

# Science Quest

未来科学への誘い

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**S SEIBIDO**

## はしがき

私たちが生活している地球は様々な課題をかかえています。人間の英知を集めれば決して解決できないものはないと考えられます。人為的な行為による大気中の二酸化炭素などの温室効果ガスによって気温が上昇傾向にあり、二酸化炭素の排出を抑えるために具体的な対策が国連を中心とした国際会議で各国政府に求められています。また、情報通信技術の発展によって私たちの生活は劇的に便利になろうとしています。さらに、地球外に目を向けると、宇宙開発にも新たな様々なプロジェクトが計画されています。

本書Science Quest（『未来科学への誘い』）の英文は、私たちを取り巻く現代的で近未来の科学分野に焦点をあてて、大学生向けに中級総合英語教材として書き下ろされたものです。各ユニットの英文の語数は450語程度、辞書に頼ることなく読み、内容を理解できるようにしています。ユニット内の指示文は英語で書いていますが、Pre-reading、While-reading、Post-readingの各段階で、英単語と定義文による語彙確認、リーディング、英語の質問に対して英文で答える内容把握、英語による大意把握、TOEIC®試験形式による英語表現の確認、英語表現、トピックと関連した会話の部分聞き取り、さらに、グラフや表を用いた英語によるディスカッションタスクを課しています。つまり、英語の「読み」「書き」「聞き」「話す」という4技能が総合的に学習できます。

本書のトピックは、ニュースやTV番組でしばしば取り上げられるものですが、理系の学生だけでなく文系の学生にも興味を持って接することができます。次の4つの観点からWORLDを見つめています。THE LIVING WORLDでは、動物や生態系などの知られざる営みに触れることができます。THE NATURAL WORLDでは、エネルギーや環境と人間の関わりに関する問題に迫ることができます。THE TECHNOLOGICAL WORLDでは、情報技術の発展と人間の生活の変化への対応が述べられています。THE WORLD BEYONDでは、遙かかなたの宇宙開発などに視野を向けさせてくれます。

本書を通して、我々人類が直面している問題を再確認して理解を深めることは、学生の皆さんの将来にとって有意義であると確信しています。また、取り上げられたトピックや関連事項について、ネットなどで調べられることもお勧めします。情報を発信するにはしっかりと知識と問題意識を持って英語に接するようにしてください。

最後になりますが、本書の出版をお勧め頂いた成美堂社長佐野英一郎氏、編集部の佐野泰孝氏、小亀正人氏には大変お世話になりました。心からの感謝を申し上げます。

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# 本書の使い方

## Vocabulary Preview

本文に使用される重要な語句に焦点をあて抽出した10語を取り上げています。英語による定義の中から選択して、語彙を確認してください。できるだけ辞書に頼らずに解答しますが、最後には必ず辞書で確認してください。

## Reading

本文は科学分野のトピックですが、必ずしも専門分野の知識を必要としません。できるだけ平易で分かり易い英語で書かれています。黙読、音読、音声聞く、音声を聞きながら音読などの活動をお勧めします。

## Notes

難しい語句や固有名詞などの意味を説明しています。必要に応じて参考にしてください。

## Comprehension Check

本文の内容を正確に理解したかどうかを確認するための質問です。質問に対する答えとして最も適当なものを(a)～(c)から選んでください。

## Best Summary

本文の内容を要約した英文として最も適当なものを4つの選択肢から選んでください。

## Word Choice

TOEIC®試験形式の問題で、英文の空所に最も適当な語句を4つの選択肢から選んでください。語句は本文に出てきたものです。

## Composition

日本語の意味を表すように( )の語句を適当に並べ替えてください。文頭に来る語は大文字にしてください。表現は本文に出てきたものです。

## Partial Dictation and Conversation

本文と関連したトピックのダイアログになっています。空欄に聞き取った英語を入れて、ペアになってダイアログの練習を行ってください。

## Active Learning

グラフや表を見て、3つの質問に対するディスカッションを自由に行います。その際に、WORDS & PHRASESを参考にしてください。

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# UNIT 1

# Fast Asleep?

## 動物たちの眠り



人間と同様にすべての動物に眠りが必要である。群れで暮らす動物、大型の動物、空中を飛び続ける鳥類、半脳が眠る動物などは、生息環境や身体的脅威の有無など自然界の条件によって、どのように睡眠を取っているのだろうか。

### Vocabulary Preview

Match each word with a definition by drawing a line between them.

- |                 |   |   |
|-----------------|---|---|
| 1. eliminate    | • | • (a) to move without making any special effort           |
| 2. species      | • | • (b) a kind of animal or plant                           |
| 3. predator     | • | • (c) to put something inside something else              |
| 4. herd         | • | • (d) to determine, or to find out that something is true |
| 5. drift        | • | • (e) to change in response to the environment            |
| 6. surface      | • | • (f) very surprising                                     |
| 7. implant      | • | • (g) the top layer of something                          |
| 8. ascertain    | • | • (h) a group of animals such as cows                     |
| 9. evolve       | • | • (i) an animal that attacks or is a threat to another    |
| 10. astonishing | • | • (j) to get rid of; to dispose of                        |

The available evidence suggests that all animals need sleep. In modern civilizations, humans have eliminated most **imminent** physical threats, so we are able to sleep deeply for several hours continuously. Most animals, in contrast, need to balance the need for rest with the need to protect themselves from danger.

