

Science Spark

Dave Rear

S SEIBIDO

photographs by
iStockphoto
Shutterstock

音声ファイルのダウンロード/ストリーミング

CD マーク表示がある箇所は、音声を弊社 HP より無料でダウンロード/ストリーミングすることができます。下記 URL の書籍詳細ページに音声ダウンロードアイコンがございますのでそこから自習用音声としてご活用ください。

<http://seibido.co.jp/ad738>



Science Spark

Copyright ©2026 by Dave Rear

*All rights reserved for Japan.
No part of this book may be reproduced in any form
without permission from Seibido Co., Ltd.*

To Teachers and Students

Science and technology are always moving forward. From computers and robots to travel, space, sports, health, and the environment, people are constantly exploring new ideas and finding better ways to live and learn. This book explores some of the most fascinating and cutting-edge discoveries happening in science right now.

This book is divided into five themed sections, each featuring three units that explore unusual questions and fascinating possibilities in science. The first section focuses on animals, uncovering surprising facts about how creatures sleep, why fish swim together, and even investigating real-life cases that might remind you of zombies. In the second section, we turn our attention to the environment. Can farming be more climate-friendly? What happens to old smartphones? Is it possible to heat a home using waste? These chapters explore clever ideas for solving big problems. The third section takes us into outer space. You'll learn about the science behind human hibernation, the future of life beyond the International Space Station, and what it's like to prepare for living on Mars. Next, we dive into the world of humans. How does science explain the best ways to study? Could someone actually have hair like Rapunzel? And why do we itch? This section looks at everyday mysteries from a scientific angle. Finally, the fifth section steps into the realm of science fiction. It asks bold questions about futuristic inventions—like machines that create food, brain implants, and space elevators—and whether they could one day become real.

To guide students through the topics, each unit contains activities that accompany the passages. As well as questions to test reading comprehension, there are exercises to extend knowledge of vocabulary and grammatical structures and a listening passage that gives students practice in understanding talks and conversations. The unit ends with discussion questions that encourage students to think beyond the topic. Thank you for taking an interest in this book. I hope you enjoy using it!

Dave Rear

Table of Contents

Section I: Animals

UNIT 1	Power Nap: What animal takes the shortest sleeps? パワースナップ：睡眠が最も短い動物 7
UNIT 2	Energy Equation: Why do fish swim in groups? エネルギーの方程式：魚が群れで泳ぐ理由 13
UNIT 3	Walking Dead: Are zombies real? ウォーキング・デッド：ゾンビの存在の真相 19

Section II: Environment

UNIT 4	Methane Problem: Can we reduce the impact of dairy farming? メタン問題：酪農の影響を軽減する方法 25
UNIT 5	Phone Waste: Can we build a repairable smartphone? スマホの廃棄物：修理可能なスマートフォン 31
UNIT 6	Body Heat: How can you heat a home with sewage? 体熱：下水を使って家を暖める方法 37



Section III: Space

UNIT 7

Suspended Animation: Can humans hibernate for space travel?

老化防止：宇宙飛行のための人工冬眠..... 43

UNIT 8

End of an Era: What will replace the International Space Station?

時代の終わり：国際宇宙ステーションに代わるもの..... 49

UNIT 9

Space Living: What is the Mars simulation test?

宇宙生活：火星シミュレーションテスト..... 55

Section IV: Humans

UNIT 10

Test Tips: What does science tell us about studying?

勉強のコツ：科学が教える勉強法..... 61

UNIT 11

Let Down Your Hair: Is Rapunzel's fairy tale possible?

ラプンツェルの秘密：ラプンツェルが奇想天外ではない理由..... 67

UNIT 12

Impossible to Bear: Why do we itch?

耐えられない問題：痒みの原因..... 73

Section V: Science Fiction

UNIT 13

Miracle Microwave: Can we make a food replicator?

奇跡の電子レンジ：食べ物を自己複製する可能性..... 79

UNIT 14

Brain Chip: Will humans have microchips in their heads?

脳チップ：人間にマイクロチップが埋め込まれる日..... 85

UNIT 15

Stairway to Heaven: Can we build a space elevator?

天国への階段：エレベーターで宇宙へ行く未来..... 91





Power Nap

What animal takes the shortest sleeps?

