:* Oh no, this is with my family. We all live in different parts of the US, so this is the best way to get together.

*Taylor:* Oh, how nice! How often do you meet up?

*Riley:* That depends. It's difficult to get everyone together, even when it's online! \_\_\_\_\_ (a) \_\_\_\_\_ We don't always stick to that though.

*Taylor:* I'm sure. Especially if they're in different time zones.

*Riley:* That's very true. I'm the only one who lives on the East Coast while everyone else lives in either California or the Central US. That's why we always start so late. For the others, it's actually closer to dinner time.

*Taylor:* \_\_\_\_\_ (b) \_\_\_\_\_ As you know, I'm more of a night person.

*Riley:* It's not too bad, but sometimes I wish they could make it a little earlier for my sake. \_\_\_\_\_ (c) \_\_\_\_\_

*Taylor:* So what kinds of things do you talk about? And who joins the call?

*Riley:* \_\_\_\_\_ (d) \_\_\_\_\_ My brother loves to talk about politics, as do I. But my mother doesn't, and my sister is indifferent, so we don't spend too much time on that. We also talk a lot about

movies, as well as what's going on in our lives. As for who joins, besides those I mentioned, two of my cousins participate sometimes. They're very funny.

*Taylor:* So your whole family likes movies, not only you?

*Riley:* Absolutely. In fact, we kind of give ourselves "homework." At the end of each meeting, we decide on what to watch before the next meeting. \_\_\_\_\_ (e) \_\_\_\_\_ It's similar to how some people have a book club. But we have a film club.

*Taylor:* That sounds fun. Except that I don't really watch movies these days so I would have nothing to say! But I like the idea.

*Riley:* Yeah, that was one motivation for us to start meeting during the peak of COVID-19. \_\_\_\_\_ (f) \_\_\_\_\_ I wasn't sure if it would work at first. Especially considering my mother is almost 80 years old and not very good with computers. But we all helped her to get set up and now she loves it. We all do. It's really brought us closer together.

*Taylor:* I can imagine. Maybe I should start doing that with my relatives. \_\_\_\_\_ (g) \_\_\_\_\_

*Riley:* Okay, but what about your immediate family? Do you talk to them much?

*Taylor:* I chat with my younger sister nearly every day, although we don't actually talk on the telephone that much. And I might call my parents about once every month or two, but that's about it.

*Riley:* Before we started these Zoom meetings, I hardly ever talked to my siblings. I was starting to feel more distance, psychologically as well as geographically. Now those days are over.

*Taylor:* I'm so happy to hear that. My family talked at one time about doing something similar, but we never followed through. \_\_\_\_\_ (h) \_\_\_\_\_

*Riley:* Great! All I can say is that it's really brought my family closer together.

*Taylor:* That's really important. Especially these days when it feels like we're losing closeness to people.

*Riley:* [もちろん、みんなに直接会えるほうがいいですけど、私の場合それは現実的ではないのです。] So even though technology sometimes drives us apart, at other times it can actually bring us together.

*Taylor:* Yeah, I can see that.

*Riley:* Now, if you'll excuse me, I really do have to log on to this meeting. I love my family, but they can be very impatient!

*Taylor:* No problem. Have a good talk!

Ⅲ - A 空所 (a)~(h) に入るもっとも適切なものを次の 1~10 の中からそれぞれ一つ選び、その番号を解答欄に記入しなさい。同じ選択肢を二度使ってはいけません。選択肢の中には使われないものが二つ含まれています。

- 1 Well, that wouldn't bother me.
- 2 Just three of us.
- 3 Then we discuss it in two weeks.
- 4 Nobody was going out, so we just decided to try meeting up online.
- 5 Lots of stuff.
- 6 I think you've inspired me to take the initiative.
- 7 But we try to do it once every couple of weeks.
- 8 Morning is the best time for us.
- 9 I haven't talked to some of my cousins in years.
- 10 It's difficult for me to start chatting so late in the day.

Ⅲ - B 本文中の [            ] 内の日本語を英語で表現しなさい。

もちろん、みんなに直接会えるほうがいいですけど、私の場合それは現実的ではないのです。