5 Different species balance those two needs in interesting ways.

Some animals spend very little time at all asleep. Giraffes in the wild have been calculated to spend roughly eight percent of their day asleep. They sometimes lie down, resting their head on their **rump**. To avoid being caught by predators, they do this for only a few minutes at a time. Often, though, they nap while standing up,  
10 which allows them to get moving more quickly at any sign of danger. Horses also exhibit the same behavior. One advantage of living in a herd, as horses and giraffes do, is that some animals can sleep while others stay awake to watch out for danger.

Another animal that sleeps for only a very small portion of the day is the **sperm whale**. Before sleeping, sperm whales dive down **headfirst** a short distance, then  
15 passively drift head up to the surface. Researchers say that they do not move or even breathe while sleeping, but that they wake up after 10 to 15 minutes. Sperm whales sleep even less than giraffes, about seven percent of each day. Researchers discovered this behavior only in 2008, and it was caught on camera in 2017.

Researchers know very little about the sleeping habits of birds, but in 2016, by  
20 implanting sensors in **frigatebirds'** skulls, they were able to ascertain that the birds are able to take naps of only about 10 seconds while flying. This enables them to get enough rest to remain **airborne** for long stretches of time, up to two months. Since frigatebirds are unable to swim, or even float in water, this ability is essential when they are crossing the sea.

25 Some animals, such as **bottlenose dolphins**, use **unihemispheric** sleep, where only half of the brain is asleep at any one time. This allows the dolphins to control their breathing so that they breathe in the air that they need when they come to the surface while still getting rest. After a certain amount of time, the hemisphere that was asleep wakes up and the other hemisphere has a period of sleep.

30 Some of what scientists know about sleep has been discovered only in the last decade, suggesting that there are sleep behaviors that are as yet unknown. What we

do know indicates that animals have evolved an astonishing array of mechanisms to ensure that they can get the rest they need while protecting themselves from danger.

#### NOTES

**imminent** 差し迫った **rump** 臀部 **sperm whale** マッコウクジラ **headfirst** 頭から先に  
**frigatebird** ガンカンドリ **airborne** 飛行して **bottlenose dolphin** バンドウイルカ  
**unihemispheric** 半脳の

### Comprehension Check

Choose the most suitable answer for each question.

1. Why are humans able to sleep deeply and continuously?
  - (a) We are able to balance threats against each other.
  - (b) Our large brains need more rest.
  - (c) We usually don't need to worry about physical threats.
2. Why do horses often nap while standing up?
  - (a) They can respond more quickly to danger.
  - (b) Lying down is uncomfortable.
  - (c) Their herd pressures them to stand up.
3. How did researchers find out that some birds nap while flying?
  - (a) They watched the birds closely when they were flying low.
  - (b) They attached instruments to their wings.
  - (c) They put sensors in their skulls.
4. What is unihemispheric sleep?
  - (a) It is a pattern of sleep whereby animals such as dolphins in the southern hemisphere sleep one night and dolphins in the northern hemisphere sleep the next night.
  - (b) It is a pattern of sleep in animals such as dolphins whereby only one half of the brain is asleep for a time, and then the other half.
  - (c) It is a pattern of sleep in animals such as dolphins whereby only one half of the brain needs sleep and the other is always awake.



### Best Summary

From these four sentences, choose the one that summarizes the passage best.

1. Unlike humans, most animals face environmental threats, so they use a variety of ways to get rest while avoiding being left unprotected for a long time.
2. Most animals avoid lying down to sleep, because it would take too long to stand up and run away from danger.
3. It has proved difficult for scientists to study the large variety of animals on the planet; accordingly, little is known about the sleep habits of most of them.
4. To avoid being attacked, most animals probably do not sleep at all.

### Word Choice

Choose a suitable expression to fill each blank.

1. Sperm whales sleep for \_\_\_\_\_ seven percent of each day.  
(a) roughly            (b) approximate    (c) exactly            (d) in the range
2. Giraffes tend to run at the first \_\_\_\_\_ of danger.  
(a) signal            (b) indicate            (c) sign            (d) cue
3. For optimal efficiency, humans need to \_\_\_\_\_ that they get sufficient sleep.  
(a) assure            (b) ensure            (c) ascertain            (d) claim
4. Some birds can swim well, but others are \_\_\_\_\_ do so.  
(a) disable of            (b) incapable to            (c) unable to            (d) disabled to
5. Outside of our comfortable, advanced societies, humans often \_\_\_\_\_ the same instincts as animals.  
(a) disturb            (b) exhibit            (c) allow            (d) prevail

### Composition

Rearrange the words within the parentheses to make sentences.