Everybody enjoys the feeling of taking a lazy, afternoon nap. But there's an animal on Earth which takes sleeping to a whole different level. Meet the chinstrap penguin – the world champion of the power nap! Why did it evolve such an unusual pattern of sleep?

Target Vocabulary

Match the English word with the meaning below.

- | | | | |
|--------------------|-------|--------------------|-------|
| 1. colleague (n.) | _____ | 5. evolve (vb.) | _____ |
| 2. habitat (n.) | _____ | 6. hemisphere (n.) | _____ |
| 3. expedition (n.) | _____ | 7. predator (n.) | _____ |
| 4. monitor (vb.) | _____ | 8. strategy (n.) | _____ |

- | | | | |
|------------------------|-------------------|------------------|-------------------|
| a. journey, adventure | b. observe, watch | c. half, section | d. develop, grow |
| e. natural environment | f. hunter | g. coworker | h. plan, approach |



1-03

Taking a 15-minute nap at your desk after lunch probably won't impress your colleagues with your work ethic, but actually many experts recommend so-called "power napping" as an effective way to stay focused at the office. Outside the workplace, however, there's an animal that takes the power nap far beyond these boring human levels. That animal is the chinstrap penguin.



1-04

Won Young Lee, a scientist at the Korea Polar Research Institute, studies how an animal's habitat influences its behavior. During an expedition to Antarctica's King George Island, he noticed something unusual about the sleep patterns of the chinstrap penguins as they cared for their young. They appeared to sleep for very short periods of time. To learn more, he and his team mounted sleep-trackers on the backs of several birds and surgically attached them to their brains. The tracker allowed the researchers to monitor the penguins' brain activity, while other sensors on the device recorded their location and movements.



1-05

What they found was that the penguins took incredibly short naps: more than 600 "microsleeps" per hour for an average of only four seconds. Lee believes this sleeping pattern evolved as a way for the penguins to keep their babies safe in the dangerous environment in which they grow up. In penguin colonies, sea birds are always looking for unguarded eggs and chicks. "Penguin parents should be vigilant all the time during breeding to keep their offspring safe," Lee says. The colonies are also very noisy, which likely makes it difficult to enjoy a long and peaceful rest. While you might think this fractured sleep pattern would leave the penguins too tired to do anything, in fact the 10,000 naps they take each day provide over 11 hours of sleep. That's much more than any office worker gets!



1-06

The "super power naps" of the chinstrap penguins appear to be unique in the natural world. But they're not the only animals that have evolved unusual sleep patterns.

Dolphins have the ability to shut off only one hemisphere of their brain at a time, often keeping one eye open while the opposite hemisphere is taking a rest. Sleeping like this allows the dolphin to maintain necessary bodily functions, such as breathing and swimming, and to remain vigilant for predators. They share this ability with other creatures including migratory birds, which have to fly for long periods without stopping to rest.



1-07

Another strategy animals have evolved is to survive with little or even no sleep in the important first months after giving birth in order to protect their young. Killer whales can stay awake for an entire month, and large land animals like elephants and giraffes sleep for only two hours a day, often while standing up.



1-08

Next time you're feeling sleepy in class, why not try the chinstrap penguin method of napping? Your teacher probably won't even notice you closed your eyes.

Notes

chinstrap penguin ヒゲペンギン **surgically** 外科的に
unguarded 無防備な **be vigilant** 警戒する **breeding** 繁殖
offspring 子供 **fractured** 断続的な **bodily functions** 身体機能
migratory bird 渡り鳥 **killer whale** シャチ

True / False

Mark the following sentences as TRUE (T) or FALSE (F).

- () Power napping is considered to be an unhealthy habit.
- () Chinstrap penguins go to sleep more than 600 times each hour.
- () The penguins take these very short naps during breeding season.
- () Dolphins sleep with both their eyes open so they can spot predators.
- () Some large land animals sleep standing up.

Understanding Details

Answer the following questions in English.

1. Why did chinstrap penguins evolve their pattern of sleeping, according to scientists?

.....
.....

2. In total, how many hours do chinstrap penguins sleep a day?

.....
.....

3. How do killer whales help to keep their young safe during the first month after birth?

.....
.....

Using Target Vocabulary

Choose the correct word for each sentence. Three of the words are not used.

1. The great white shark is a highly skillful ().
2. Animals must adapt to the () in which they live.
3. We plan to () the animal's behavior using this new camera.
4. Since we are traveling to the southern (), the season will be different.
5. I'll discuss the project with my () before making a decision.

colleague

habitat

expedition

monitor

evolve

hemisphere

predator

strategy

Summary and Grammar



1-09

Choose the correct answer for each gap.

Power napping at the office 1_____ by experts to maintain concentration, but chinstrap penguins take this to another level. Won Young Lee from the Korea Polar Research Institute discovered that these penguins engage in “microsleeps” to protect their young in dangerous environments. On Antarctica’s King George Island, Lee’s team 2_____ penguins taking over 600 naps per hour, each lasting about four seconds. This amounts to over 11 hours of sleep daily, crucial for remaining vigilant against predators and enduring the noisy colony. Other animals also have unique sleep patterns. Dolphins, for example, rest one brain hemisphere at a time. Additionally, killer whales, elephants, and giraffes 3_____ with minimal sleep after giving birth. Copying the penguins’ napping method could be a smart way to rest in class without 4_____.

- | | | | |
|----------------------|--------------------|--------------------|----------------|
| 1. (a) recommend | (b) is recommended | (c) be recommended | (d) recommends |
| 2. (a) was observed | (b) is observed | (c) observes | (d) observed |
| 3. (a) functions | (b) are functioned | (c) functioning | (d) function |
| 4. (a) being noticed | (b) noticed | (c) be noticed | (d) noticing |

Listening



1-10

Listen to the following short talk about the importance of sleep. Mark the sentences as TRUE (T) or FALSE (F).

- () Japanese people get the least amount of sleep in the world.
- () Doctors recommend people get eight to nine hours of sleep a night.
- () 100,000 car crashes in the US each year are caused by tiredness.
- () Depression is one of the long-term effects of a lack of sleep.
- () Teenagers require the same amount of sleep as adults.

Discussion

Think about the following questions and discuss your answers with your classmates.

1. Do you get enough sleep? Why / why not?

.....

.....

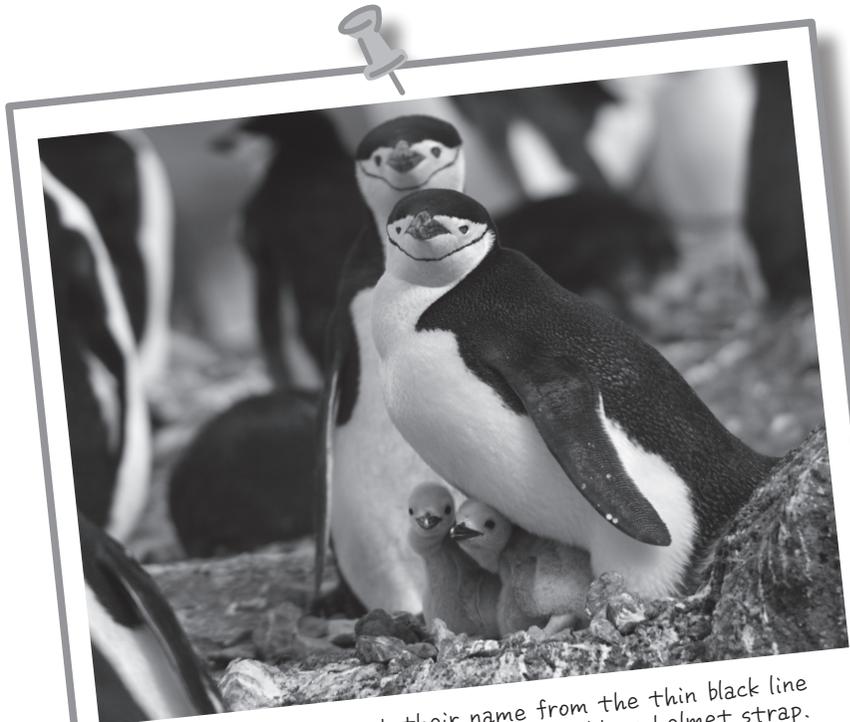
.....

2. Do you think schools or universities should start classes later so that students can get more sleep?

.....

.....

.....



Chinstrap penguins got their name from the thin black line that runs under their chin, which looks like a helmet strap. This unique marking makes it seem as if they're wearing a tiny black helmet. It's one of the easiest ways to tell them apart from other penguins.