1. 平均的な成人の理想的な睡眠時間は7、8時間と計算されている。  
The ideal sleeping time for the average adult human ( be / been / calculated / eight / has / seven / to / to ) hours.

2. ゲンカンドリは海に落ちるのを避けるために極めて短時間の仮眠を取る。  
Frigatebirds ( avoid / extremely / falling / naps / short / take / to ) into the sea.
- 

3. 立ったまま眠る主な利点は捕食動物が近付いたら動物たちが逃げられることである。  
The ( advantage / main / of / sleeping / standing / while ) is that it allows animals to run away if a predator approaches.
- 

4. 眠るために横になることの問題点は、動物たちが、捕食動物から逃れるために、逃げ出したり立ち上がることさえできないかもしれないことである。  
The problem with lying down to sleep is that animals may not be able to ( away / even / in / or / run / stand / time / up ) to escape a predator.
- 

### *Partial Dictation and Conversation* ➤

 1-08

.....  
Listen to the dialogue, and fill in the missing words. Then, speak the dialogue with a partner. After speaking once or twice, switch roles.

**A:** Your dog looks so cute asleep. Oh, sorry, it looks like I

① \_\_\_\_\_.

**B:** Like most animals, he sleeps very lightly. If he hears another dog, or a cat,

② \_\_\_\_\_, he tends to wake up right away.

**A:** I wonder why that is.

**B:** Well, you have to remember that, in the wild, those sounds

③ \_\_\_\_\_ represent danger. After all, on an evolutionary scale, it isn't so long ago that all dogs were wild.

**A:** I guess you ④ \_\_\_\_\_ there. By the way, have you seen a horse lie down to sleep?

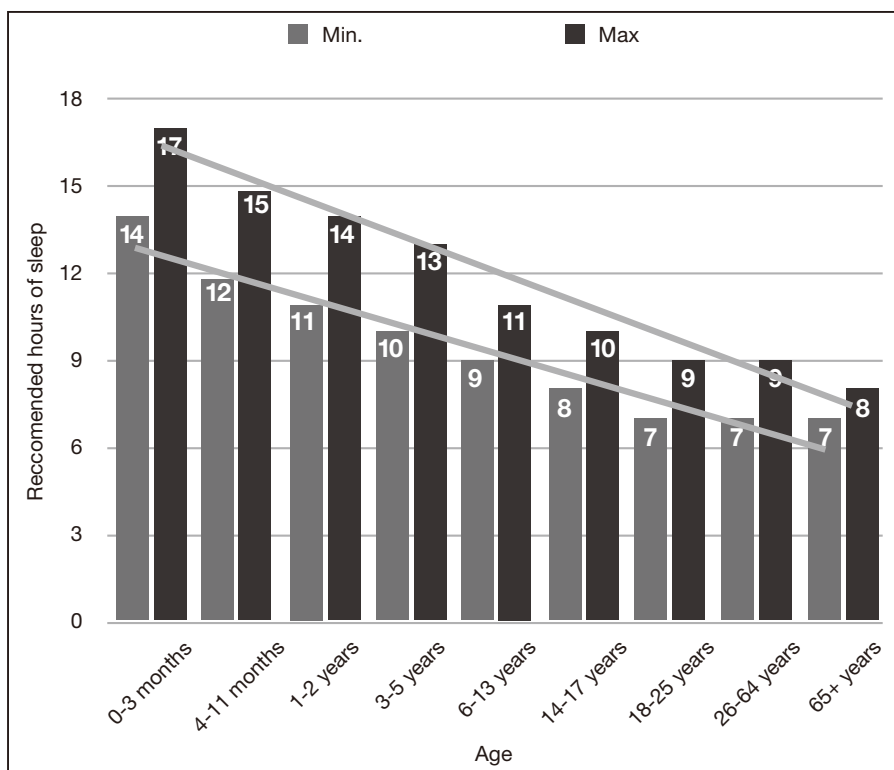
**B:** Yes. A horse sometimes lies down to sleep. Other times, it will sleep

⑤ \_\_\_\_\_.

## Active Learning

Look at the graph below, which shows the sleep time ranges according to age recommended by the U.S.'s *National Sleep Foundation*. With a partner, talk about these recommendations and your sleep habits, including the following questions.

1. How do people's sleep requirements change with age?
2. How do these times compare to the amount of sleep you usually get now?
3. Do you think the recommendations are reasonable?



[Data source: <https://www.sleepfoundation.org/articles/how-much-sleep-do-we-really-need>]



### WORDS & PHRASES

According to the *National Sleep Foundation*, \_\_\_\_\_.

As you might expect, babies need the most sleep.

There's a steady decline with age in the amount of sleep required.

These days, I usually sleep (for) about \_\_\_\_\_ a night.